

HALLESCHES JAHRBUCH FÜR GEOWISSENSCHAFTEN

BEIHEFT 41

Hematit:

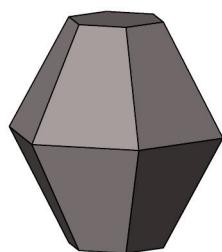


Romboeder
Baspinakoid

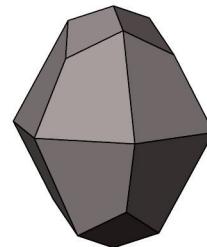
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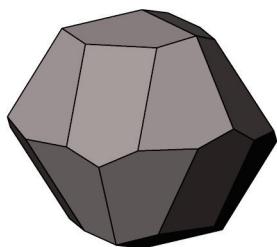
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Dipyramid
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Romboeder
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Romboeder

HERBERT PÖLLMANN & ALEXANDRA SÖDERBERG

**SYMMETRIE UND DIE 32 PUNKTGRUPPEN IN DEUTSCHER UND
SCHWEDISCHER SPRACHE**

SYMMETRI OCH 32 PUNKTGRUPPERNA PÅ TYSKA OCH SVENSKA



HALLE (SAALE) 2018

HALLESCHES JAHRBUCH FÜR GEOWISSENSCHAFTEN

Herausgeber

**Institut für Geowissenschaften und Geographie
der Martin - Luther Universität Halle-Wittenberg**

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Vorwort

Im vorliegenden zusammenfassenden Buch wird versucht, die Grundlagen der Kristallographie und insbesondere der Symmetrielehre in deutscher und englischer Sprache darzustellen. Die Zusammenfassung der Symmetrielehre basierend auf den 32 Punktgruppen wird erweitert durch Anwendungsbeispiele der makroskopischen Form von wichtigen Mineralen sowie Hinweisen zu den Raumgruppen.

Die Zusammenarbeit zwischen deutschen und brasilianischen Wissenschaftlern über lange Jahre basiert hierbei nicht nur auf der Kooperation in wissenschaftlichen Projekten sondern wurde darüber hinaus auch durch einen regen Wissenschaftler- und Studentenaustausch weiter intensiviert. Die Unterstützung des Deutschen Akademischen Austauschdienstes (DAAD) auf deutscher Seite, bzw. Capes/Cnpq auf brasilianischer Seite soll an dieser Stelle besonders hervorgehoben werden.

Die Idee, Sprachbarrieren durch gemeinsame Grundlagenpublikationen abzubauen, ergab sich aus den Schwierigkeiten von Austauschstudenten, Vorlesungen und Übungen in einer fremden Sprache und zudem einer fremden Fachsprache zu verstehen. Oft werden fehlende Kenntnisse der deutschen oder portugiesischen Sprache dann über Englisch ausgeglichen.

Das Buch ist vor allem dahingehend ausgerichtet, zu helfen, erste Sprachbarrieren zu überwinden und entsprechendes Grundlagenwissen anschaulich darzustellen. Durch die Komplexität des Gesamtgebietes kann hier natürlich nur ein kleiner Ausschnitt aufgezeigt werden, der trotzdem Basisdaten in beiden Sprachen darstellt und als Einführung verwendet werden kann.

Hier soll bewusst der Versuch unternommen werden, die für den Austausch zwischen Brasilien und Deutschland notwendigen Sprachen in den Vordergrund zu stellen. Es ist geplant, diese Zusammenstellung in den kommenden Jahren auszuweiten, zu vervollständigen sowie auch eine entsprechende Zusammenstellung in englischer Sprache zur Verfügung zu stellen.

Besonderer Dank gebührt Frau Prof. Dr. Dorothee Mertmann für die geduldige und hilfreiche Umsetzung des Manuskriptes in die vorliegende Endform.

Herbert Pöllmann

Halle, Januar 2018

Förord

Denna sammanfattande bok är ett försök att redogöra för grunderna till kristallografen och i särskilt symmetriläran på tyskt-svenskt språk, såsom redan publicerats på andra språk. Symmetrilärens sammanfattning baserar på de 32 punktgrupperna och kompletteras med rymdgrupperna och användningsexempel av de viktiga mineralernas makroskopiska form.

Idén att undanröja språkbarriärer genom skapandet av gemensamma grundpublikationer har även genomförts på andra språk. Svårigheterna som utbytesstudenter bemöter med att förstå och använda föreläsningar och övningar på ett främmande språk, ska härför åtgärdas.

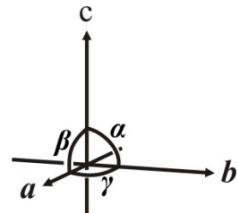
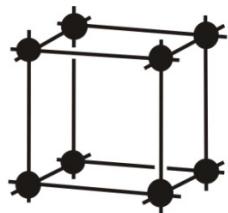
Boken ska hjälpa att övervinna de första språkbarriärerna och att förstå kristallografins grundläggande kunskaper. På grund av kunskapsområdets komplexitet, kommer endast en liten del att kunna skildras här för att ge en snabb introduktion.

Innehållets utökning till en tysk-svensk version ska hjälpa framtida utbytesstudenter att snabbare kunna fördjupa sig i ämnet och övervinna språkbarriärerna.

Vidare sammanställningar är planerade och ska inom kort även finnas i svensk-engelsk version.

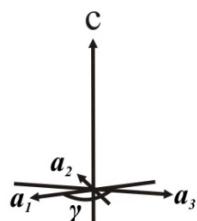
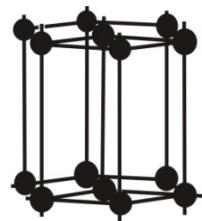
Herbert Pöllmann, Halle, Januari 2018

Die 7 Kristallsysteme



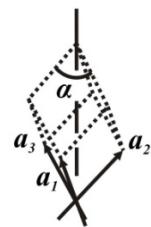
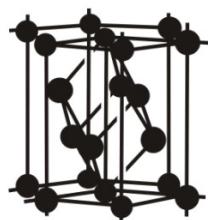
Kubisch:

$$a_0 = b_0 = c_0 \\ \alpha = \beta = \gamma = 90^\circ$$



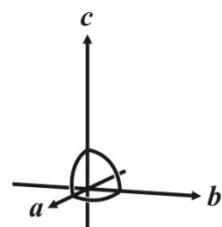
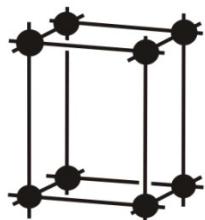
Hexagonal:

$$a_1 = a_2 = a_3 \neq c_0 \\ \alpha = \beta = 90^\circ; \gamma = 120^\circ$$



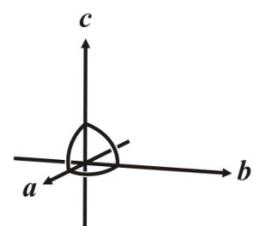
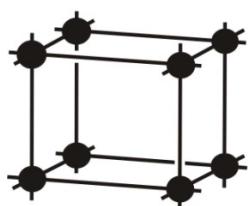
Rhomboedrisch:

$$a_1 = a_2 = a_3 \\ \alpha_1 = \alpha_2 = \alpha_3 \neq 90^\circ$$



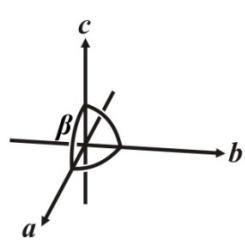
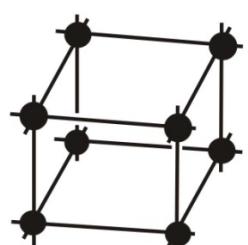
Tetragonal:

$$a_0 = b_0 \neq c_0 \\ \alpha = \beta = \gamma = 90^\circ$$



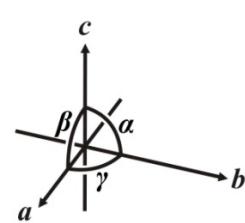
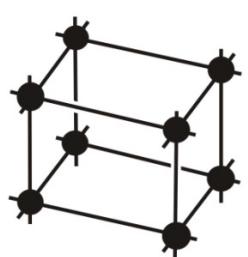
Orthorhombisch:

$$a_0 \neq b_0 \neq c_0 \\ \alpha = \beta = \gamma = 90^\circ$$



Monoklin:

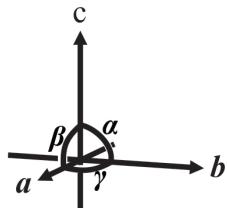
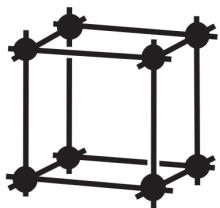
$$a_0 \neq b_0 \neq c_0 \\ \alpha = \gamma = 90^\circ; \beta \neq 90^\circ$$



Triklin:

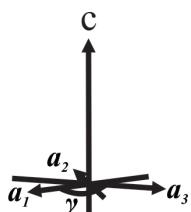
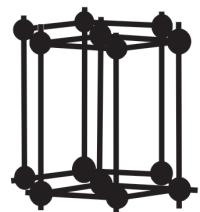
$$a_0 \neq b_0 \neq c_0 \\ \alpha \neq \beta \neq \gamma \neq 90^\circ$$

De 7 kristallsystemen



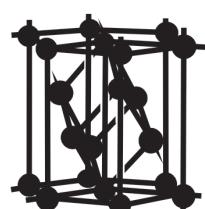
Kubisk:

$$\begin{aligned}a_0 &= b_0 = c_0 \\ \alpha &= \beta = \gamma = 90^\circ\end{aligned}$$



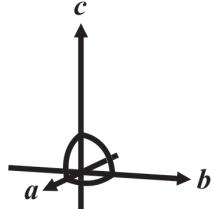
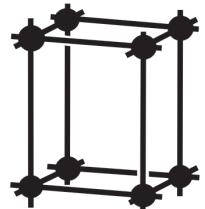
Hexagonal:

$$\begin{aligned}a_1 &= a_2 = a_3 \neq c_0 \\ \alpha &= \beta = 90^\circ; \gamma = 120^\circ\end{aligned}$$



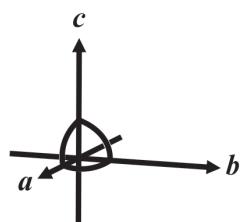
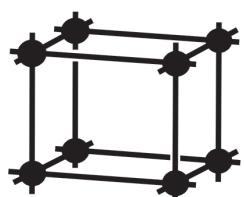
Trigonal:

$$\begin{aligned}a_1 &= a_2 = a_3 = c_0 \\ \alpha &= \beta = 90^\circ; \gamma = 120^\circ\end{aligned}$$



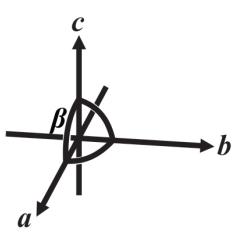
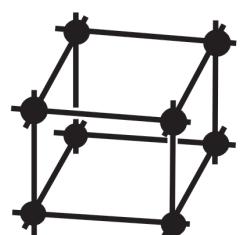
Tetragonal:

$$\begin{aligned}a_0 &= b_0 \neq c_0 \\ \alpha &= \beta = \gamma = 90^\circ\end{aligned}$$



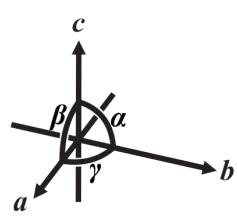
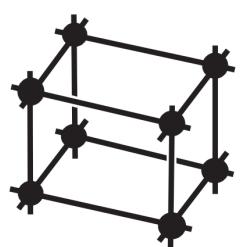
Ortorombisk:

$$\begin{aligned}a_0 &\neq b_0 \neq c_0 \\ \alpha &= \beta = \gamma = 90^\circ\end{aligned}$$



Monoklin:

$$\begin{aligned}a_0 &\neq b_0 \neq c_0 \\ \alpha &= \gamma = 90^\circ; \beta \neq 90^\circ\end{aligned}$$



Triklin:

$$\begin{aligned}a_0 &\neq b_0 \neq c_0 \\ \alpha &\neq \beta \neq \gamma \neq 90^\circ\end{aligned}$$

Häufigkeit von Mineralen

5091 Minerale sind derzeit bekannt (www.mindat.org, August 2017). Nach einer alten Aufstellung sind:

Kubisch	5 Crystal classes	346	9,9%
Hexagonal	7 Crystal classes	326	9,3%
Trigonal-Rhomboedrisch	5 Crystal classes	295	8,4%
Tetragonal	7 Crystal classes	278	7,9%
Orthorhombisch	3 Crystal classes	774	22%
Monoklin	3 Crystal classes	1129	32,2%
Triklin	2 Crystal classes	332	9,5%
Amorph		30	0,8%

aus „Minerale: Bestimmen nach äußereren Kennzeichen / HOCHLEITNER; PHILIPSBERN;WEINER“

Wirkung der verschiedenen Drehachsen

Name	Symbol	Wirkung
Inversion	* / i	Inversion am Zentrum
Zweizählige Drehachse	• / 2	Drehungen um 180°
Spiegelebene / inverse zweizählige D.	m = $\bar{2}$	Spiegelung an einer Ebene
Dreizählige Drehachse	▲ / 3	Drehungen um 120°
Inverse dreizählige D.	▲ / $\bar{3}$	Drehungen um 120° und Inversion
Vierzählige Drehachse	◆ / 4	Drehungen um 90°
Inverse vierzählige D.	◆ / $\bar{4}$	Drehungen um 90° und Inversion
Sechszählige Drehachse	● / 6	Drehungen um 60°
Inverse sechszählige D.	● / $\bar{6}$	Drehungen um 60° und Inversion

Mineralförkunster

Av 3510 kända mineral (maj 1993) är följande:

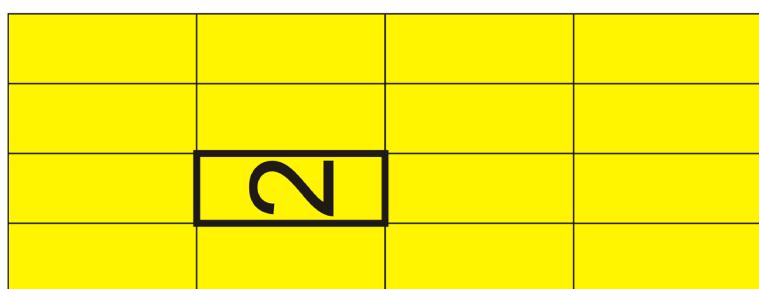
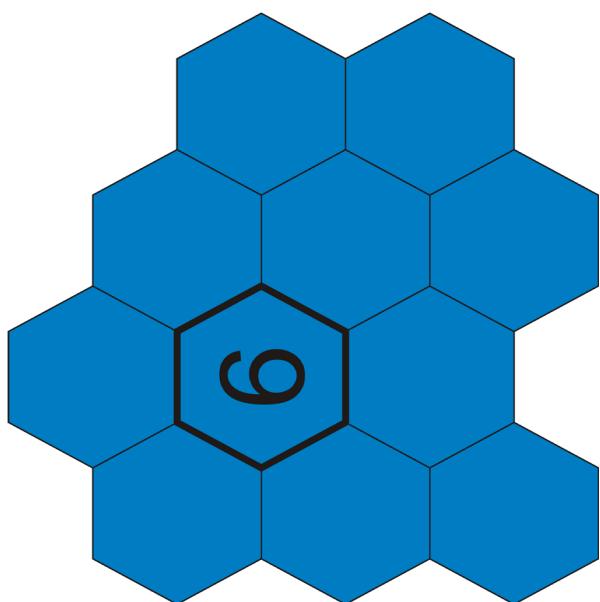
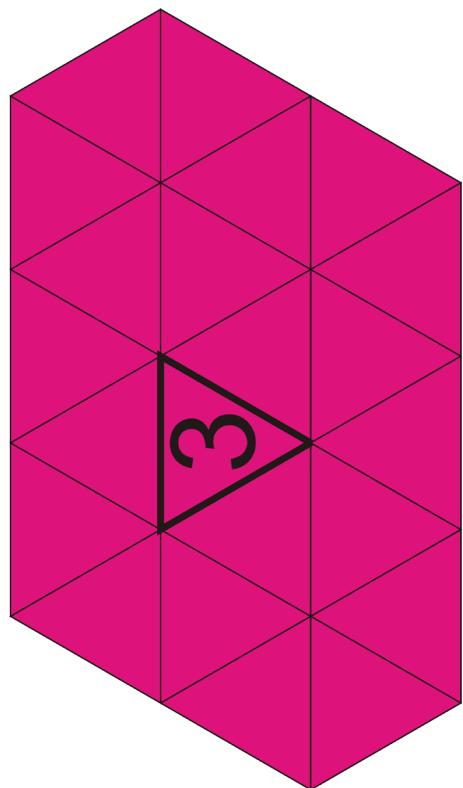
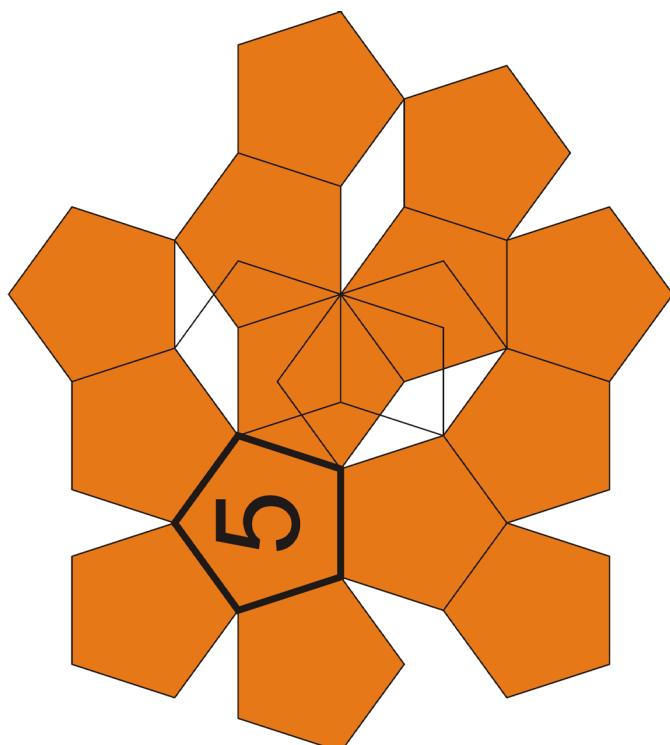
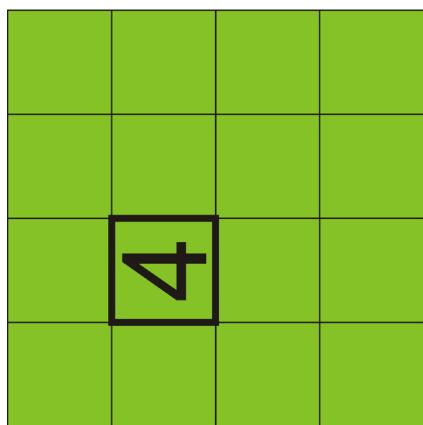
Kubisk	5 kristallklasser	346	9,9%
Hexagonal	7 kristallklasser	326	9,3%
Trigonal	5 kristallklasser	295	8,4%
Tetragonal	7 kristallklasser	278	7,9%
Ortorombisk	3 kristallklasser	774	22%
Monoklin	3 kristallklasser	1129	32,2%
Triklin	2 kristallklasser	332	9,5%
Amorf		30	0,8%

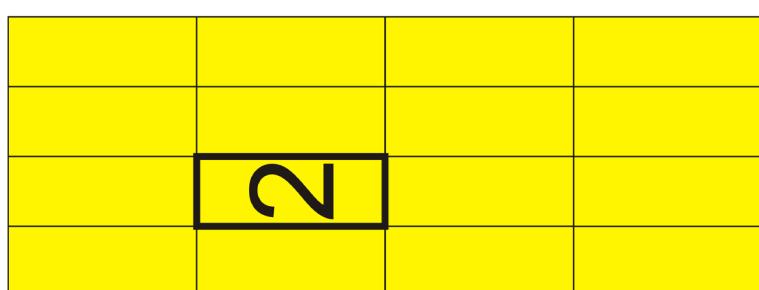
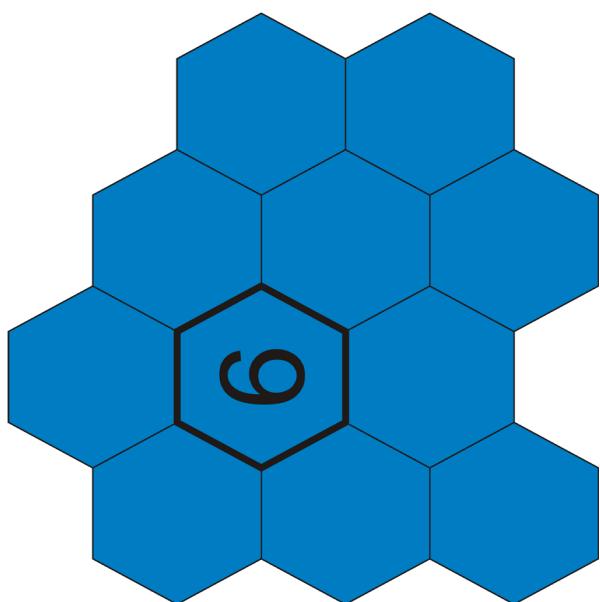
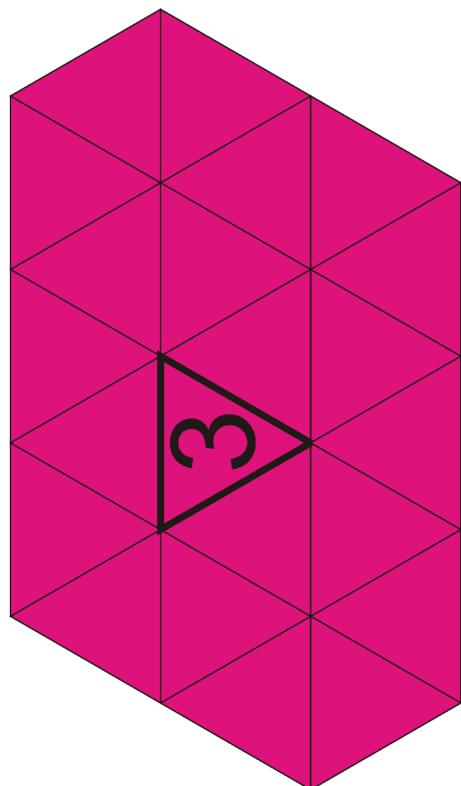
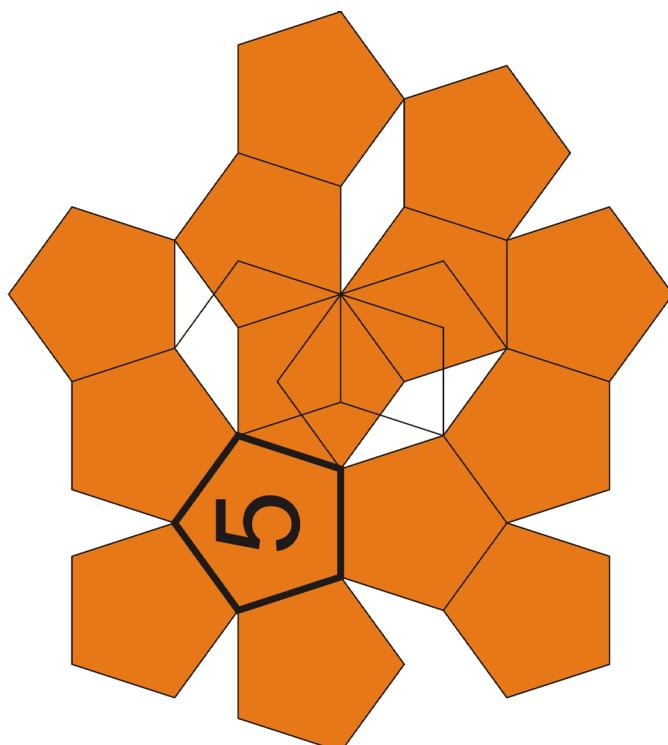
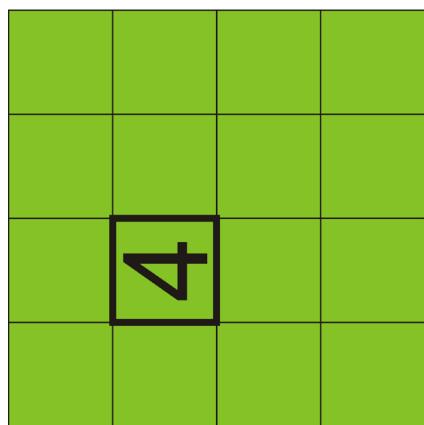
Det finns 30 unika mineralarter, som utgör 0,8% av alla mineralförekunster.

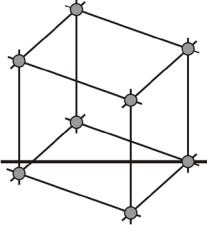
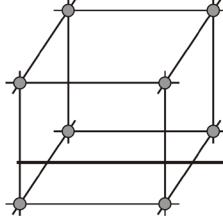
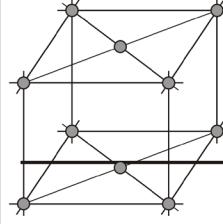
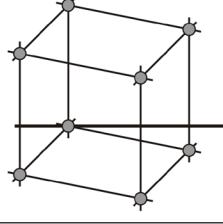
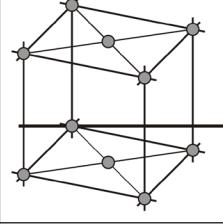
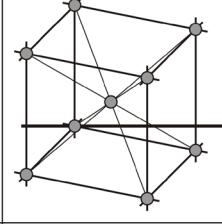
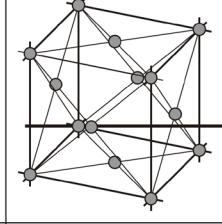
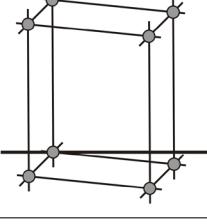
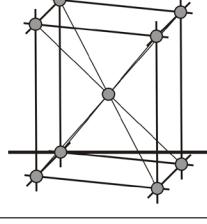
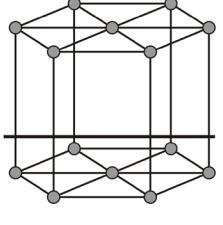
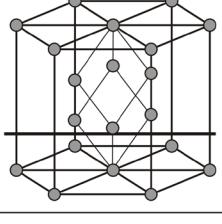
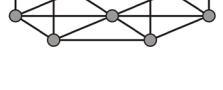
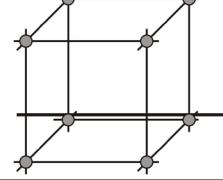
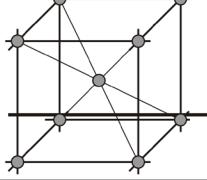
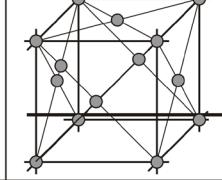
Ur „Minerale: Bestimmen nach äußeren Kennzeichen / Hochlehrbuch; Paulsson; Werner“

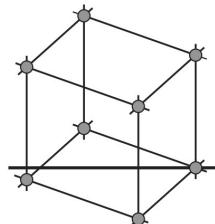
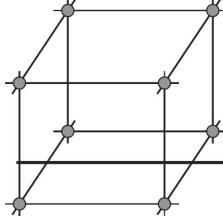
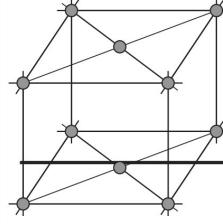
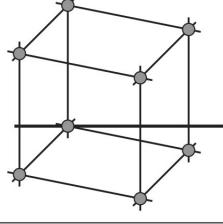
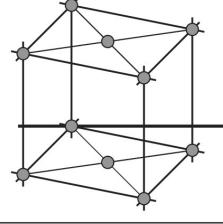
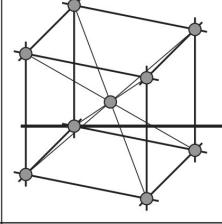
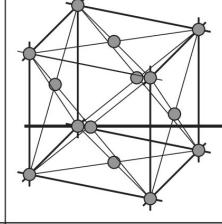
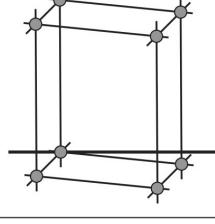
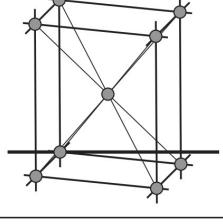
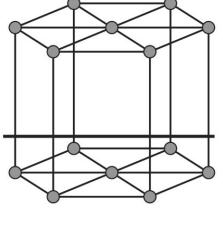
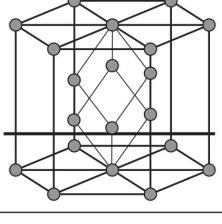
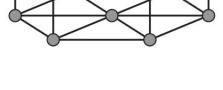
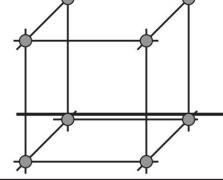
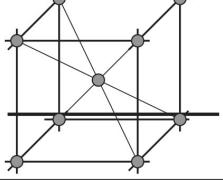
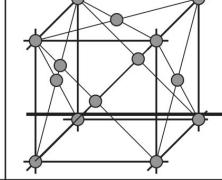
De olika rotationsaxlarna och deras verkan

Namn	Symbol	Verkan
Inversion	* / i	Inversion i centrum
Twåtalig rotationsaxel	Ø / 2	180° rotation
Spegelplan / inveterad tvåtalig inversion	m = 2	Spegling i planet
Tretalig rotationsaxel	▲ / 3	120° rotation
Inveterad tretalig rotationsaxel	△ / 3	120° rotation och inversion
Fyrtalig rotationsaxel	◆ / 4	90° rotation
Inveterad fyrtalig rotationsaxel	◆ / 4	90° rotation och inversion
Sextalig rotationsaxel	● / 6	60° rotation
Inveterad sextalig rotationsaxel	◎ / 6	60° rotation och inversion





	P	C	I	F
triklin				
monoklin			identisch mit C-Gitter	identisch mit C-Gitter
ortho-rhombisch				
tetragonal		identisch mit P-Gitter		identisch mit I-Gitter
trigonal				
hexagonal				
kubisch		unmöglich		

	P	C	I	F
triklin				
monoklin			identiskt med C-gittret	identiskt med C-gittret
ortorombisk				
tetragonal		ideniskt med P-gittret		identiskt med I-gittret
trigonal				
hexagonal				
kubisk		omöjlig		

Die Symmetrieelemente

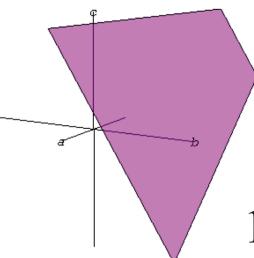
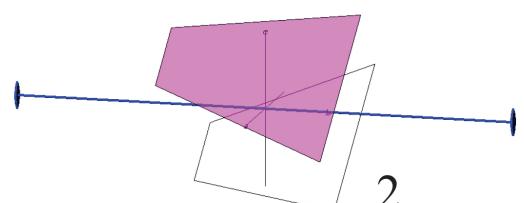
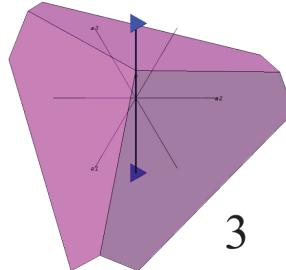
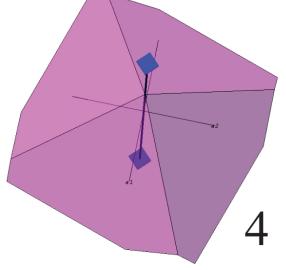
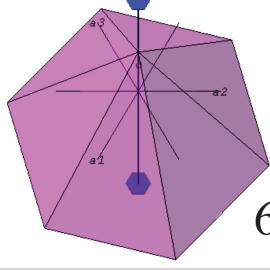
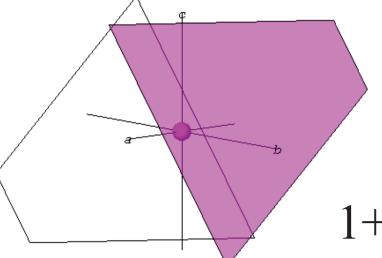
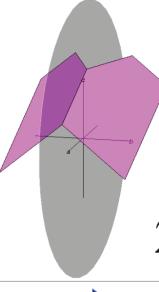
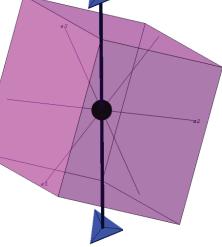
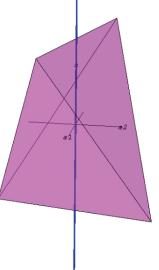
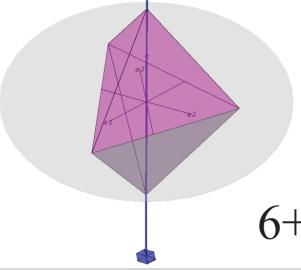
(normale Drehachsen, Drehachsen kombiniert mit Inversion)
kombiniert mit
Inversionszentrum

normal	Inversionszentrum
	1
	2
	3
	4
	6

Symmetrielement

(normala rotationsaxlar, rotationsaxlar kombinerade med inversion)

kombinerad med
inversionscentrum

normal	
	1
	2
	3
	4
	6
	kombinerad med inversionscentrum
	1
	1+i
	2+i = m
	3+i
	4+i
	6+i

Die Symmetrieelemente

Symmetrie	Symbole nach (polare Drehachse)	Symbole nach Schönflies	Symbole nach Hermann-Mauguin	Symbole nach (Kombination von Drehachsen und horizontalen Symmetrieebenen)	Symbole nach (Kombination von Drehachsen und vertikalen Symmetrieebenen)	Symbole nach (Kombination von Drehachsen, horizontalen und vertikalen Symmetrieebenen)	Symbole nach (Kombination mit zweizähligen Drehachsen)	Symmetriezentrum und Inversionsachsen
	*	C_1	C_2	C_3	C_4	C_5	C_6	\bullet
				C_{2h}	C_{3h}	C_{4h}	C_{6h}	\blacklozenge
				$2/m$	$3/m(\bar{6})$	$4/m$	$6/m$	\bullet
				C_s	C_{2v}	C_{3v}	C_{4v}	C_{6v}
				m	$mm2$	$3m$	$4mm$	$6mm$
				D_{2h}	D_{3h}	D_{4h}	D_{6h}	
				mmm	$\bar{6}2m$	$4/mmm$	$6/mmm$	
				D_2	D_3	D_4	D_6	
				222	32	422	622	
				C_i	C_{3i}	S_4	D_{3d}	D_{2d}
				$\bar{1}$	$\bar{2}(m)$	$\bar{3}$	$\bar{4}$	$6(3/m)$
					$\bar{3}m$	$\bar{4}2m$	$\bar{6}2m$	

Symmetrieelement

Symmetri	Symboler omkring	Symmetri			
		•	◦	◆	♦
(polar rotationscentrum)	Schönfliess	C ₁	C ₂	C ₃	C ₄
Hermann-Menguin	I	2	3	4	6
Kombination av rotationscenter och horisontella symmetriplan	Schönfliess	C _{2h}	C _{3h}	C _{4h}	C _{6h}
Hermann-Menguin		2/m	3/m (6)	4/m	6/m
Kombination av rotationscenter och vertikala symmetriplan	Schönfliess	C ₁	C _{2v}	C _{3v}	C _{4v}
Hermann-Menguin	m	mm2	3m	4mm	6mm
Kombination av rotationscenter, horisontala och vertikala symmetriplan	Schönfliess	D _{2h}	D _{3h}	D _{4h}	D _{6h}
Hermann-Menguin		mmm	62m	4/mmm	6/mmm
Kombination med ekvivalenta rotationscenter	Schönfliess	D ₂	D ₃	D ₄	D ₆
Hermann-Menguin	222	32	422	622	
Symmetricentrum och inversionscenter	Schönfliess	C ₁	C ₂	C ₃	C ₄
Hermann-Menguin	I	2(m)	3m	4	6(3/m)
					62m

Die 32 Punktgruppen

Kristallsystem	Triklin	Monoklin	Orthorhomatisch	Trigonal	Hexagonal	Tetragonal	Kubisch
Holoedrie	$\bar{1}$	$\frac{2}{m}$	$\frac{2}{m} \frac{2}{m} \frac{2}{m}$	$\bar{3} \frac{2}{m}$	$\frac{6}{m} \frac{2}{m} \frac{2}{m}$	$\frac{4}{m} \frac{2}{m} \frac{2}{m}$	$\frac{4}{m} \bar{3} \frac{2}{m}$
Blickrichtung	- keine-	[010]	[100] [010] [001]	[001] [100] [110]	[001] [100] [110]	[001] [100] [110]	[001] [111] [110]
Punktgruppen	1	2	2 2 2	3	6	4	2 3
	$\bar{1}$	m	$\frac{2}{m} \frac{2}{m} \frac{2}{m}$	3 m	6 m m	4 m m	$\frac{2}{m} \bar{3}$
		$\frac{2}{m}$		$\bar{3}$	$\bar{6}$	$\bar{4}$	$\bar{4} 3 m$
				$\bar{3} \frac{2}{m}$	$\bar{6} 2 m$	$\bar{4} 2 m$	$\frac{4}{m} \bar{3} \frac{2}{m}$
					$\bar{6} m 2$	$\bar{4} m 2$	$\frac{4}{m} \frac{2}{m} \frac{2}{m}$
					$\frac{6}{m}$	$\frac{4}{m}$	$\frac{6}{m} \frac{2}{m} \frac{2}{m}$

De 32 punktgrupperna

Kristallsystem	Triklin	Monoklin	Ortorombisk	Trigonal	Hexagonal	Tetragonal	Kubisk
Holoedri	$\bar{1}$	$\frac{2}{m}$	$\frac{2}{m} \frac{2}{m} \frac{2}{m}$	$\bar{3} \frac{2}{m}$	$\frac{6}{m} \frac{2}{m} \frac{2}{m}$	$\frac{4}{m} \frac{2}{m} \frac{2}{m}$	$\frac{4}{m} \bar{3} \frac{2}{m}$
Blickriktning	- ingen-	[010]	[100] [010] [001]	[001] [100]	[001] [100] [110]	[001] [100] [110]	[001] [111] [110]
Punktgrupper	1	2	2 2 2	3	6	4	2 3
	$\bar{1}$	m	$m m^2$	3 2	6 2 2	4 2 2	4 3 2
			$\frac{2}{m} \frac{2}{m} \frac{2}{m}$	3 m	6 m m	$\frac{2}{m} \bar{3}$	
				$\bar{3}$	$\bar{6}$	$\bar{4}$	$\bar{4} 3 m$
				$\bar{3} \frac{2}{m}$	$\bar{6} 2 m$	$\bar{4} 2 m$	$\frac{4}{m} \bar{3} \frac{2}{m}$
					$\bar{6} m 2$	$\bar{4} m 2$	$\frac{4}{m} \frac{2}{m} \frac{2}{m}$
					$\frac{6}{m}$	$\frac{4}{m}$	
					$\frac{6}{m} \frac{2}{m} \frac{2}{m}$		

Die 32 Kristallklassen

Anzahl der Klassen	Bezeichnung nach Herman-Mauguin		Bezeichnung der Kristallklasse
	komplett	abgekürzt	
Triklines System			
2 Klassen	1	1	Triklin Pedial
	-1	-1	Triklin Pinakoidal
Monoklines System			
3 Klassen	$2/m$	$2/m$	Monoklin Prismatisch
	m	m	Monoklin Domatisch
	2	2	Monoklin Sphenoid
Orthorombisches System			
3 Klassen	$2/m2 /m/m$	mmm	Orthorombisch Dipyramidal
	$mm2$	$mm2$	Orthorombisch Pyramidal
	222	222	Orthorombisch Disphenoid
Tetragonales System			
7 Klassen	$4/m2/m2/m$	$4/mmm$	Ditetragonal Dipyramidal
	$4mm$	$4mm$	Ditetragonal Pyramidal
	422	422	Tetragonal Trapezoedrisch
	$4/m$	$4/m$	Tetragonal Dipyramidal
	4	4	Tetragonal Pyramidal
	$4 \cdot 2 m$	$4 \cdot 2 m$	Tetragonal Skalenoedrisch
	-4	-4	Tetragonal Disphenoidisch
Hexagonales System:			
7 Klassen	$6/m2/m2/m$	$6/mmm$	Dihexagonal Dipyramidal
	$6mm$	$6mm$	Dihexagonal Pyramidal
	622	622	Hexagonal Trapezoedrisch
	$6/m$	$6/m$	Hexagonal Dipyramidal
	6	6	Hexagonal Pyramidal
	$-6m2$	$-6m2$	Ditrigonal Dipyramidal
	-6	-6	Trigonal Dipyramidal
Trigonales System:			
5 Klassen	$-3 \cdot 2m$	$-3m$	Ditrigonal Skalenoedrisch
	$3m$	$3m$	Ditrigonal Pyramidal
	32	32	Trigonal Trapezoedrisch
	3	3	Trigonal Pyramidal
	-3	-3	Trigonal Rhomboedrisch
Kubisches System			
5 Klassen	$4/m \cdot 3 2/m$	$m3m$	Hexakisoktaedrisch
	432	432	Pentagonikositetraedrisch
	$2/m \cdot -3$	$m3$	Disdodekaedrisch
	$-4 \cdot 3m$	$-4 \cdot 3m$	Hexakistetraedrisch
	23	23	Tetraedrisch Pentagondodekaedrisch

De 32 kristallklasserna

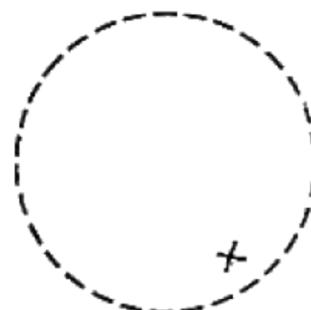
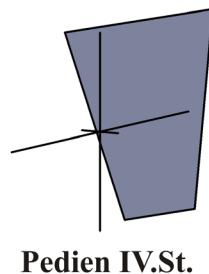
Antal klasser	Beskrivning enligt Herman-Mauguin		Beskrivning av kristallklassen
	komplett	förkortad	
Triklint system			
2 klasser	1	1	Triklin Pedial
	-1	-1	Triklin Pinakoidal
Monoklint system			
3 klasser	$2/m$	$2/m$	Monoklin Prismatisk
	m	m	Monoklin Domatisk
	2	2	Monoklin Sphenoid
Ortorombiskt system			
3 klasser	$2/m2/m/m$	mmm	Ortorombisk Dipyramidal
	$mm2$	$mm2$	Ortorombisk Pyramidal
	222	222	Ortorombisk Disphenoid
Tetragonalt system			
7 klasser	$4/m2/m2/m$	$4/mmm$	Ditetragonal Dipyramidal
	$4mm$	$4mm$	Ditetragonal Pyramidal
	422	422	Tetragonal Trapezoedrisk
	$4/m$	$4/m$	Tetragonal Dipyramidal
	4	4	Tetragonal Pyramidal
	$4-2m$	$4-2m$	Tetragonal Skalenoedrisk
	-4	-4	Tetragonal Disphenoidisk
Hexagonalt system:			
7 klasser	$6/m2/m2/m$	$6/mmm$	Dihexagonal Dipyramidal
	$6mm$	$6mm$	Dihexagonal Pyramidal
	622	622	Hexagonal Trapezoedrisk
	$6/m$	$6/m$	Hexagonal Dipyramidal
	6	6	Hexagonal Pyramidal
	$-6m2$	$-6m2$	Ditrigonal Dipyramidal
	-6	-6	Trigonal Dipyramidal
Trigonalt system:			
5 klasser	$-3 2m$	$-3m$	Ditrigonal Skalenoedrisk
	$3m$	$3m$	Ditrigonal Pyramidal
	32	32	Trigonal Trapezoedrisk
	3	3	Trigonal Pyramidal
	-3	-3	Trigonal Rhomboedrisk
Kubiskt system			
5 klasser	$4/m-3 2/m$	$m3m$	Hexakisoktaedrisk
	432	432	Pentagonikositetraedrisk
	$2/m -3$	$m3$	Disdodekaedrisk
	$-4 3m$	$-4 3m$	Hexakistetraedrisk
	23	23	Tetraedrisk Pentagondodekaedrisk

Triklines Kristallsystem

Trikline Hemiedrie
Triklin-pediale Klasse

Symbol: 1 oder C_1

Allgemeine Form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
Pedien I.St.	Pedien II.St.	Pedien III.St.
$\{100\}$	$\{010\}$	$\{001\}$
I. Pedion	II. Pedion	III. Pedion

Mineral-Bsp.:

Sinnerite $Cu_6As_4S_9$

Hartite $C_{20}H_{34}$

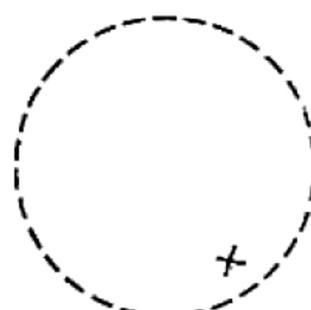
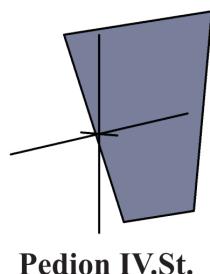
Nekoite $Ca_3[Si_6O_{15}] * 7H_2O$

Det triklina kristallsystemet

Triklin hemiedri
Triklin-pedial klass

Symbol: 1 eller C₁

Allmän form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
<p>Pedion I.St.</p>	<p>Pedion II.St.</p>	<p>Pedion III.St.</p>

$\{100\}$	$\{010\}$	$\{001\}$
<p>I. Pedion</p>	<p>II. Pedion</p>	<p>III. Pedion</p>

Exempel på mineral:

Sinnerit Cu₆As₄S₉

Hartit C₂₀H₃₄

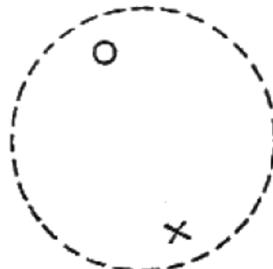
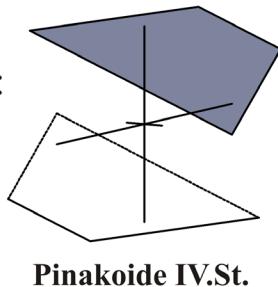
Nekoit Ca₃[Si₆O₁₅]^{*}7H₂O

Triklines Kristallsystem

Trikline Holoedrie
Triklin-pinakoidale Klasse

Symbol: $\bar{1}$ oder C_i

Allgemeine Form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
$\{100\}$	$\{010\}$	$\{001\}$
I. Pinakoid	II. Pinakoid	III. Pinakoid

Mineral-Bsp.:

Albit $\text{Na}[\text{AlSi}_3\text{O}_8]$

Kyanit/Disthen $\text{Al}_2[\text{O/SiO}_4]$

Wollastonit $\text{Ca}[\text{SiO}_3]$

Axinit $\text{Ca}_2(\text{Fe,Mn})\text{Al}_2[\text{BO}_3\text{OH/Si}_4\text{O}_{12}]$

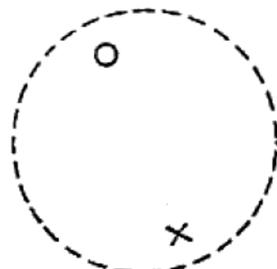
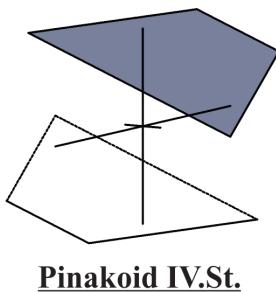
Det triklina kristallsystemet

Triklin holoedri

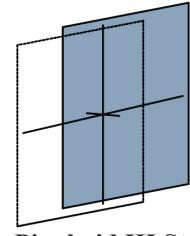
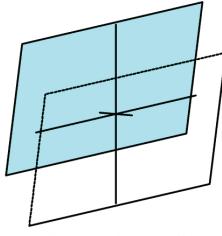
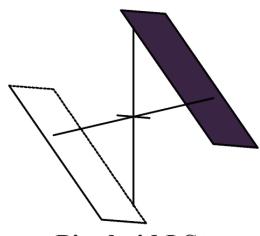
Triklin-pinakoidal klass

Symbol: $\bar{1}$ eller C_i

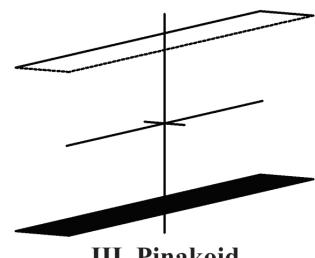
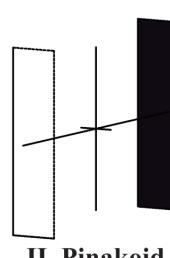
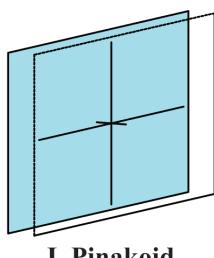
Allmän form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
-----------	-----------	-----------



$\{100\}$	$\{010\}$	$\{001\}$
-----------	-----------	-----------



Exempel på mineral:

Albit $\text{Na}[\text{AlSi}_3\text{O}_8]$

Kyanit $\text{Al}_2[\text{O/SiO}_4]$

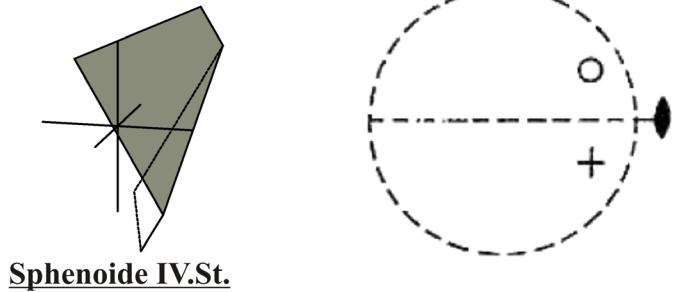
Wollastonit $\text{Ca}[\text{SiO}_3]$

Axinit $\text{Ca}_2(\text{Fe,Mn})\text{Al}_2[\text{BO}_3\text{OH/Si}_4\text{O}_{12}]$

Monoklines Kristallsystem

Monokline Hemimorphie Symbol: 2 oder C_2
 Monoklin-sphenoidische Klasse

Allgemeine Form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
 <u>Sphenoide I.St.</u>	 <u>Pinakoide II.St.</u>	 <u>Sphenoide III.St.</u>
$\{100\}$	$\{010\}$	$\{001\}$
 <u>I. Pinakoid</u>	 <u>II. Pedion</u>	 <u>III. Pinakoid</u>

Mineral-Bsp.:

(Rohr-/Kandis-)Zucker $C_{12}H_{22}O_{11}$

Weinsäure $C_4H_6O_6$

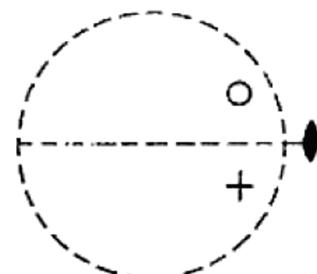
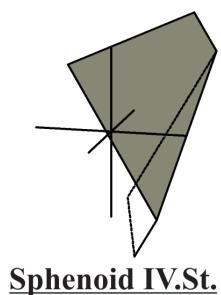
Latiumite $(Ca,K)_8(Al,Mg,Fe)[(Si,Al)_{10}O_{25}/(SO_4)]$

Det monoklina kristallsystemet

Monoklin hemimorfi
Monoklin-sphenoid klass

Symbol: 2 eller C₂

Allmän form:
{hkl}



{0kl}	{h0l}	{hk0}
<p><u>Sphenoid I.St.</u></p>	<p><u>Pinakoid II.St.</u></p>	<p><u>Sphenoid III.St.</u></p>

{100}	{010}	{001}
<p><u>I. Pinakoid</u></p>	<p><u>II. Pedion</u></p>	<p><u>III. Pinakoid</u></p>

Exempel på mineral:

Rörsocker C₁₂H₂₂O₁₁

Vinsyra C₄H₆O₆

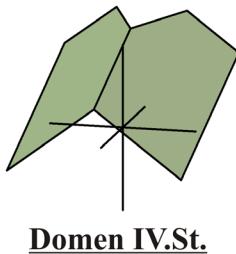
Latiumite (Ca,K)₈(Al,Mg,Fe)[(Si,Al)₁₀O₂₅/(SO₄)]

Monoklines Kristallsystem

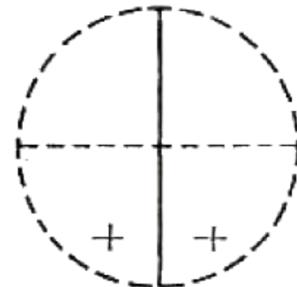
Monokline Hemiedrie II.Art
Monoklin-domatische Klasse

Symbol: m oder C_s

Allgemeine Form:
 $\{hkl\}$



Domen IV.St.



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
<u>Domen I.St.</u>	<u>Pedien II.St.</u>	<u>Domen III.St.</u>
$\{100\}$	$\{010\}$	$\{001\}$
<u>I. Pedion</u>	<u>II. Pinakoid</u>	<u>III. Pedion</u>

Mineral-Bsp.:

Posnjakite $\text{Cu}_4[(\text{OH})_6/\text{SO}_4]^*\text{H}_2\text{O}$

Hilgardit $\text{Ca}_2[\text{Cl}/\text{B}_5\text{O}_8(\text{OH})_2]$

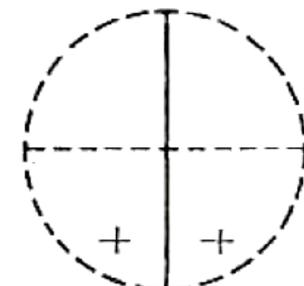
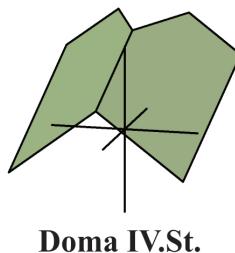
Skolezit $\text{Ca}[\text{Al}_2\text{Si}_3\text{O}_{10}]^*\text{3H}_2\text{O}$

Det monoklina kristallsystemet

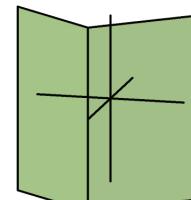
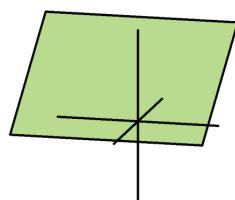
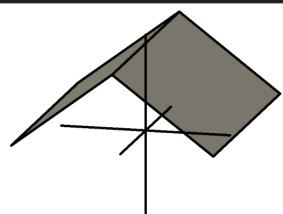
Monoklin hemidri II. typ
Monoklin-domatisk klass

Symbol: m eller C_s

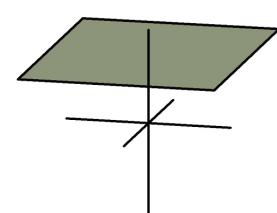
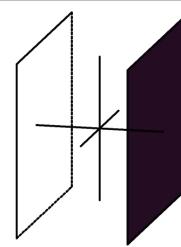
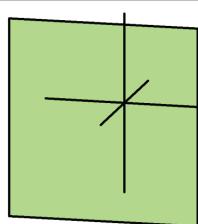
Allmän form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
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$\{100\}$	$\{010\}$	$\{001\}$
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Exempel på mineral:

Posnjakit Cu₄[(OH)₆/SO₄]^{*}H₂O

Hilgardit Ca₂[Cl/B₅O₈(OH)₂]

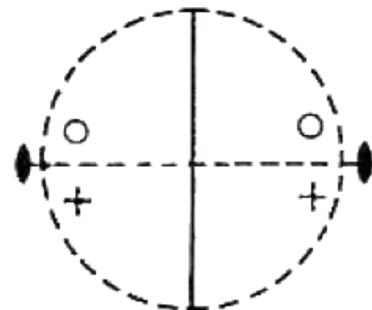
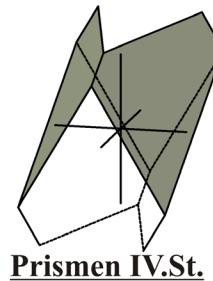
Skolezit Ca[Al₂Si₃O₁₀]^{*}3H₂O

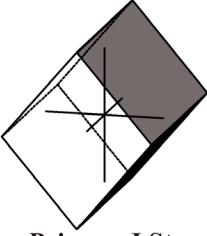
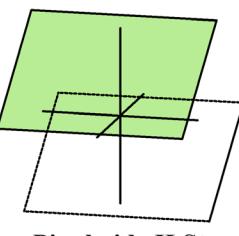
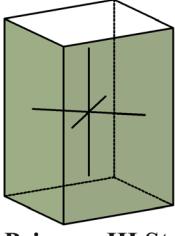
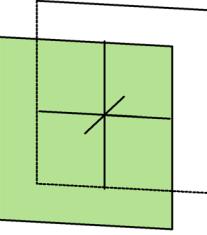
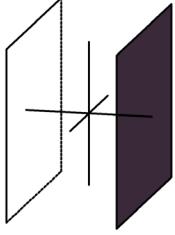
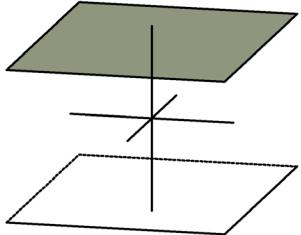
Monoklines Kristallsystem

Monokline Holoedrie
Monoklin-prismatische Klasse

Symbol: $2/m$ oder C_{2h}

Allgemeine Form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
		
Prismen I.St.	Pinakoide II.St.	Prismen III.St.
$\{100\}$	$\{010\}$	$\{001\}$
		
I. Pinakoid	II. Pinakoid	III. Pinakoid

Mineral-Bsp.:

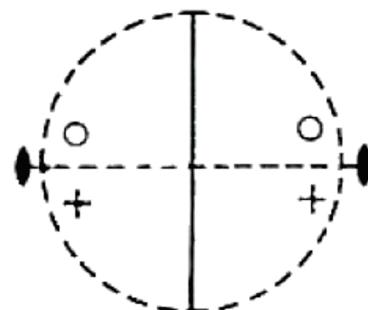
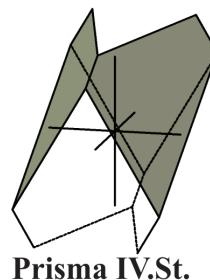
- häufigste Kristallklasse
- siehe Zusatzseite

Det monoklina kristallsystemet

Monoklin holoedri
Monoklin-prismatisk klass

Symbol: $2/m$ eller C_{2h}

Allmän form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
<p><u>Prisma I.St.</u></p>	<p><u>Pinakoid II.St.</u></p>	<p><u>Prisma III.St.</u></p>

$\{100\}$	$\{010\}$	$\{001\}$
<p><u>I. Pinakoid</u></p>	<p><u>II. Pinakoid</u></p>	<p><u>III. Pinakoid</u></p>

Exempel på mineral:

- vanligaste kristallklassen
- se tillägg

Mineral-Bsp. für 2/m: (häufigste Kristallklasse)

Gips $\text{Ca}[\text{SO}_4]*2\text{H}_2\text{O}$

Diopsid $\text{Ca}(\text{Mg},\text{Fe})[\text{Si}_2\text{O}_6]$

Orthoklas $\text{K}[\text{AlSi}_3\text{O}_8]$

Soda $\text{Na}_2[\text{CO}_3]*10\text{H}_2\text{O}$

Arsenopyrit FeAsS

Azurit $\text{Cu}_3[(\text{CO}_3)_2/(\text{OH})_2]$

Biotit $\text{K}(\text{Mg},\text{Fe}^{2+},\text{Mn}^{2+})_3[(\text{OH},\text{F})_2/(\text{Al},\text{Fe}^{3+},\text{Ti}^{3+})\text{Si}_3\text{O}_{10}]$

Borax $\text{Na}_2[\text{B}_4\text{O}_5/(\text{OH})_4]\cdot8\text{H}_2\text{O}$

Chalkosin Cu_2S

Epidot $\text{Ca}_2(\text{Fe},\text{Al})_3[(\text{Si}_2\text{O}_7)/(\text{SiO}_4)_3/(\text{OH})_2]$

Hornblende $\text{Ca}_2(\text{Mg}, \text{Fe}, \text{Al})_5 [(\text{Al}, \text{Si})_8\text{O}_{22}/(\text{OH})_2]$

Kryolith Na_3AlF_6

Malachit $\text{Cu}_2[(\text{CO}_3)/(\text{OH})_2]$

Muskovit $\text{KAl}_2[\text{Si}_3\text{AlO}_{10}/(\text{OH},\text{F})_2]$

Phlogopit $\text{KMg}_3[\text{Si}_3\text{AlO}_{10}/(\text{F},\text{OH})_2]$

Realgar AsS

Sanidin $(\text{K},\text{Na})[\text{Al}_3\text{SiO}_8]$

Staurolith $(\text{Fe}^{2+},\text{Mg},\text{Zn})_2\text{Al}_9[(\text{Si},\text{Al})_4\text{O}_{22}/(\text{OH})_2]$

Titanit $\text{CaTi}[\text{O/SiO}_4]$

Exempel på 2/m mineral: (vanligaste kristallklassen)

Gips $\text{Ca}[\text{SO}_4]*2\text{H}_2\text{O}$

Diopsid $\text{Ca}(\text{Mg},\text{Fe})[\text{Si}_2\text{O}_6]$

Ortoklas $\text{K}[\text{AlSi}_3\text{O}_8]$

Kristallsoda $\text{Na}_2[\text{CO}_3]*10\text{H}_2\text{O}$

Arsenikkis FeAsS

Azurit $\text{Cu}_3[(\text{CO}_3)_2/(\text{OH})_2]$

Biotit $\text{K}(\text{Mg},\text{Fe}^{2+},\text{Mn}^{2+})_3[(\text{OH},\text{F})_2/(\text{Al},\text{Fe}^{3+},\text{Ti}^{3+})\text{Si}_3\text{O}_{10}]$

Borax $\text{Na}_2[\text{B}_4\text{O}_5/(\text{OH})_4]\cdot8\text{H}_2\text{O}$

Kopparglans Cu_2S

Epidot $\text{Ca}_2(\text{Fe},\text{Al})_3[(\text{Si}_2\text{O}_7)/(\text{SiO}_4)_3/(\text{OH})_2]$

Hornblände $\text{Ca}_2(\text{Mg}, \text{Fe}, \text{Al})_5 [(\text{Al}, \text{Si})_8\text{O}_{22}/(\text{OH})_2]$

Kryolit Na_3AlF_6

Malakit $\text{Cu}_2[(\text{CO}_3)/(\text{OH})_2]$

Glimmer $\text{KA}1_2[\text{Si}_3\text{AlO}_{10}/(\text{OH},\text{F})_2]$

Flogopit $\text{KMg}_3[\text{Si}_3\text{AlO}_{10}/(\text{F},\text{OH})_2]$

Realgar AsS

Sanidin $(\text{K},\text{Na})[\text{Al}_3\text{SiO}_8]$

Staurolit $(\text{Fe}^{2+},\text{Mg},\text{Zn})_2\text{Al}_9[(\text{Si},\text{Al})_4\text{O}_{22}/(\text{OH})_2]$

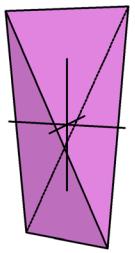
Titanit $\text{CaTi}[\text{O/SiO}_4]$

Orthorhombrisches Kristallsystem

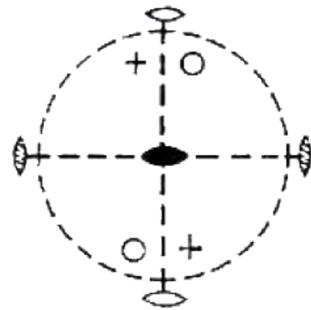
Rhombische Hemiedrie
Rhombisch-disphenoidische Klasse

Symbol: 222 oder D_2

Allgemeine Form:
 $\{hkl\}$



Rhombische Disphenoide



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
$\{100\}$	$\{010\}$	$\{001\}$

Mineral-Bsp.:

Epsomit (Bittersalz) $MgSO_4 \cdot 7H_2O$

Zinkvitriol/Goslarit $ZnSO_4 \cdot 7H_2O$

Austinit $CaZn[(AsO_4)/(OH)]$

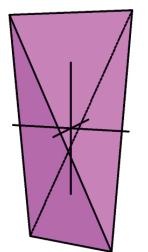
Arsenoclasite $Mn_5[(AsO_4)_2/(OH)_4]$

Det ortorombiska kristallsystemet

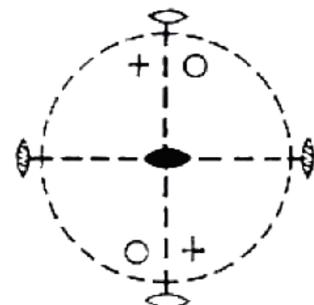
Rombisk hemiedri
Rombisk-disphenoid klass

Symbol: 222 eller D_2

Allmän form:
 $\{hkl\}$



Rombisk Disphenoid



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
 <u>Prisma I.St.</u>	 <u>Prisma II.St.</u>	 <u>Prisma III.St.</u>

$\{100\}$	$\{010\}$	$\{001\}$
 <u>I. Pinakoid</u>	 <u>II. Pinakoid</u>	 <u>III. Pinakoid</u>

Exempel på mineral:

Epsomit $MgSO_4 \cdot 7H_2O$

Goslarit $ZnSO_4 \cdot 7H_2O$

Austinit $CaZn[(AsO_4)/(OH)]$

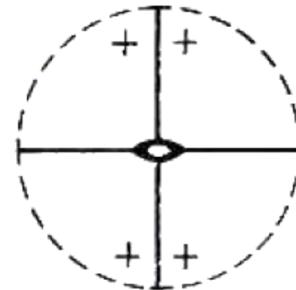
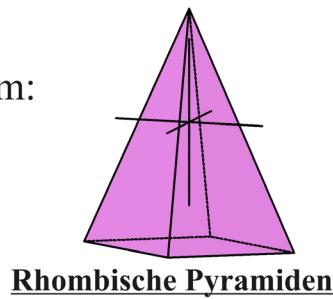
Arsenoclasit $Mn_5[(AsO_4)_2/(OH)_4]$

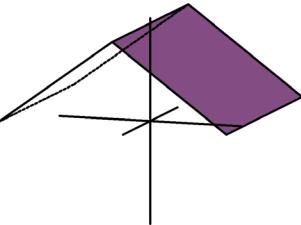
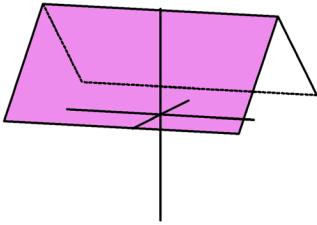
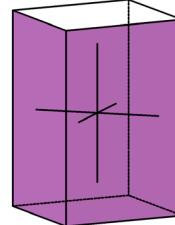
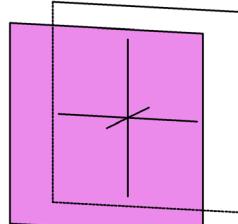
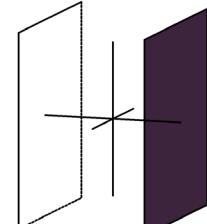
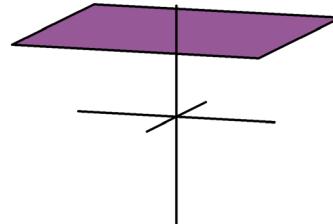
Orthorhombrisches Kristallsystem

Rhombische Hemimorphie
Rhombisch-pyramidal Klasse

Symbol: mm2 oder C_{2v}
(mm)

Allgemeine Form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
		
Domen I.St.	Domen II.St.	Prismen III.St.
$\{100\}$	$\{010\}$	$\{001\}$
		
I. Pinakoid	II. Pinakoid	III. Pedien

Mineral-Bsp.:

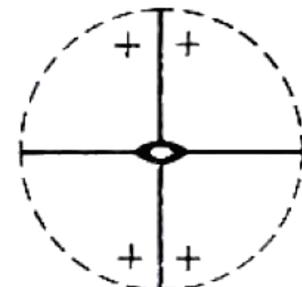
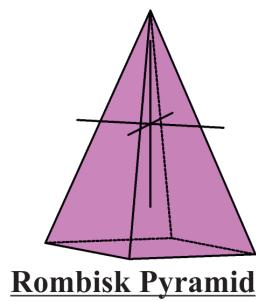
Hemimorphit/Kieselzinkerz $Zn_4[(OH)_2/Si_2O_7]*H_2O$
Struvit $MgNH_4[PO_4]*6H_2O$
Prehnit $Ca_2Al_2[Si_3O_{10}/(OH)_2]$

Det ortorombiska kristallsystemet

Rombisk hemimorf
Rombisk-pyramidal klass

Symbol: mm2 eller C_{2v}
(mm)

Allmän form:
 $\{hkl\}$



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
 <u>Doma I.St.</u>	 <u>Doma II.St.</u>	 <u>Prisma III.St.</u>

$\{100\}$	$\{010\}$	$\{001\}$
 <u>I. Pinakoid</u>	 <u>II. Pinakoid</u>	 <u>III. Pedion</u>

Exempel på mineral:

Hemimorfit/Kiselgalmeja $Zn_4[(OH)_2/Si_2O_7]^*H_2O$

Struvit $MgNH_4[PO_4]^*6H_2O$

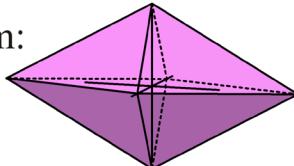
Prehnit $Ca_2Al_2[Si_3O_{10}/(OH)_2]$

Orthorhombisches Kristallsystem

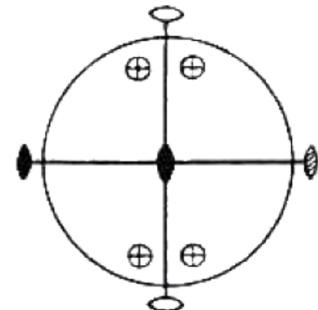
Rhombische Holoedrie
Rhombisch-dipyramidal Klasse

Symbol: $2/m\ 2/m\ 2/m$
(mmm) oder D_{2h}

Allgemeine Form:
 $\{hkl\}$



Rhombische Dipyramiden



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
 <u>Prismen I.St.</u>	 <u>Prismen II.St.</u>	 <u>Prismen III.St.</u>

$\{100\}$	$\{010\}$	$\{001\}$
 <u>I. Pinakoid</u>	 <u>II. Pinakoid</u>	 <u>III. Pinakoid</u>

Mineral-Bsp.:

Schwefel S

Baryt $\text{Ba}[\text{SO}_4]$

Aragonit $\text{Ca}[\text{CO}_3]$

Topas $\text{Al}_2[\text{F}_2/\text{SiO}_4]$

Anhydrit $\text{Ca}[\text{SO}_4]$

Olivin $(\text{Mg}, \text{Fe})_2[\text{SiO}_4]$

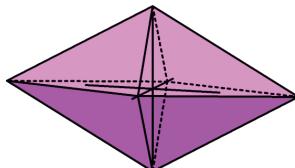
Det ortorombiska kristallsystemet

Rombisk holoedri

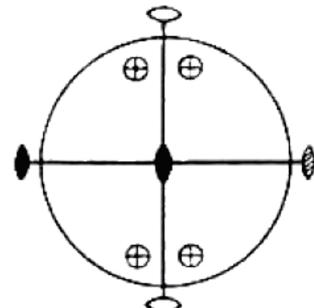
Rombisk-dipyramidal klass

Symbol: $2/m\ 2/m\ 2/m$
 (mmm) eller D_{2h}

Allmän form:
 $\{hkl\}$



Rombisk Dipyramid



$\{0kl\}$	$\{h0l\}$	$\{hk0\}$
 <u>Prisma I.St.</u>	 <u>Prisma II.St.</u>	 <u>Prisma III.St.</u>

$\{100\}$	$\{010\}$	$\{001\}$
 <u>I. Pinakoid</u>	 <u>II. Pinakoid</u>	 <u>III. Pinakoid</u>

Exempel på mineral:

Svavel S

Baryt $\text{Ba}[\text{SO}_4]$

Aragonit $\text{Ca}[\text{CO}_3]$

Topas $\text{Al}_2[\text{F}_2/\text{SiO}_4]$

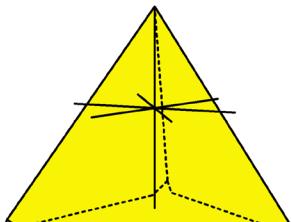
Anhydrit $\text{Ca}[\text{SO}_4]$

Olivin $(\text{Mg}, \text{Fe})_2[\text{SiO}_4]$

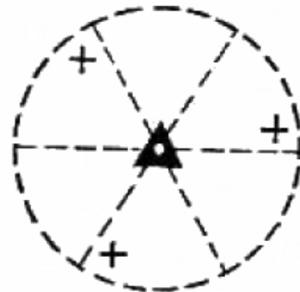
Trigonales Kristallsystem

Hemimorphie d. trig. Tetartoedrie Symbol: 3 oder C_3
Trigonal-pyramidale Klasse

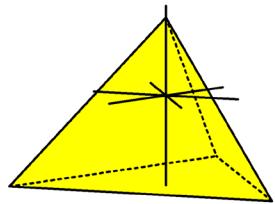
Allgemeine Form:
 $\{hkl\} / \{hkil\}$



Trigonale Pyramiden III. St.

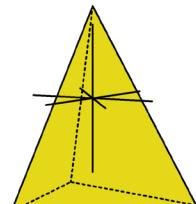


$\{h01\} / \{h0\bar{h}\}$



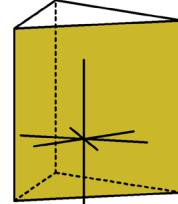
Trig. Pyramiden I.St.

$\{hh\bar{l}\} / \{hh\bar{2}h\}$



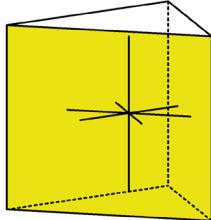
Trig. Pyramiden II.St.

$\{hk0\} / \{hki0\}$



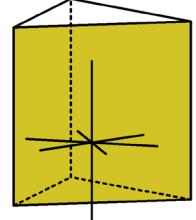
Trig. Prismen III.St.

$\{100\} / \{10\bar{1}0\}$



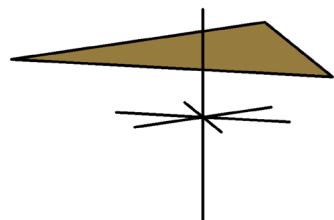
Trig. Prismen I.St.

$\{110\} / \{11\bar{2}0\}$



Trig. Prismen II.St.

$\{001\} / \{0001\}$



Basispedien

Mineral-Bsp.:

Susannite $Pb_4[(SO_4)/(CO_3)_2/(OH)_2]$

Carlinit TlS_2

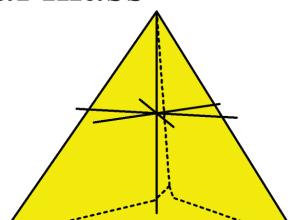
Bleigermanat(Tieftemp.Modifikation) $Pb_5Ge_3O_{11}$

Det trigonala kristallsystemet

Hemimorf av trig. tetartoedri
Trigonal-pyramidal klass

Symbol: 3 eller C₃

Allmän form:
 $\{hkl\} / \{hkil\}$



Trigonal Pyramid III. St.



$\{h01\} / \{h0\bar{h}\}$	$\{hh1\} / \{h\bar{h}2\bar{h}1\}$	$\{hk0\} / \{hki0\}$
<u>Trig. Pyramid I.St.</u>	<u>Trig. Pyramid II.St.</u>	<u>Trig. Prisma III.St.</u>
$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$
<u>Trig. Prisma I.St.</u>	<u>Trig. Prisma II.St.</u>	<u>Baspedion</u>

Exempel på mineral:

Susannit $Pb_4[(SO_4)/(CO_3)_2/(OH)_2]$

Carlinit TlS_2

Blygermanat (lägtemp. ändring) $Pb_5Ge_3O_{11}$

Trigonales Kristallsystem

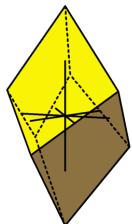
Hexagonal-trapezoedrische

Tetartoedrie

Trigonal-trapezoedrische Klasse

Symbol: 32 oder D_3

Allgemeine Form:
 $\{hkl\} / \{hkil\}$



Trig. Trapezoeder



$\{h0l\} / \{h0\bar{h}l\}$	$\{hh\bar{l}\} / \{h\bar{h}2\bar{h}l\}$	$\{hk0\} / \{hki0\}$

$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$

Mineral-Bsp.:

Zinnober/Cinnabarit HgS

Tiefquarz SiO_2

Selen Se

Tellur Te

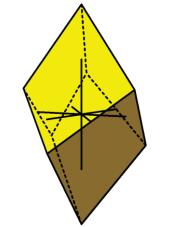
Det trigonala kristallsystemet

Hexagonal-trapezoedrisk tetartoedri

Trigonal-trapezoedrisk klass

Symbol: 32 eller D_3

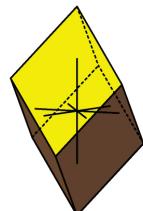
Allmän form:
 $\{hkl\} / \{hkil\}$



Trig. Trapezoeder

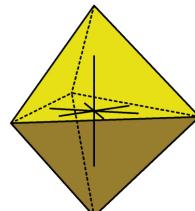


$\{h0l\} / \{h0\bar{h}l\}$



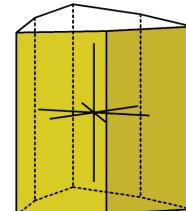
Romboeder I.St.

$\{hh\bar{l}\} / \{hh\bar{2}h\bar{l}\}$



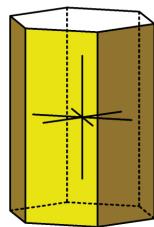
Trig. Diyramid II.St.

$\{hk0\} / \{hki0\}$



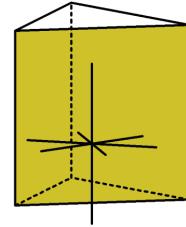
Ditrig. Prisma II.St.

$\{100\} / \{10\bar{1}0\}$



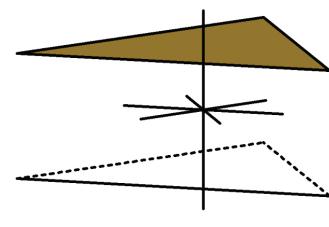
Hex. Prisma I.St.

$\{110\} / \{11\bar{2}0\}$



Trig. Prisma II.St.

$\{001\} / \{0001\}$



Baspinakoid

Exempel på mineral:

Cinnober HgS

Lågkvarts SiO₂

Selen Se

Tellur Te

Trigonales Kristallsystem

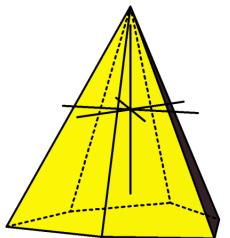
Hemimorphie d. rhomboedrischen

Hemiedrie

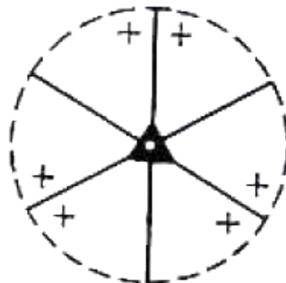
Ditrigonal-pyramidal Klasse

Symbol: 3m oder C_{3v}

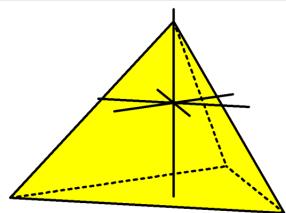
Allgemeine Form:
 $\{hkl\} / \{hk\bar{l}\}$



Ditrig. Pyramiden I.St.

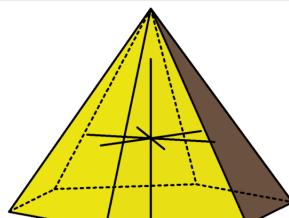


$\{h0l\} / \{h0\bar{h}l\}$



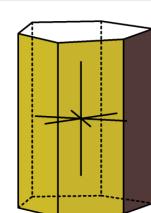
Trig. Pyramiden I.St.

$\{hh\bar{l}\} / \{hh2\bar{h}l\}$



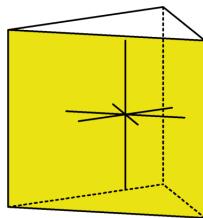
Hex. Pyramiden II.St.

$\{hk0\} / \{hki0\}$



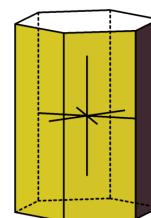
Ditrig. Prismen II.St.

$\{100\} / \{10\bar{1}0\}$



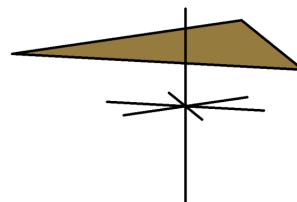
Trig. Prismen I.St.

$\{110\} / \{11\bar{2}0\}$



Hex. Prisma II.St.

$\{001\} / \{0001\}$



Basispedien

Mineral-Bsp.:

Turmalin (X)(Y₃)(Z₆)[Si₆O₁₈/(BO₃)₃/(V₃)(W)]

Proustit Ag₃AsS₃

Lithiumniobat LiNbO₃

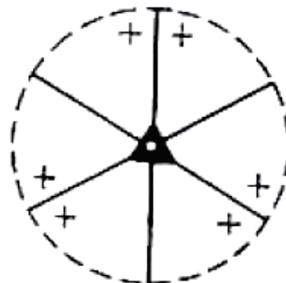
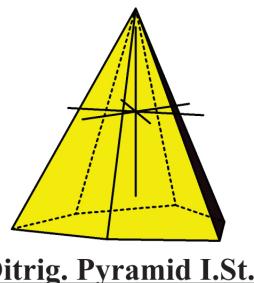
Det trigonala kristallsystemet

Hemimorfi av romboedrisk hemiedri

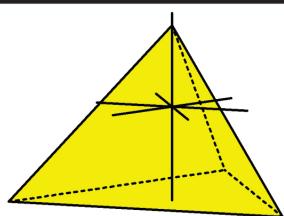
Ditrigonal-pyramidal klass

Symbol: 3m eller C_{3v}

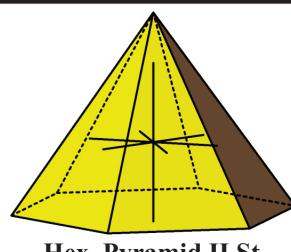
Allmän form:
 $\{hkl\} / \{hk\bar{l}\}$



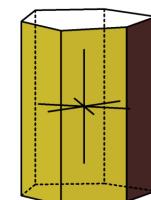
$\{h0l\} / \{h0\bar{h}l\}$



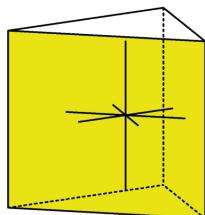
$\{hh\bar{l}\} / \{hh\bar{2}\bar{h}l\}$



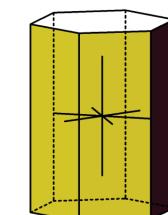
$\{hk0\} / \{hki0\}$



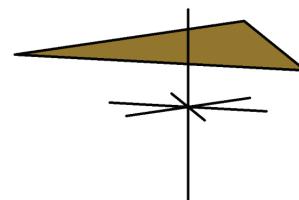
$\{100\} / \{10\bar{1}0\}$



$\{110\} / \{11\bar{2}0\}$



$\{001\} / \{0001\}$



Exempel på mineral:

Turmalin (X)(Y₃)(Z₆)[Si₆O₁₈/(BO₃)₃/(V₃)(W)]

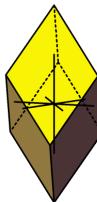
Proustit Ag₃AsS₃

Lithiumniobat LiNbO₃

Trigonales Kristallsystem

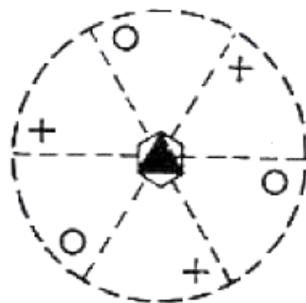
Hexagonal-rhomboedrische
Tetartoedrie
Rhomboedrische Klasse

Allgemeine Form:
 $\{hkl\} / \{hkil\}$

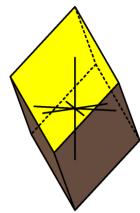


Rhomboeder III.St.

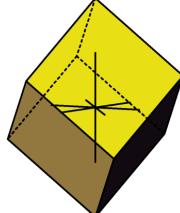
Symbol: $\bar{3}$ oder C_{3i}



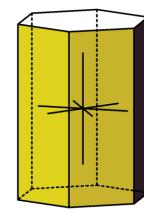
$\{h0l\} / \{h0\bar{h}\bar{l}\}$	$\{hh\bar{l}\} / \{h\bar{h}2\bar{h}l\}$	$\{hk0\} / \{hki0\}$
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Rhomboeder I.St.

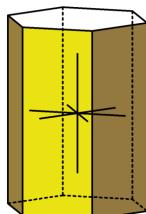


Rhomboeder II.St.

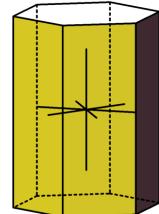


Hex. Prismen II.St.

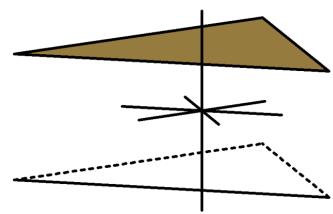
$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$
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Hex. Prisma I.St.



Hex. Prisma II.St.



Basispinakoid

Mineral-Bsp.:

Dolomit $\text{CaMg}[(\text{CO}_3)_2]$

Dioptas $\text{Cu}[\text{Si}_6\text{O}_{18}]$

Phenakit Be_2SiO_4

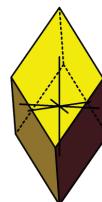
Det trigonala kristallsystemet

Hexagonal-romboedrisk tetartoedri

Romboedrisk klass

Symbol: $\bar{3}$ eller C_{3i}

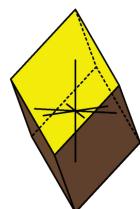
Allmän form:
 $\{hkl\} / \{hkil\}$



Romboeder III.St.

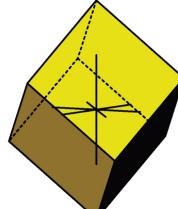


$\{h0l\} / \{h0\bar{h}l\}$



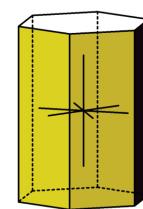
Romboeder I.St.

$\{hh\ell\} / \{hh\bar{2}h\ell\}$



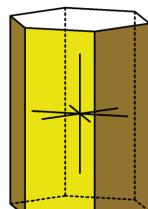
Romboeder II.St.

$\{hk0\} / \{hki0\}$



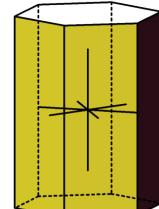
Hex. Prisma II.St.

$\{100\} / \{10\bar{1}0\}$



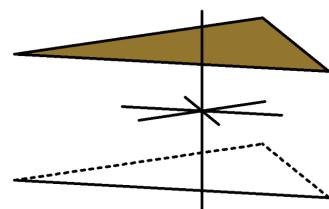
Hex. Prisma I.St.

$\{110\} / \{11\bar{2}0\}$



Hex. Prisma II.St.

$\{001\} / \{0001\}$



Baspinakoid

Exempel på mineral:

Dolomit $\text{CaMg}[(\text{CO}_3)_2]$

Dioptas $\text{Cu}[\text{Si}_6\text{O}_{18}]$

Fenakit Be_2SiO_4

Trigonales Kristallsystem

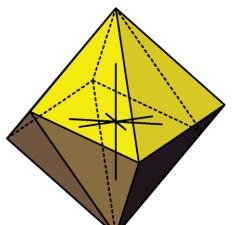
Hexagonal-rhomboedrische

Hemiedrie

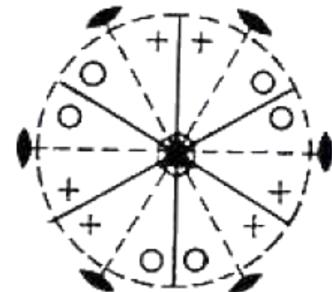
Ditrigonal-skalenoedrische Klasse

Symbol: $\bar{3}$ 2/m oder D_{3d}
 $(\bar{3}m)$

Allgemeine Form:
 $\{hkl\} / \{hkil\}$



Ditrig. Skalenoeder



$\{h0l\} / \{h0\bar{h}l\}$	$\{hh\bar{l}\} / \{hh\bar{2}h\bar{l}\}$	$\{hk0\} / \{hki0\}$

$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$

Mineral-Bsp.:

Calcit CaCO_3

Siderit FeCO_3

Korund Al_2O_3

Rhodochrosit MnCO_3

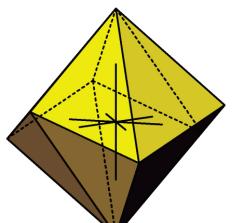
Hämatit Fe_2O_3

Det trigonala kristallsystemet

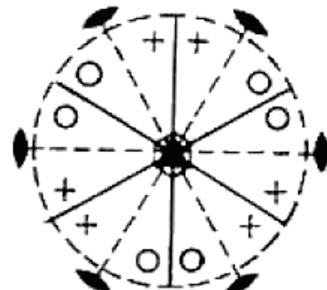
Hexagonal-romboedrisk hemiedri

Ditrigonal-skalenoedrisk klass Symbol: $\bar{3}$ 2/m eller D_{3d}
 $(\bar{3}m)$

Allmän form:
 $\{hkl\} / \{hkil\}$



Ditrig. Skalenoeder



$\{h0l\} / \{h0\bar{h}l\}$	$\{hh\bar{l}\} / \{hh\bar{2}h\bar{l}\}$	$\{hk0\} / \{hki0\}$

$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$

Exempel på mineral:

Kalcit CaCO_3

Siderit FeCO_3

Korund Al_2O_3

Rodokrosit MnCO_3

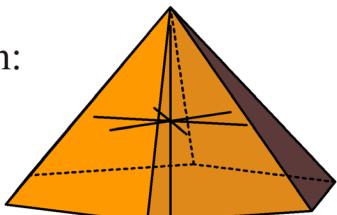
Hematit Fe_2O_3

Hexagonales Kristallsystem

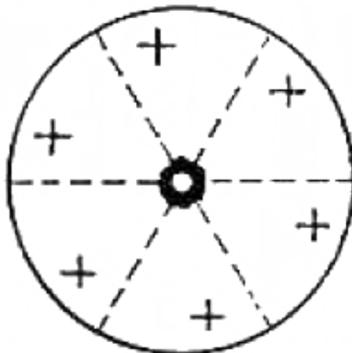
Hexagonale Tetartoedrie
Hexagonal-pyramidale Klasse

Symbol: 6 oder C₆

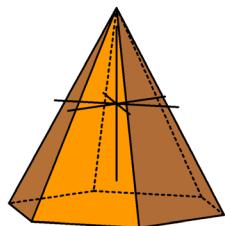
Allgemeine Form:
 $\{hkl\} / \{hkil\}$



Hexagonale Pyramiden III. St.

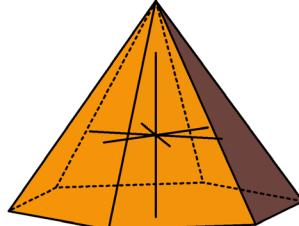


$\{h0l\} / \{h0\bar{l}\}$



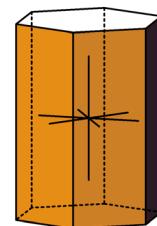
Hex. Pyramiden I. St.

$\{hh\bar{l}\} / \{hh2\bar{h}\bar{l}\}$



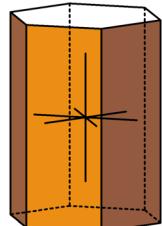
Hex. Pyramiden II. St.

$\{hk0\} / \{hki0\}$



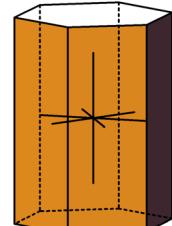
Hex. Prismen III. St.

$\{100\} / \{10\bar{1}0\}$



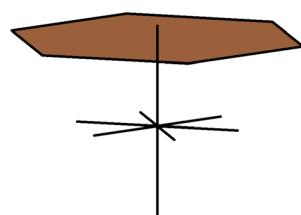
Hex. Prisma I. St.

$\{110\} / \{11\bar{2}0\}$



Hex. Prisma II. St.

$\{001\} / \{0001\}$



Basispedien

Mineral-Bsp.:

Lithiumiodat $\alpha\text{-LiIO}_3$

Nephelin $(\text{Na},\text{K})[\text{AlSiO}_4]$

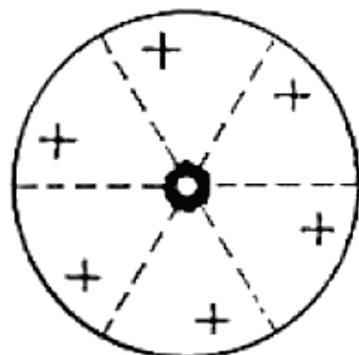
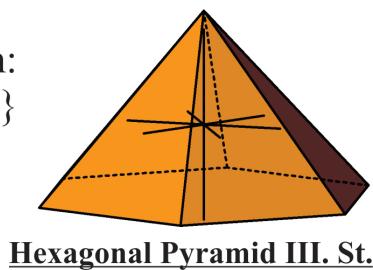
Thaumasit $\text{Ca}_3[\text{SO}_4/\text{CO}_3/\text{Si(OH)}_6]*12\text{H}_2\text{O}$

Det hexagonala kristallsystemet

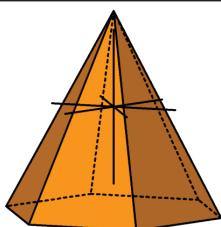
Hexagonal tetartoedri
Hexagonal-pyramidal klass

Symbol: 6 eller C₆

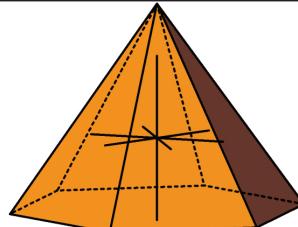
Allmän form:
 $\{hkl\} / \{hkil\}$



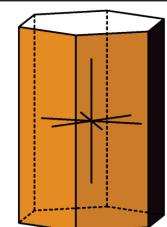
$\{h0l\} / \{h0\bar{l}\}$



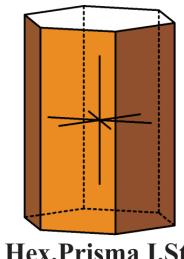
$\{hh\bar{l}\} / \{hh\bar{2}h\bar{l}\}$



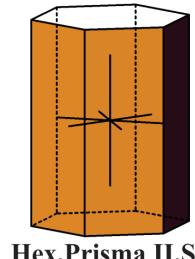
$\{hk0\} / \{hki0\}$



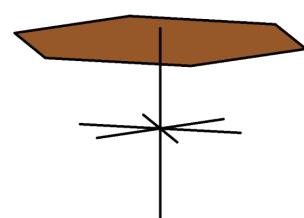
$\{100\} / \{10\bar{1}0\}$



$\{110\} / \{11\bar{2}0\}$



$\{001\} / \{0001\}$



Exempel på mineral:

Litiumiodat $\alpha\text{-LiIO}_3$
 Nefelin $(\text{Na},\text{K})[\text{AlSiO}_4]$
 Taumasit $\text{Ca}_3[\text{SO}_4/\text{CO}_3/\text{Si(OH)}_6]*12\text{H}_2\text{O}$

Hexagonales Kristallsystem

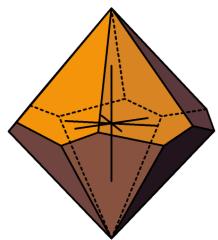
Hexagonal-trapezoedrische

Hemiedrie

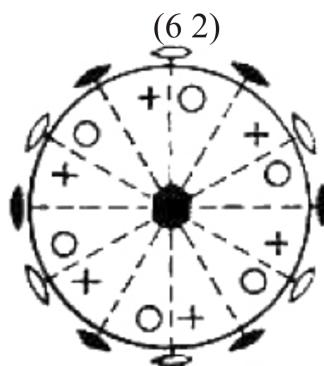
Hexagonal-trapezoedrische Klasse

Symbol: 622 oder D_6

Allgemeine Form:
 $\{hkl\} / \{hkil\}$

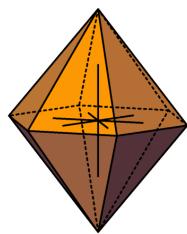


Hexagonaler Trapezoeder



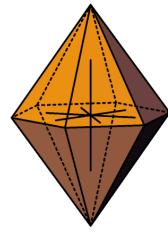
(6 2)

$\{h0l\} / \{h0\bar{l}\}$



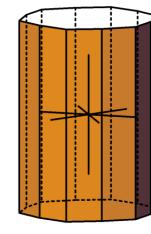
Hex.Dipyramiden I.St.

$\{hh\bar{l}\} / \{hh\bar{2}h\bar{l}\}$



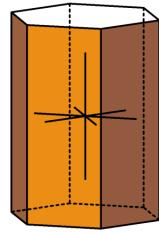
Hex. Dipyramiden II.St.

$\{hk0\} / \{hki0\}$



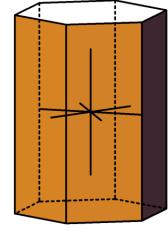
Dihex. Prismen

$\{100\} / \{10\bar{1}0\}$



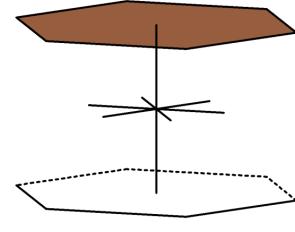
Hex.Prisma I.St.

$\{110\} / \{11\bar{2}0\}$



Hex. Prisma II.St.

$\{001\} / \{0001\}$



Basispinakoid

Mineral-Bsp.:

Hochquarz SiO_2

Virgilit $\text{LiAlSi}_2\text{O}_6$

Rhabdophan $(\text{Ce},\text{La})\text{PO}_4 * \text{H}_2\text{O}$

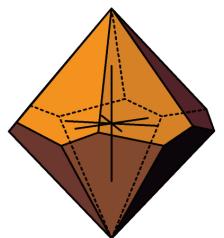
Det hexagonala kristallsystemet

Hexagonal-trapezoedrisk hemiedri

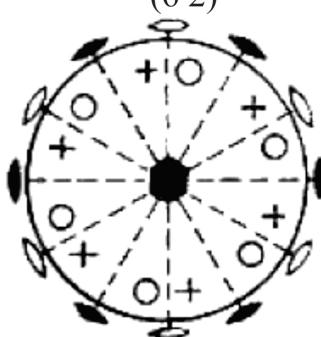
Hexagonal-trapezoedrisk klass

Symbol: 622 eller D_6
(6 2)

Allmän form:
 $\{hkl\} / \{hkil\}$



Hexagonal Trapezoeder



$\{h0l\} / \{h0\bar{l}\}$	$\{hh\bar{l}\} / \{h\bar{h}2\bar{h}l\}$	$\{hk0\} / \{hki0\}$

$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$

Exempel på mineral:

Högkvarts SiO_2

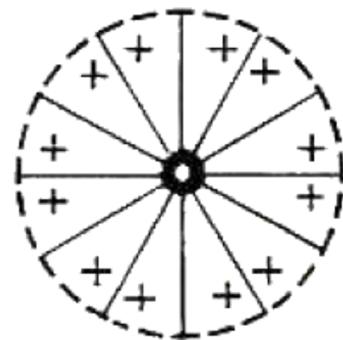
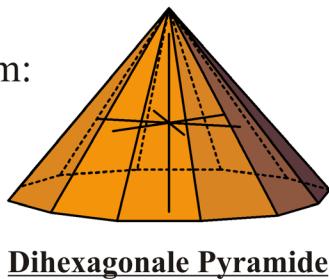
Virgilit $\text{LiAlSi}_2\text{O}_6$

Rabdofan $(\text{Ce},\text{La})\text{PO}_4 * \text{H}_2\text{O}$

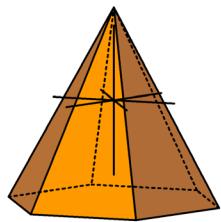
Hexagonales Kristallsystem

Hexagonale Hemimorphie Symbol: 6mm oder C_{6v}
 Dihexagonal-pyramidal Klasse

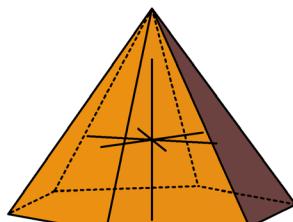
Allgemeine Form:
 $\{hkl\} / \{hkil\}$



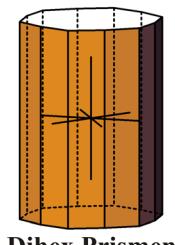
$\{h0l\} / \{h0\bar{l}\}$



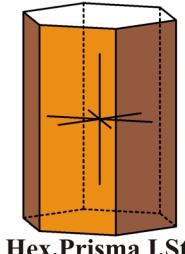
$\{hh\bar{l}\} / \{hh2\bar{h}l\}$



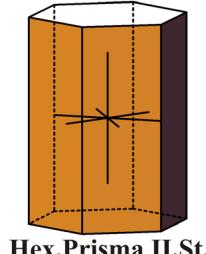
$\{hk0\} / \{hki0\}$



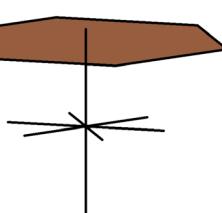
$\{100\} / \{10\bar{1}0\}$



$\{110\} / \{11\bar{2}0\}$



$\{001\} / \{0001\}$



Mineral-Bsp.:

Wurzit ZnS

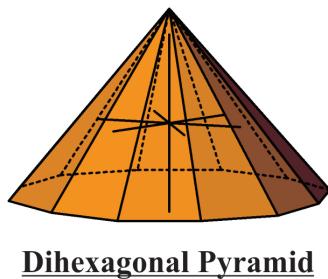
Zinkit ZnO

Greenockit CdS

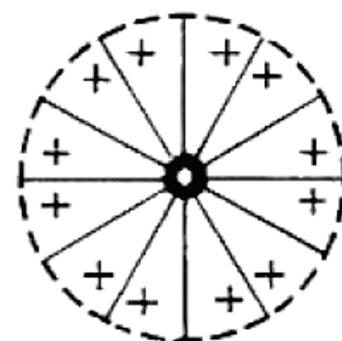
Det hexagonala kristallsystemet

Hexagonal hemimorfi
Dihexagonal-pyramidal klass

Allmän form:
 $\{hkl\} / \{hkil\}$



Symbol: 6mm eller C_{6v}



$\{h0l\} / \{h0\bar{l}\}$	$\{hh\bar{l}\} / \{hh\bar{2}h\bar{l}\}$	$\{hk0\} / \{hki0\}$
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 <u>Hex.Pyramid I.St.</u>	 <u>Hex. Pyramid II.St.</u>	 <u>Dihex.Prisma</u>
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$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$
 <u>Hex.Prisma I.St.</u>	 <u>Hex.Prisma II.St.</u>	 <u>Baspedion</u>

Exempel på mineral:

Wurtzit ZnS

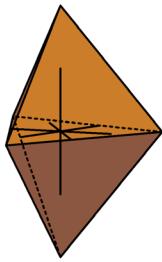
Zinkit ZnO

Greenockit CdS

Hexagonales Kristallsystem

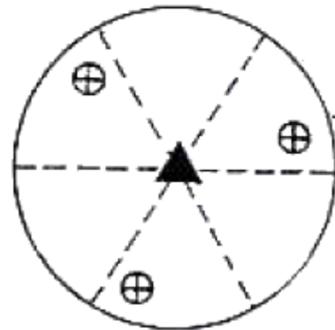
Trigonale Tetartoedrie
Trigonal-dipyramidal Klasse

Allgemeine Form:
 $\{hkl\} / \{hkil\}$

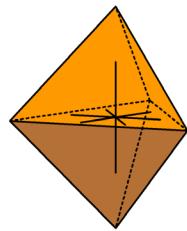


Trig. Dipyramiden III.St.

Symbol: $\bar{6}$ oder C_{3h}

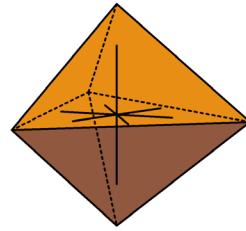


$\{h0l\} / \{h0\bar{l}\}$



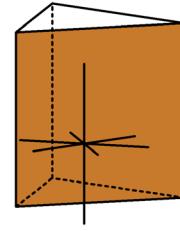
Trig. Dipyramiden I.St.

$\{hh\bar{l}\} / \{h\bar{h}2\bar{l}\}$



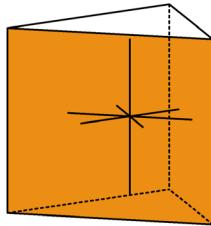
Trig. Dipyramiden II.St.

$\{hk0\} / \{hki0\}$



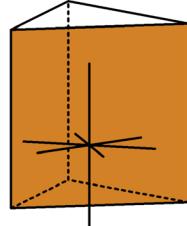
Trig. Prismen III.St.

$\{100\} / \{10\bar{1}0\}$



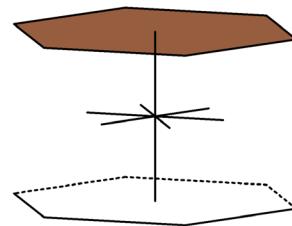
Trig. Prismen I.St.

$\{110\} / \{11\bar{2}0\}$



Trig. Prismen II.St.

$\{001\} / \{0001\}$



Basispinakoid

Mineral-Bsp.:

Bleigermanat(Hochtemp.Modifikation) $Pb_5[Ge_3O_{11}]$

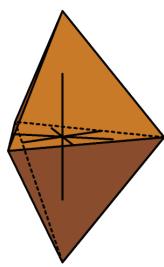
Penfieldit $Pb_2[Cl_3/OH]$

Ganomalit $Pb_9Ca_5Mn[(Si_2O_7)_3/(SiO_4)_3]$

Det hexagonala kristallsystemet

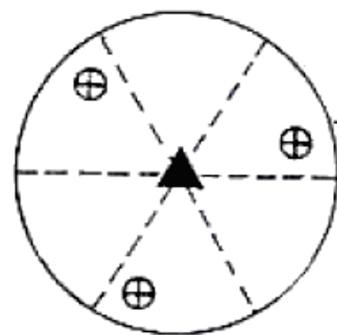
Trigonal tetartoedri
Trigonal-dipyramidal klass

Allmän form:
 $\{hkl\} / \{hkil\}$



Trig. Dipyramid III.St.

Symbol: $\bar{6}$ eller C_{3h}



$\{h0l\} / \{h0\bar{l}\}$	$\{hh\bar{l}\} / \{hh2\bar{h}l\}$	$\{hk0\} / \{hki0\}$
<u>Trig. Dipyramid I.St.</u>	<u>Trig. Dipyramid II.St.</u>	<u>Trig. Prisma III.St.</u>
$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$
<u>Trig. Prisma I.St.</u>	<u>Trig. Prisma II.St.</u>	<u>Baspinakoid</u>

Exempel på mineral:

Blygermanat (högtemp. ändring) $Pb_5[Ge_3O_{11}]$

Penfieldit $Pb_2[Cl_3/OH]$

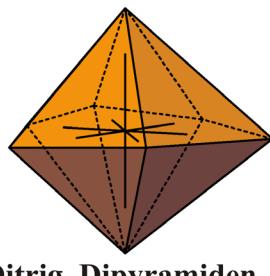
Ganomalit $Pb_9Ca_5Mn[(Si_2O_7)_3/(SiO_4)_3]$

Hexagonales Kristallsystem

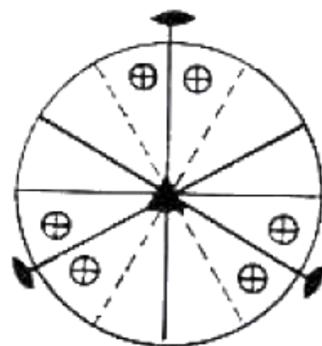
Trigonale Hemiedrie
Ditrigonal-dipyramidal Klasse

Symbol: $\bar{6}2m$ oder D_{3h}

Allgemeine Form:
 $\{hkl\} / \{hkil\}$



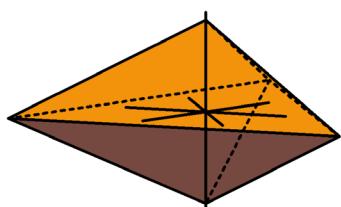
Ditrig. Dipyramiden



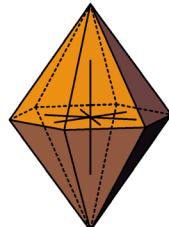
$\{h0l\} / \{h0\bar{l}\}$

$\{hh\bar{l}\} / \{hh2\bar{h}\bar{l}\}$

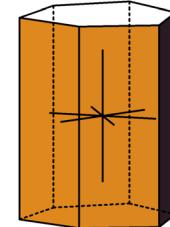
$\{hk0\} / \{hki0\}$



Trig. Dipyramiden I.St.



Hex. Dipyramiden II.St.

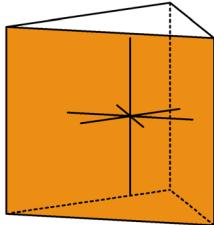


Ditrig. Prismen III.St.

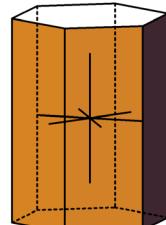
$\{100\} / \{10\bar{1}0\}$

$\{110\} / \{11\bar{2}0\}$

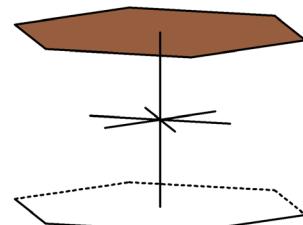
$\{001\} / \{0001\}$



Trig. Prismen I.St.



Hex. Prismen II.St.



Basispinakoid

Mineral-Bsp.:

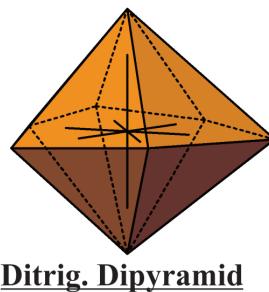
Benitoit $\text{BaTi}[\text{Si}_3\text{O}_9]$

Belkovit $\text{Ba}_3(\text{Nb}, \text{Ti})_6(\text{Si}_2\text{O}_7)_2\text{O}_{12}$

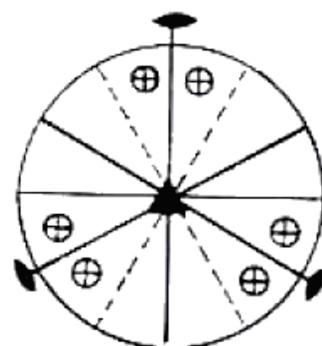
Det hexagonala kristallsystemet

Trigonal hemiedri
Ditrigonal-dipyramidal klass

Allmän form:
 $\{hkl\} / \{hkil\}$



Symbol: $\bar{6}2m$ eller D_{3h}



$\{h0l\} / \{h0\bar{l}\}$	$\{hh\bar{l}\} / \{hh2\bar{h}l\}$	$\{hk0\} / \{hki0\}$
<u>Trig. Dipyramid I.St.</u>	<u>Hex. Dipyramid II.St.</u>	<u>Ditrig. Prisma III.St.</u>
$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$
<u>Trig. Prisma I.St.</u>	<u>Hex. Prisma II.St.</u>	<u>Baspinakoid</u>

Exempel på mineral:

Benitoit $\text{BaTi}[\text{Si}_3\text{O}_9]$

Belkovit $\text{Ba}_3(\text{Nb}, \text{Ti})_6(\text{Si}_2\text{O}_7)_2\text{O}_{12}$

Hexagonales Kristallsystem

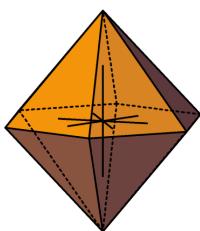
Hexagonal-pyramide

Hemiedrie

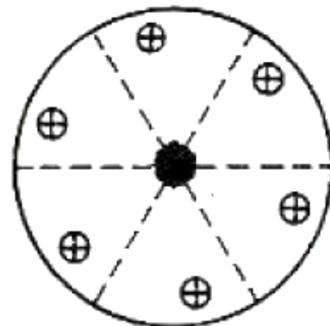
Hexagonal-dipyramidale Klasse

Symbol: 6/m oder C_{6v}

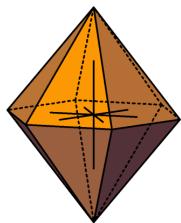
Allgemeine Form:
 $\{hkl\} / \{hkil\}$



Hexagonale Dipyramide III.St.

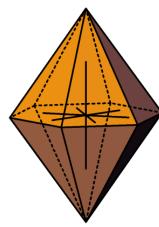


$\{h0l\} / \{h0\bar{l}\}$



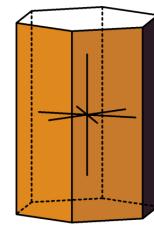
Hex.Dipyramiden I.St.

$\{hh\bar{l}\} / \{hh2\bar{h}l\}$



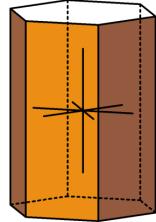
Hex. Dipyramiden II.St.

$\{hk0\} / \{hki0\}$



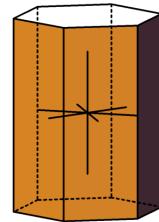
Hex.Prismen III.St.

$\{100\} / \{10\bar{1}0\}$



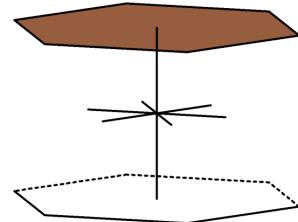
Hex.Prisma I.St.

$\{110\} / \{11\bar{2}0\}$



Hex.Prisma II.St.

$\{001\} / \{0001\}$



Basispinakoid

Mineral-Bsp.:

Apatit $(\text{Ca},\text{Ba},\text{Pb},\text{Sr},\text{etc.})_5[(\text{PO}_4)_3(\text{CO}_3)_3]/(\text{F},\text{Cl},\text{OH})]$

Pyromorphit $\text{Pb}_5[(\text{PO}_4)_3/\text{Cl}]$

Vanadinit $\text{Pb}_5[(\text{VO}_4)_3/\text{Cl}]$

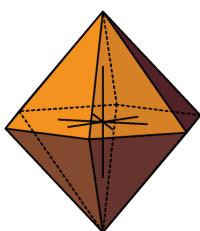
Det hexagonala kristallsystemet

Hexagonal-pyramidal hemiedri

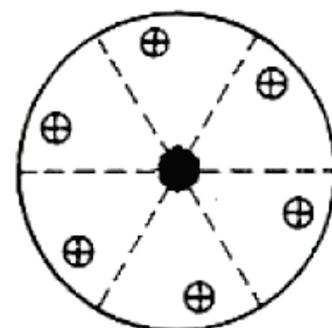
Hexagonal-dipyramidal klass

Symbol: 6/m eller C_{6v}

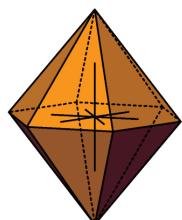
Allmän form:
 $\{hkl\} / \{hkil\}$



Hexagonal Dipyramid III.St.

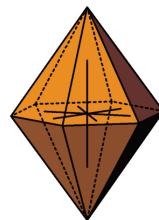


$\{h0l\} / \{h0\bar{l}\}$



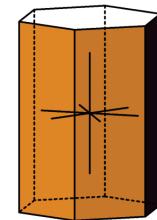
Hex.Dipyramid I.St.

$\{hh\bar{l}\} / \{hh2\bar{h}l\}$



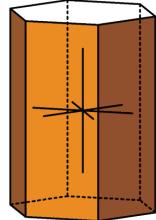
Hex. Dipyramid II.St.

$\{hk0\} / \{hki0\}$



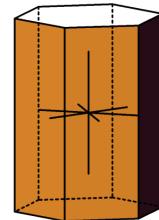
Hex.Prisma III.St.

$\{100\} / \{10\bar{1}0\}$



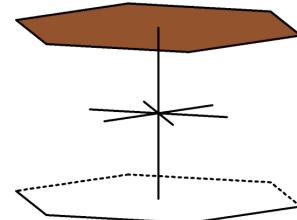
Hex.Prisma I.St.

$\{110\} / \{11\bar{2}0\}$



Hex.Prisma II.St.

$\{001\} / \{0001\}$



Baspinakoid

Exempel på mineral:

Apatit $(Ca, Ba, Pb, Sr, etc.)_5[(PO_4)_3/(F, Cl, OH)]$

Pyromorfit $Pb_5[(PO_4)_3/Cl]$

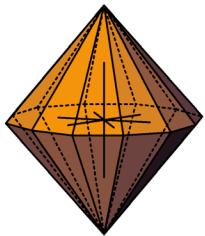
Vanadinit $Pb_5[(VO_4)_3/Cl]$

Hexagonales Kristallsystem

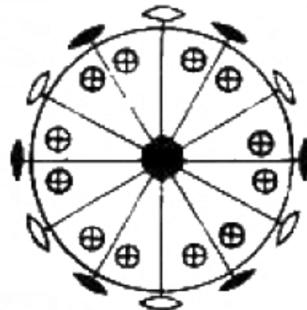
Hexagonale Holoedrie
Dihexagonal-dipyramidal Klasse

Symbol: 6/mmm oder D_{6h}
(6/m 2/m 2/m)

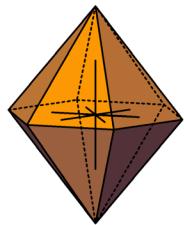
Allgemeine Form:
 $\{hkl\} / \{hkil\}$



Dihexagonal Dipyramiden

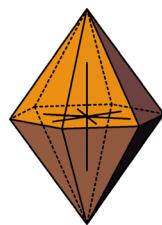


$\{h0l\} / \{h0\bar{l}\}$



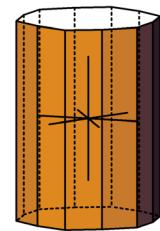
Hex.Dipyramiden I.St.

$\{hh\bar{l}\} / \{hh2\bar{h}l\}$



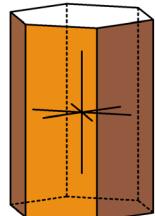
Hex.Dipyramiden II.St.

$\{hk0\} / \{hki0\}$



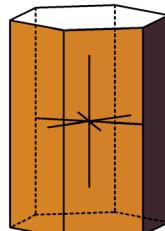
Dihex.Prismen

$\{100\} / \{10\bar{1}0\}$



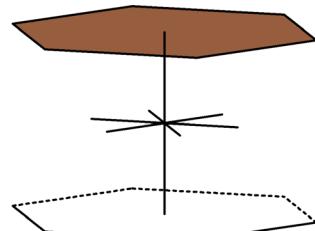
Hex.Prisma I.St.

$\{110\} / \{11\bar{2}0\}$



Hex.Prisma II.St.

$\{001\} / \{0001\}$



Basispinakoid

Mineral-Bsp.:

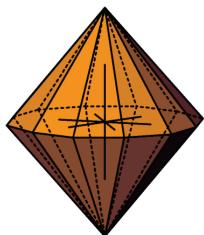
Beryll $Be_3Al_2[Si_6O_{18}]$	Covellin CuS
Graphit C	Eis H_2O
Hochtridymit SiO_2	

Det hexagonala kristallsystemet

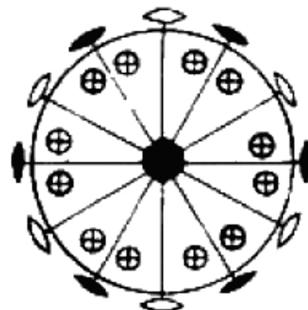
Hexagonal holoedri
Dihexagonal-dipyramidal klass

Symbol: 6/mmm eller D_{6h}
(6/m 2/m 2/m)

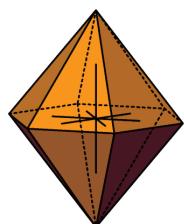
Allmän form:
 $\{hkl\} / \{hkil\}$



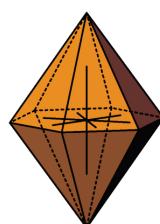
Dihexagonal Dipyramid



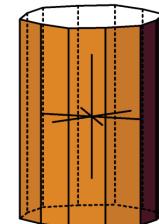
$\{h0l\} / \{h0\bar{l}\}$	$\{hh\bar{l}\} / \{h\bar{h}2\bar{h}l\}$	$\{hk0\} / \{hki0\}$
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Hex.Dipyramid I.St.

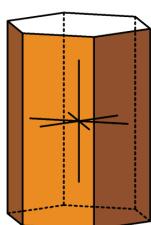


Hex.Dipyramid II.St.

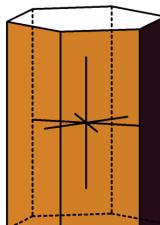


Dihex.Prisma

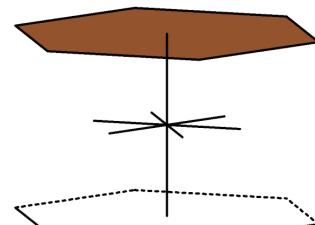
$\{100\} / \{10\bar{1}0\}$	$\{110\} / \{11\bar{2}0\}$	$\{001\} / \{0001\}$
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Hex.Prisma I.St.



Hex.Prisma II.St.



Baspinakoid

Exempel på mineral:

Beryll $Be_3Al_2[Si_6O_{18}]$ Covellin CuS

Grafit C Is H_2O

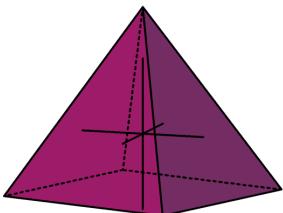
Tridymit SiO_2

Tetragonales Kristallsystem

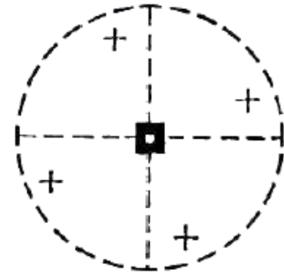
Hemimorphie d. tetragonal-pyramidalen Hemiedrie
Tetragonal-pyramidale Klasse

Symbol: 4 oder C_4

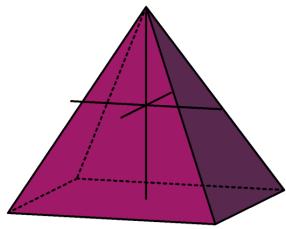
Allgemeine Form:
 $\{hkl\}$



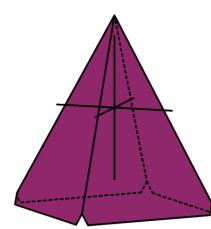
Tetrag. Pyramiden III.St.



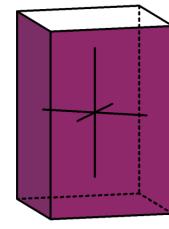
$\{h0l\}$	$\{hh0\}$	$\{hk0\}$
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Tetrag. Pyramiden II.St.

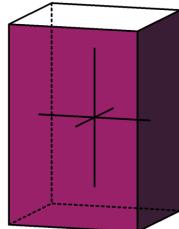


Tetrag. Pyramiden I.St.

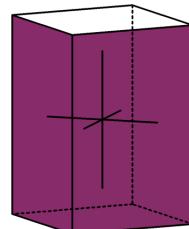


Tetrag. Prismen III.St.

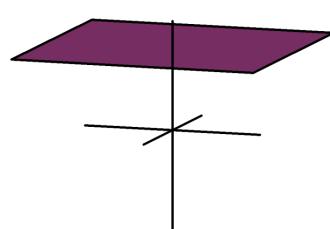
$\{100\}$	$\{110\}$	$\{001\}$
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Tetrag. Prisma II.St.



Tetrag. Prisma I.St.



Basispedien

Mineral-Bsp.:

Piypite $K_2Cu_2[O/(SO_4)_2]$

Pinnoite $Mg[B_2O_4]*3H_2O$

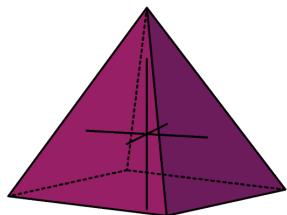
Perkleveite-(Ce) $(Ce,La,Nd)_2[Si_2O_7]$

Det tetragonala kristallsystemet

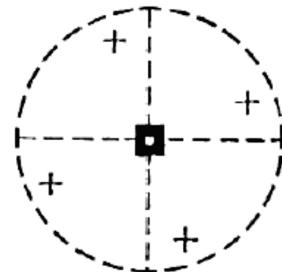
Hemimorfi av tetragonal-pyramidal hemiedri
Tetragonal-pyramidal klass

Symbol: 4 eller C₄

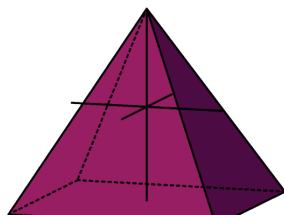
Allmän form:
{hkl}



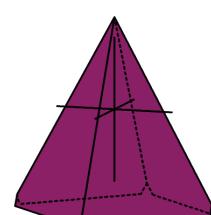
Tetrag. Pyramid III.St.



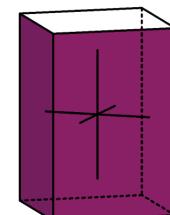
{h0l}	{hh1}	{hk0}
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Tetrag.Pyramid II.St.

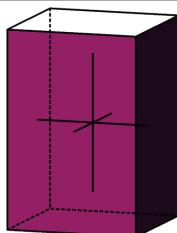


Tetrag.Pyramid I.St.

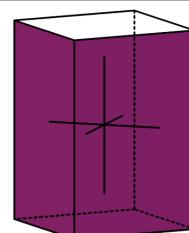


Tetrag. Prisma III.St.

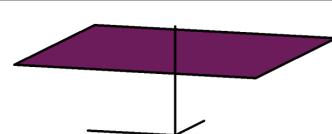
{100}	{110}	{001}
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Tetrag.Prisma II.St.



Tetrag.Prisma I.St.



Baspedion

Exempel på mineral:

Piypit K₂Cu₂[O/(SO₄)₂]

Pinnoit Mg[B₂O₄]^{*}3H₂O

Percleveit-(Ce) (Ce,La,Nd)₂[Si₂O₇]

Tetragonales Kristallsystem

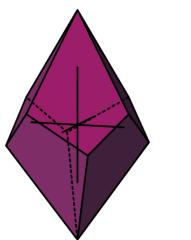
Tetragonal-trapezoedrische

Hemiedrie

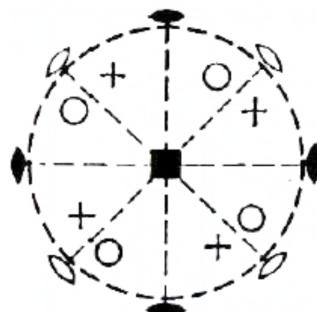
Tetragonal-trapezoedrische Klasse

Symbol: 422 oder D_4

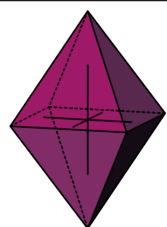
Allgemeine Form:
 $\{hkl\}$



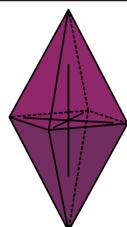
Tetrag. Trapezoeder



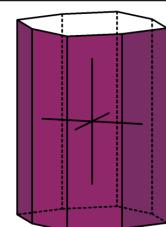
$\{h0l\}$	$\{hh1\}$	$\{hk0\}$
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Tetrag.Dipyramiden II.St.

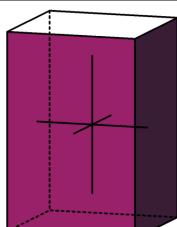


Tetrag.Dipyramiden I.St.

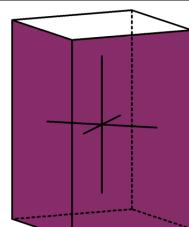


Ditetrag. Prismen

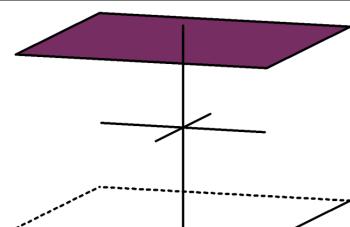
$\{100\}$	$\{110\}$	$\{001\}$
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Tetrag.Prisma II.St.



Tetrag.Prisma I.St.



Basispinakoid

Mineral-Bsp.:

Retgersit $\text{Ni}[\text{SO}_4] \cdot 6\text{H}_2\text{O}$

Maucherit $\text{Ni}_{11}\text{As}_8$

Cristobalit SiO_2

Det tetragonala kristallsystemet

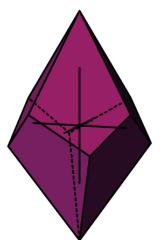
Tetragonal-trapezoedrisk

hemiedri

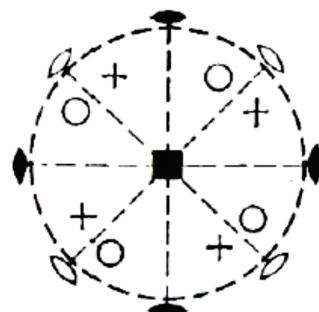
Tetragonal-trapezoedrisk klass

Symbol: 422 eller D_4

Allmän form:
 $\{hkl\}$



Tetrag. Trapezoeder



$\{h0l\}$	$\{hh\}$	$\{hk0\}$
 <u>Tetrag.Dipyramid II.St.</u>	 <u>Tetrag.Dipyramid I.St.</u>	 <u>Ditetrag. Prisma</u>

$\{100\}$	$\{110\}$	$\{001\}$
 <u>Tetrag.Prisma II.St.</u>	 <u>Tetrag.Prisma I.St.</u>	 <u>Baspinakoid</u>

Exempel på mineral:

Retgersit $\text{Ni}[\text{SO}_4]^*6\text{H}_2\text{O}$

Maucherit $\text{Ni}_{11}\text{As}_8$

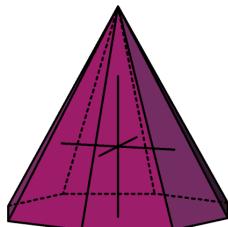
Cristobalit SiO_2

Tetragonales Kristallsystem

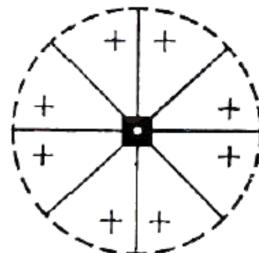
Hemimorphie d. tetragonalen
Holoedrie
Ditetragonal-pyramidal Klasse

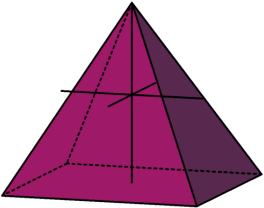
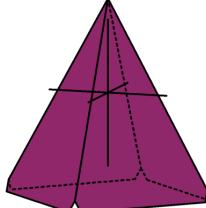
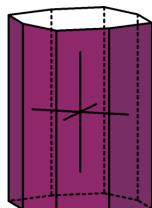
Symbol: 4mm oder C_{4v}

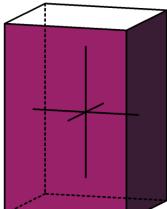
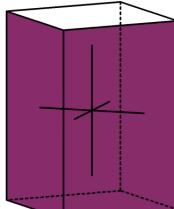
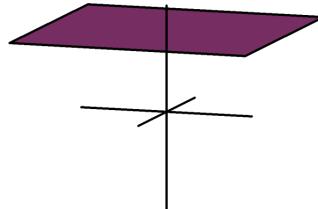
Allgemeine Form:
 $\{hkl\}$



Ditetrag. Pyramiden



$\{h0l\}$	$\{hh\}$	$\{hk0\}$
 <u>Tetrag. Pyramiden II.St.</u>	 <u>Tetrag. Pyramiden I.St.</u>	 <u>Ditetrag. Prismen</u>

$\{100\}$	$\{110\}$	$\{001\}$
 <u>Tetrag. Prisma II.St.</u>	 <u>Tetrag. Prisma I.St.</u>	 <u>Basispedien</u>

Mineral-Bsp.:

Diaboleit $Pb_2Cu[Cl_2/(OH)_4]$

Macedonite $PbTiO_3$

Nielsenite $PdCu_3$

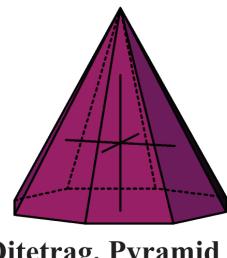
Det tetragonala kristallsystemet

Hemimorfi av tetragonal holoedri

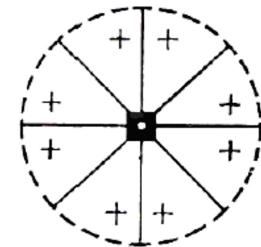
Ditetragonal-pyramidal klass

Symbol: 4mm eller C_{4v}

Allemän form:
 $\{hkl\}$



Ditetrag. Pyramid



$\{h0l\}$	$\{hh1\}$	$\{hk0\}$
 <u>Tetrag.Pyramid II.St.</u>	 <u>Tetrag.Pyramid I.St.</u>	 <u>Ditetrag. Prisma</u>

$\{100\}$	$\{110\}$	$\{001\}$
 <u>Tetrag.Prisma II.St.</u>	 <u>Tetrag.Prisma I.St.</u>	 <u>Baspedion</u>

Exempel på mineral:

Diaboleit $Pb_2Cu[Cl_2/(OH)_4]$

Macedonit $PbTiO_3$

Nielsenit $PdCu_3$

Tetragonales Kristallsystem

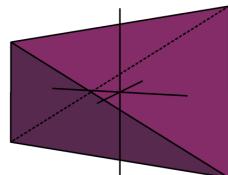
Tetragonal-sphenoidische

Tetartoedrie

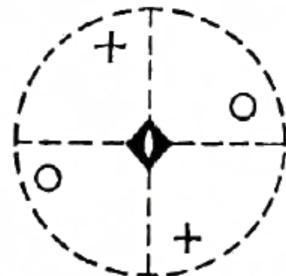
Tetragonal-disphenoidische Klasse

Symbol: $\bar{4}$ oder S_4

Allgemeine Form:
 $\{hkl\}$



Tetrag. Disphenoide III.St.



$\{h0l\}$	$\{hh1\}$	$\{hk0\}$
 <u>Tetrag. Disphenoide II.St.</u>	 <u>Tetrag. Disphenoide I.St.</u>	 <u>Tetrag. Prismen III.St.</u>

$\{100\}$	$\{110\}$	$\{001\}$
 <u>Tetrag. Prisma II.St.</u>	 <u>Tetrag. Prisma I.St.</u>	 <u>Basispinakoid</u>

Mineral-Bsp.:

Cahnit $Ca_2[AsO_4/B(OH)_4]$

Tugtupit $Na_8[(AlBeSi_4O_{12})_2/Cl_2]$

Schreibersit $(Fe,Ni)_3P$

Det tetragonala kristallsystemet

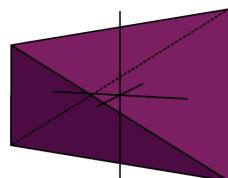
Tetragonal-sphenoid tetartoedri

Tetragonal-disphenoid klass

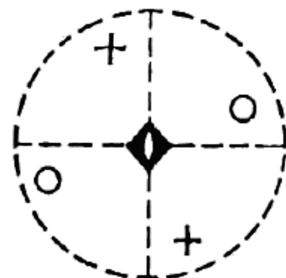
Symbol: $\bar{4}$ eller S_4

Allmän form:

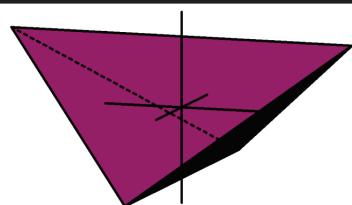
$\{hkl\}$



Tetrag.Disphenoid III.St.

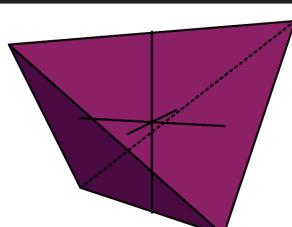


$\{h0l\}$



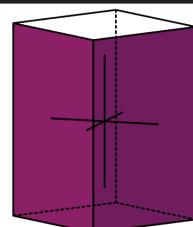
Tetrag.Disphenoid II.St.

$\{hh\}$



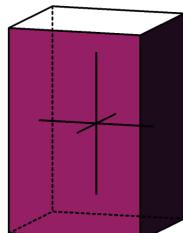
Tetrag.Disphenoid I.St.

$\{hk0\}$



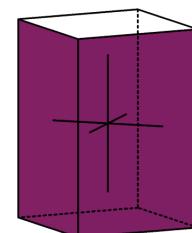
Tetrag.Prisma III.St.

$\{100\}$



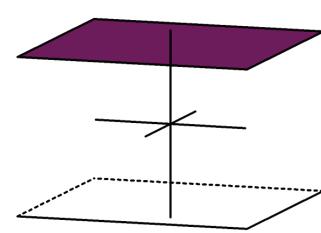
Tetrag.Prisma II.St.

$\{110\}$



Tetrag.Prisma I.St.

$\{001\}$



Baspinakoid

Exempel på mineral:

Cahnit $\text{Ca}_2[\text{AsO}_4/\text{B}(\text{OH})_4]$

Tugtupit $\text{Na}_8[(\text{AlBeSi}_4\text{O}_{12})_2/\text{Cl}_2]$

Schreibersit $(\text{Fe},\text{Ni})_3\text{P}$

Tetragonales Kristallsystem

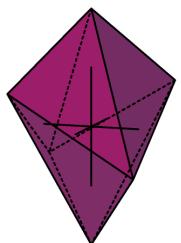
Tetragonal-sphenoidische

Hemiedrie

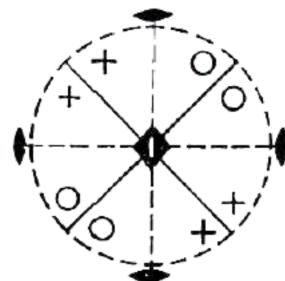
Tetragonal-skalenoedrische Klasse

Symbol: $\bar{4}2m$ oder D_{2d}

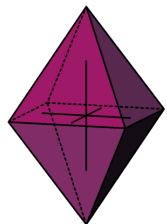
Allgemeine Form:
 $\{hkl\}$



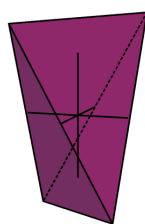
Tetrag. Skalenoeder



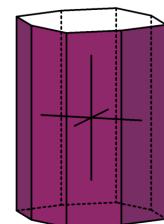
$\{h0l\}$	$\{hh\}$	$\{hk0\}$
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Tetrag. Dipyramiden II.St.

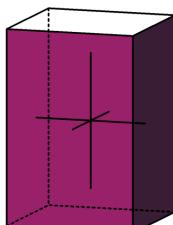


Tetrag. Dispinoide I.St.

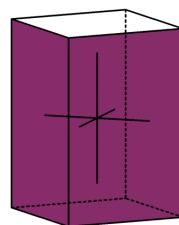


Ditetrag. Prismen

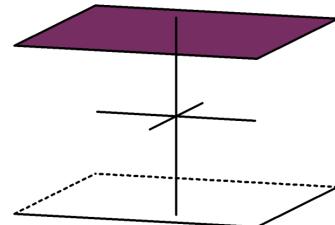
$\{100\}$	$\{110\}$	$\{001\}$
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Tetrag. Prisma II.St.



Tetrag. Prisma I.St.



Basispinakoid

Mineral-Bsp.:

Chalkopyrit $CuFeS_2$

Mooihoeekite $Cu_9Fe_9S_{16}$

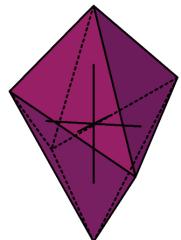
Stannit Cu_2FeSnS_4

Det tetragonala kristallsystemet

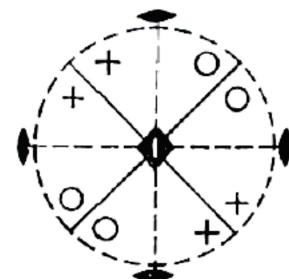
Tetragonal-sphenoid hemiedri

Tetragonal-skalenoedrisk klass Symbol: $\bar{4}2m$ eller D_{2d}

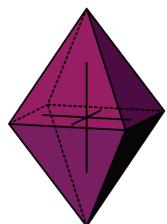
Allmän form:
 $\{hkl\}$



Tetrag. Skalenoeder

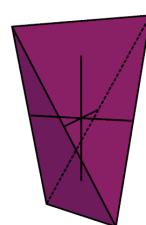


$\{h0l\}$



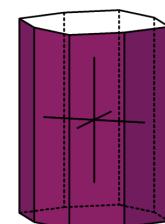
Tetrag.Dipyramid II.St.

$\{hh\}$



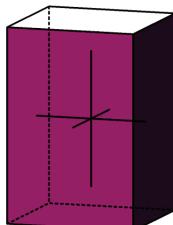
Tetrag.Disphenoid I.St.

$\{hk0\}$



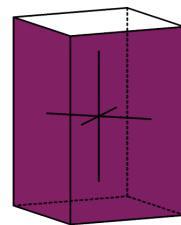
Ditetrag. Prisma

$\{100\}$



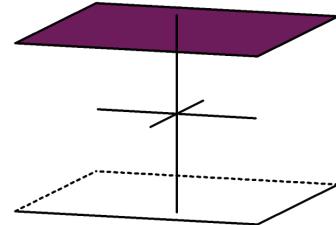
Tetrag.Prisma II.St.

$\{110\}$



Tetrag.Prisma I.St.

$\{001\}$



Baspinakoid

Exempel på mineral:

Chalkopyrit CuFeS_2

Mooihoeikit $\text{Cu}_9\text{Fe}_9\text{S}_{16}$

Stannit $\text{Cu}_2\text{FeSnS}_4$

Tetragonales Kristallsystem

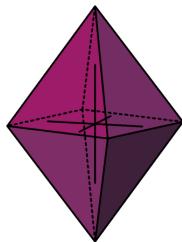
Tetragonal-dipyramidal

Hemiedrie

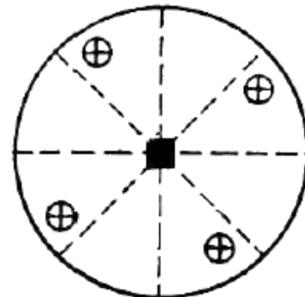
Tetragonal-dipyramidal Klasse

Symbol: 4/m oder C_{4h}

Allgemeine Form:
 $\{hkl\}$



Tetrag.Dipyramiden III.St.



$\{h0l\}$	$\{hh1\}$	$\{hk0\}$
 <u>Tetrag.Dipyramiden II.St.</u>	 <u>Tetrag.Dipyramiden I.St.</u>	 <u>Tetrag.Prismen III.St.</u>

$\{100\}$	$\{110\}$	$\{001\}$
 <u>Tetrag.Prisma II.St.</u>	 <u>Tetrag.Prisma I.St.</u>	 <u>Basispinakoid</u>

Mineral-Bsp.:

Scheelit $\text{Ca}[\text{WO}_4]$

Vesuvian $\text{Ca}_{19}(\text{Mg},\text{Fe},\text{Ti})_4\text{Al}_9[(\text{OH},\text{F})_{10}/(\text{SiO}_4)_{10}/(\text{Si}_2\text{O}_7)_4]$

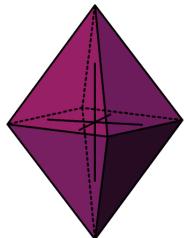
Fergusonit YNbO_4

Det tetragonala kristallsystemet

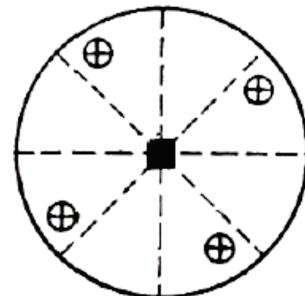
Tetragonal-dipyramidal hemiedri

Tetragonal-dipyramidal klass Symbol: 4/m eller C_{4h}

Allmän form:
 $\{hkl\}$



Tetrag.Dipyramid III.St.



$\{h0l\}$	$\{hh1\}$	$\{hk0\}$
 <u>Tetrag.Dipyramid II.St.</u>	 <u>Tetrag.Dipyramid I.St.</u>	 <u>Tetrag.Prisma III.St.</u>

$\{100\}$	$\{110\}$	$\{001\}$
 <u>Tetrag.Prisma II.St.</u>	 <u>Tetrag.Prisma I.St.</u>	 <u>Baspinakoid</u>

Exempel på mineral:

Scheelite Ca[WO₄]

Vesuvianit Ca₁₉(Mg,Fe,Ti)₄Al₉[(OH,F)₁₀/(SiO₄)₁₀/(Si₂O₇)₄]

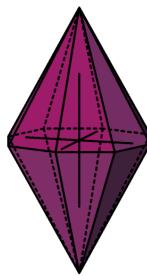
Fergusonit YNbO₄

Tetragonales Kristallsystem

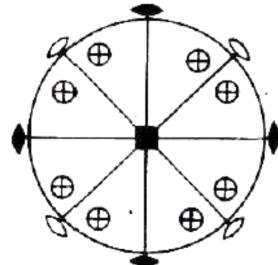
Tetragonale Holoedrie
Ditetragonal-dipyramidal Klasse

Symbol: $4/m\ 2/m\ 2/m$
 $(4/m\ m\ m)$ oder D_{4h}

Allgemeine Form:
 $\{hkl\}$



Ditetrag. Dipyramiden



$\{h0l\}$	$\{hh1\}$	$\{hk0\}$
 <u>Tetrag.Dipyramiden II.St.</u>	 <u>Tetrag.Dipyramiden I.St.</u>	 <u>Ditetrag.Prismen</u>

$\{100\}$	$\{110\}$	$\{001\}$
 <u>Tetrag.Prisma II.St.</u>	 <u>Tetrag.Prisma I.St.</u>	 <u>Basispinakoid</u>

Mineral-Bsp.:

Rutil TiO_2
Anatas TiO_2
Zirkon $Zr[SiO_4]$

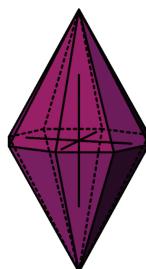
Det tetragonala kristallsystemet

Tetragonal holoedri

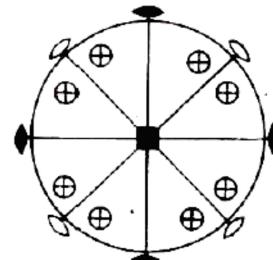
Ditetragonal-dipyramidal klass Symbol: 4/m 2/m 2/m

(4/m m m) eller D_{4h}

Allmän form:
 $\{hkl\}$



Ditetrag. Dipyramid



$\{h0l\}$	$\{hh\}$	$\{hk0\}$
 <u>Tetrag.Dipyramid II.St.</u>	 <u>Tetrag.Dipyramid I.St.</u>	 <u>Ditetrag.Prisma</u>

$\{100\}$	$\{110\}$	$\{001\}$
 <u>Tetrag.Prisma II.St.</u>	 <u>Tetrag.Prisma I.St.</u>	 <u>Baspinakoid</u>

Exempel på mineral:

Rutil TiO_2

Anatas TiO_2

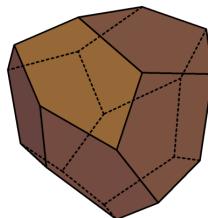
Zirkon $Zr[SiO_4]$

Kubisches Kristallsystem

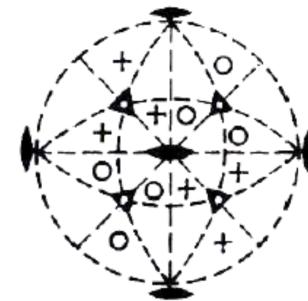
Kubische Tetartoedrie
Tetraedisch-pentagon-
doekaedrische Klasse

Symbol: 23 oder T

Allgemeine Form:
 $\{hkl\}$



Tetraedr.Pentagondodekaeder



$\{hll\}$	$\{hhl\}$	$\{hk0\}$

$\{111\}$	$\{110\}$	$\{100\}$

Mineral-Bsp.:

Langbeinit $K_2Mg_2[(SO_4)_3]$

Ullmannit NiSbS

Gersdorffit NiAsS

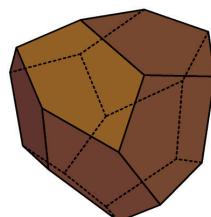
Det kubiska kristallsystemet

Kubisk tetartoedri

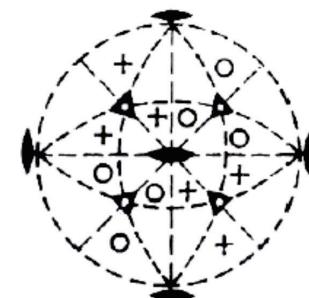
Tetraedrisk-pentagon-
dodekaedrisk klass

Symbol: 23 eller T

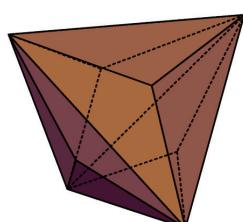
Allmän form:
 $\{hkl\}$



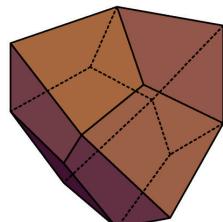
Tetraedr.Pentagondodekaeder



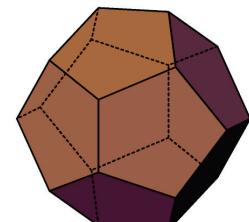
$\{hll\}$	$\{hhl\}$	$\{hk0\}$
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Pyramidentetraeder

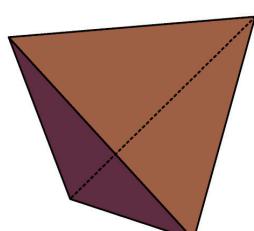


Deltoiddodekaeder

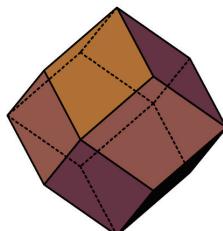


Pentagondodekaeder

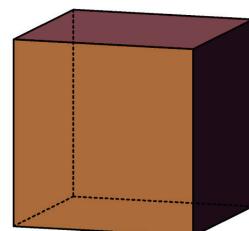
$\{111\}$	$\{110\}$	$\{100\}$
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Tetraeder



Rombdodekaeder



Kub

Exempel på mineral:

Langbeinit $K_2Mg_2[(SO_4)_3]$

Ullmannit NiSbS

Nickelglans NiAsS

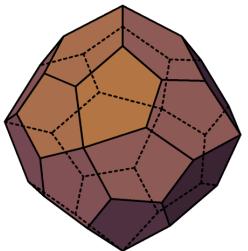
Kubisches Kristallsystem

Gyroedrische Hemiedrie

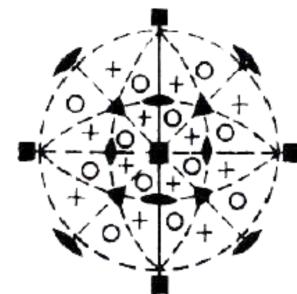
Symbol: 432 oder O

Pentagonikositetraedrische Klasse

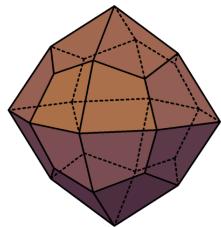
Allgemeine Form:
 $\{hkl\}$



Pentagonikositetraeder

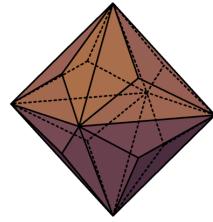


$\{hll\}$



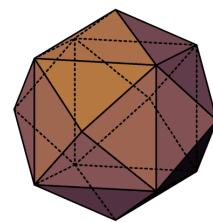
Deltoidikositetraeder

$\{hh\}$



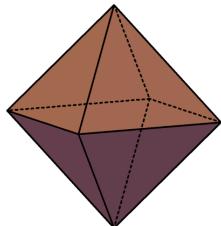
Pyramidenoktaeder

$\{hk0\}$



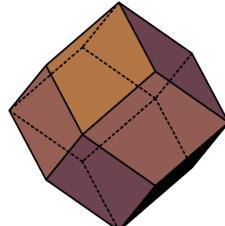
Pyramidenwürfel

$\{111\}$



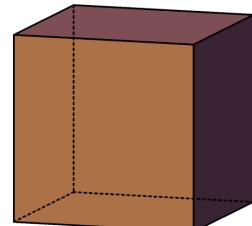
Oktaeder

$\{110\}$



Rhombendodekaeder

$\{100\}$



Würfel/ Hexaeder

Mineral-Bsp.:

Maghemit Gamma- Fe_2O_3

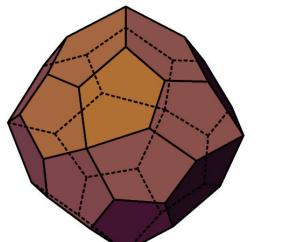
Choloalit $\text{CuPb}[(\text{TeO}_3)_2]$

Petzit Ag_3AuTe_2

Det kubiska kristallsystemet

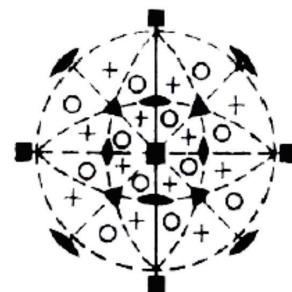
Giroedrisk hemiedri
Pentagonikositetraedrisk klass

Allmän form:
 $\{hkl\}$



Pentagonikositetraeder

Symbol: 432 eller O



$\{hll\}$	$\{hh\ell\}$	$\{hk0\}$
<u>Deltoidikositetraeder</u>	<u>Pyramidoktaeder</u>	<u>Pyramidkub</u>
$\{111\}$	$\{110\}$	$\{100\}$
<u>Oktaeder</u>	<u>Rombdodekaeder</u>	<u>Kub</u>

Exempel på mineral:

Maghemit Gamma- Fe_2O_3

Choloalit $\text{CuPb}[(\text{TeO}_3)_2]$

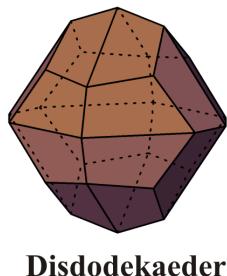
Petzit Ag_3AuTe_2

Kubisches Kristallsystem

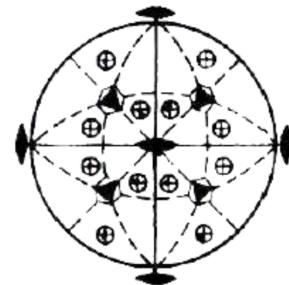
Parallelflächige Hemiedrie
Disdodekaedrische Klasse

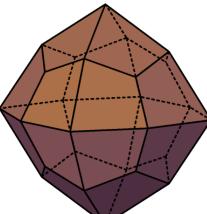
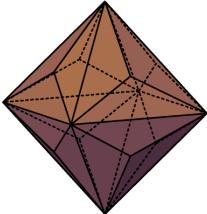
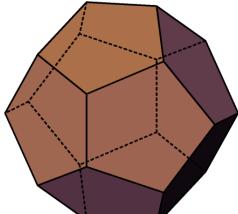
Symbol: $2/m \bar{3}$ oder T_h
(m3)

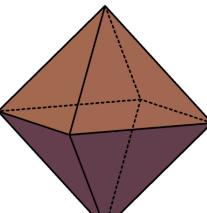
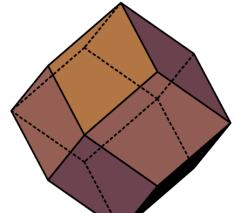
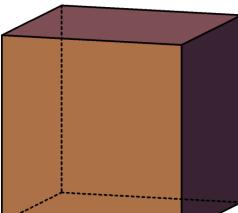
Allgemeine Form:
 $\{hkl\}$



Disdodekaeder



$\{hll\}$	$\{hhl\}$	$\{hk0\}$
		

$\{111\}$	$\{110\}$	$\{100\}$
		

Mineral-Bsp.:

Pyrit FeS_2

Cobaltin $CoAsS$

Alaune, z.B. $KAl[SO_4]_2 \cdot 12H_2O$

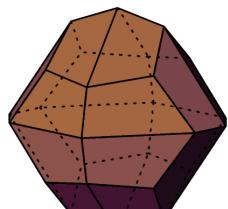
Bixbyit $(Mn,Fe)_2O_3$

Det kubiska kristallsystemet

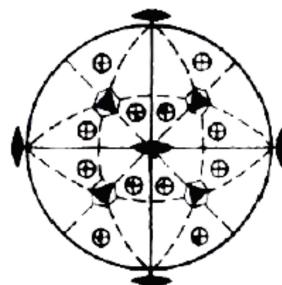
Parallelplan hemiedri
Disdodekaedrisk klass

Symbol: $2/m \bar{3}$ eller T_h
($m\bar{3}$)

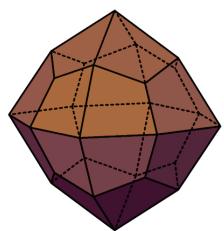
Allmän form:
 $\{hkl\}$



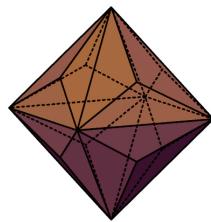
Disdodekaeder



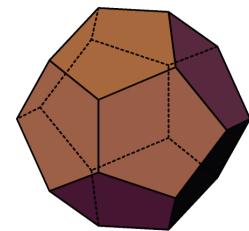
$\{hll\}$	$\{hh\ell\}$	$\{hk0\}$
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Deltoidikositetraeder

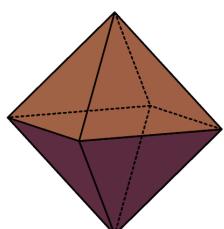


Pyramidoktaeder

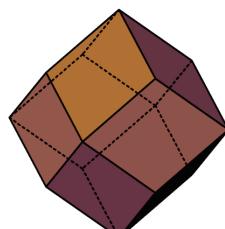


Pentagondodekaeder

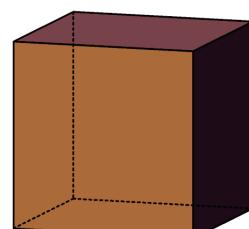
$\{111\}$	$\{110\}$	$\{100\}$
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Oktaeder



Rombdodekaeder



Kub

Exempel på mineral:

Pyrit FeS_2

Koboltglans $CoAsS$

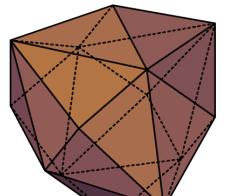
Alun, t.ex. $KAl[SO_4]_2 \cdot 12H_2O$

Bixbit $(Mn,Fe)_2O_3$

Kubisches Kristallsystem

Geneigtflächige Hemiedrie
Hexakistetraedrische Klasse

Allgemeine Form:
 $\{hkl\}$



Hexakistetraeder

Symbol: $\bar{4}3m$ oder T_d



$\{hll\}$	$\{hhl\}$	$\{hk0\}$
 <u>Pyramidentetraeder</u>	 <u>Deltoiddodekaeder</u>	 <u>Pyramidenwürfel</u>

$\{111\}$	$\{110\}$	$\{100\}$
 <u>Tetraeder</u>	 <u>Rhombindodekaeder</u>	 <u>Würfel/ Hexaeder</u>

Mineral-Bsp.:

Sphalerit/Zinkblende ZnS

Tetraedrit $(Cu,Fe)_{12}[Sb_4S_{13}]$

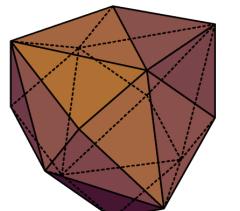
Sodalith $Na_8[(Cl)_2(AlSiO_4)_6]$

Mayenit $Ca_{12}Al_{14}O_{33}$

Det kubiska kristallsystemet

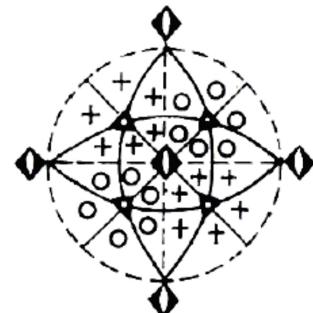
Lutplan hemiedri
Hexakistetraedrisk klass

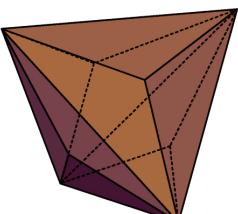
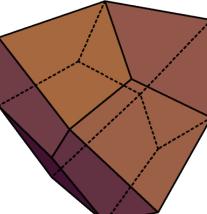
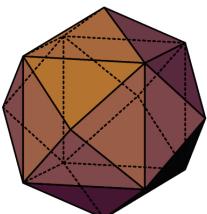
Allmän form:
 $\{hkl\}$

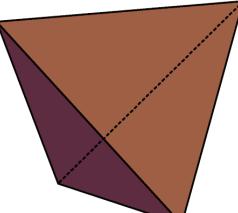
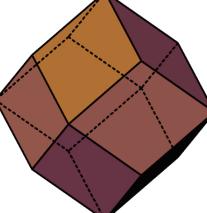
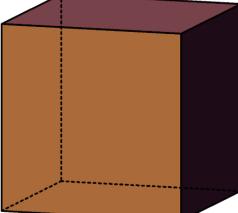


Hexakistetraeder

Symbol: $\bar{4}3m$ eller T_d



$\{hll\}$	$\{hh\ell\}$	$\{hk0\}$
 <u>Pyramidtetraeder</u>	 <u>Deltoiddodekaeder</u>	 <u>Pyramidkub</u>

$\{111\}$	$\{110\}$	$\{100\}$
 <u>Tetraeder</u>	 <u>Rombdodekaeder</u>	 <u>Kub</u>

Exempel på mineral:

Sfalerit/Zinkblände ZnS

Tetraedrit $(Cu,Fe)_{12}[Sb_4S_{13}]$

Sodalit $Na_8[(Cl)_2(AlSiO_4)_6]$

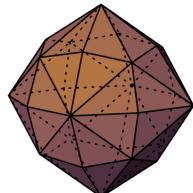
Mayenit $Ca_{12}Al_{14}O_{33}$

Kubisches Kristallsystem

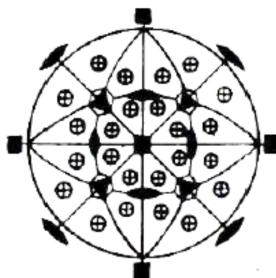
Kubische Holoedrie
Hexakisoktaedrische Klasse

Symbol: $4/m \bar{3} 2/m$ oder O_h
($m\bar{3}m$)

Allgemeine Form:
 $\{hkl\}$



Hexakisoktaeder



$\{hll\}$	$\{hhl\}$	$\{hk0\}$
 <u>Deltoidikositetraeder</u>	 <u>Pyramidenoktaeder</u>	 <u>Pyramidenwürfel</u>

$\{111\}$	$\{110\}$	$\{100\}$
 <u>Oktaeder</u>	 <u>Rhombendodekaeder</u>	 <u>Würfel/Hexaeder</u>

Mineral-Bsp.:

Elemente: Au, Ag, Cu, Pt,
Pb, Fe, W, Si, C(Diamant)
Halit/Steinsalz NaCl

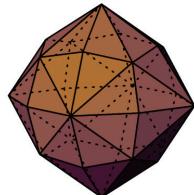
Galenit/Bleiglanz PbS
Fluorit/Flußspat CaF₂
Spinelle, z.B. MgAl₂O₄
Granate Me^{II}₃Me^{III}₂[SiO₄]₃

Det kubiska kristallsystemet

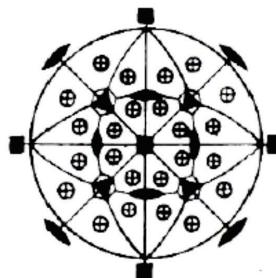
Kubisk holoedri
Hexakisoktaedrisk klass

Symbol: $4/m \bar{3} 2/m$ eller O_h
($m\bar{3}m$)

Allmän form:
 $\{hkl\}$



Hexakisoktaeder



$\{hll\}$	$\{hh\ell\}$	$\{hk0\}$

Deltoidikositetraeder

Pyramidotkaeder

Pyramidkub

$\{111\}$	$\{110\}$	$\{100\}$

Oktaeder

Rombdodekaeder

Kub

Exempel på mineral:

Element: Au, Ag, Cu, Pt,
Pb, Fe, W, Si, C(Diamant)
Halit NaCl

Galenit/Blyglans PbS
Fluorit CaF₂
Spinell, t.ex. MgAl₂O₄
Granat Me^{II}₃Me^{III}₂[SiO₄]₃

Beispiele für korrelate Kristallformen

Formenausbildung

Positiv - Negativ

Rechts - Links

Oben - Unten

Vorn - Hinten

Exempel på korrelerande kristallformer

Formbeskrivning

Positiv – Negativ

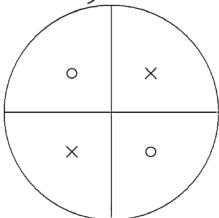
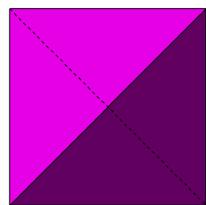
Höger – Vänster

Ovan – Nedan

Fram – Bak

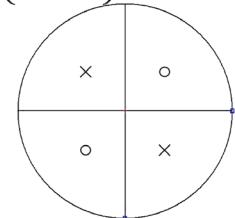
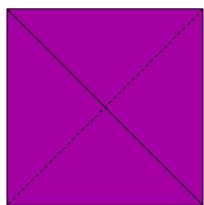
Kubisches Kristallsystem

Tetraeder $\{\overline{1}\overline{1}\}$



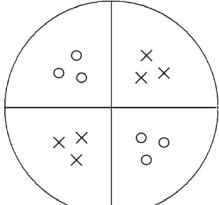
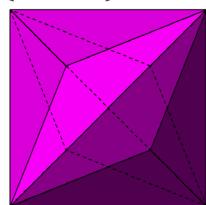
negativ

Tetraeder $\{111\}$



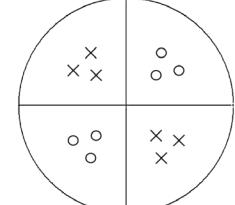
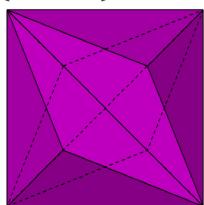
positiv

Pyramidentetraeder
 $\{2\overline{2}3\}$



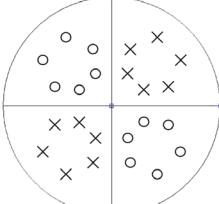
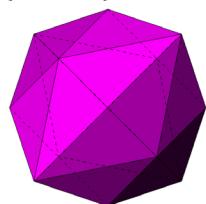
positiv

Pyramidentetraeder
 $\{\overline{2}2\overline{3}\}$



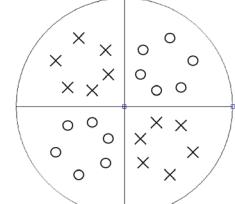
negativ

Hexakistetraeder
 $\{123\}$



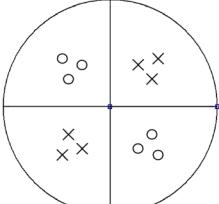
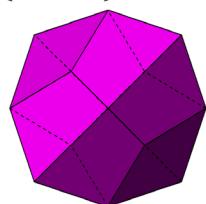
positiv

Hexakistetraeder
 $\{\overline{1}23\}$



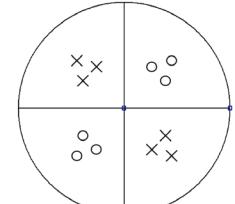
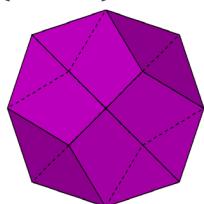
negativ

Deltoiddodekaeder
 $\{3\overline{3}2\}$



positiv

Deltoiddodekaeder
 $\{\overline{3}3\overline{2}\}$

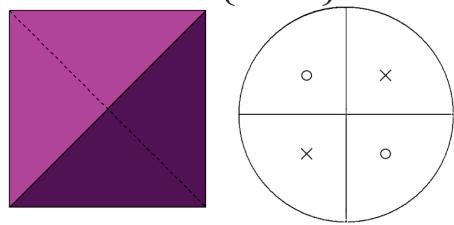


negativ

Diese stereographischen Projektionen beinhalten keinerlei Symmetrieelemente, es handelt sich hier lediglich um Bezugslinien

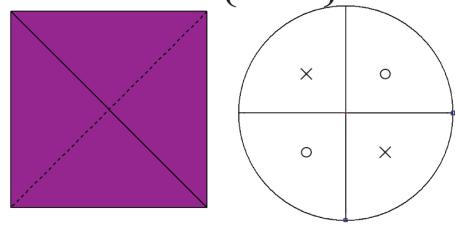
Det kubiska kristallsystemet

Tetraeder $\{\overline{1}11\}$



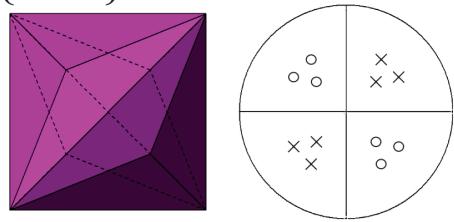
negativ

Tetraeder $\{111\}$



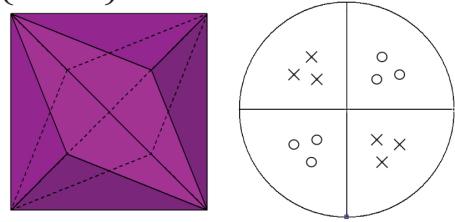
positiv

Pyramidtetraeder
 $\{223\}$



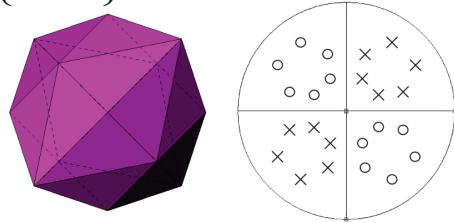
positiv

Pyramidtetraeder
 $\{\overline{2}\overline{2}3\}$



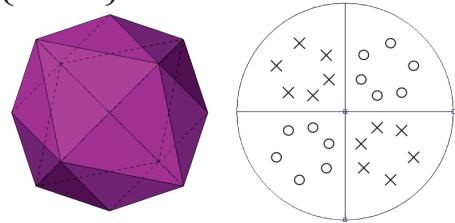
negativ

Hexakistetraeder
 $\{123\}$



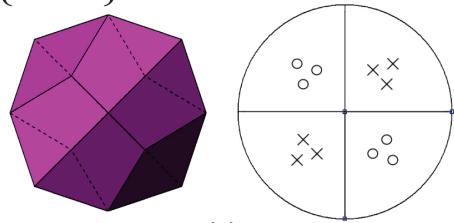
positiv

Hexakistetraeder
 $\{\overline{1}23\}$



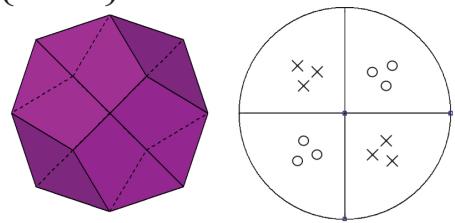
negativ

Deltoiddodekaeder
 $\{332\}$



positiv

Deltoiddodekaeder
 $\{\overline{3}\overline{3}2\}$

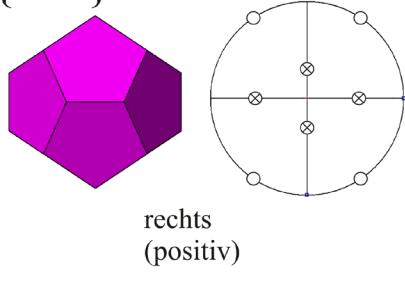


negativ

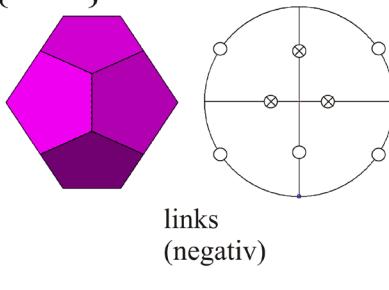
Dessa stereografiska projektioner innehåller ej symmetrielement, de visar enbart referenslinjer.

Kubisches Kristallsystem

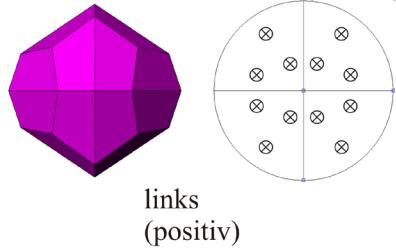
Pentagondodekaeder
 $\{230\}$



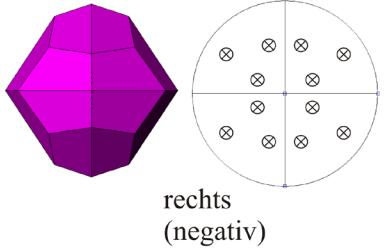
Pentagondodekaeder
 $\{320\}$



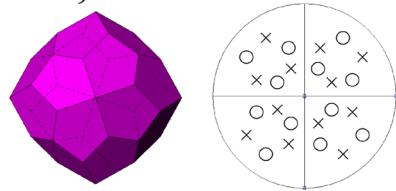
Disdodekaeder $\{213\}$



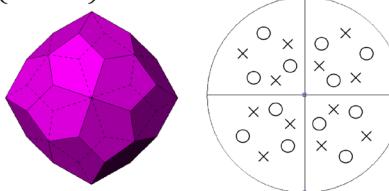
Disdodekaeder $\{123\}$



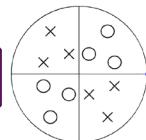
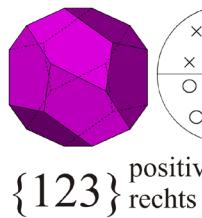
Pentagonikositetraeder
 $\{123\}$ rechts



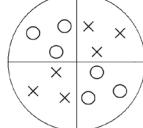
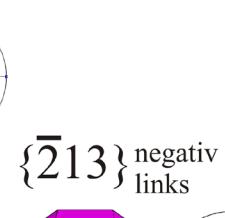
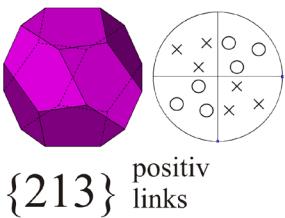
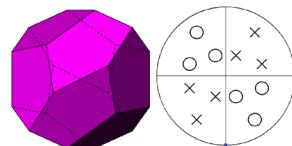
Pentagonikositetraeder
 $\{213\}$ links



Tetraedrischer Pentagondodekaeder



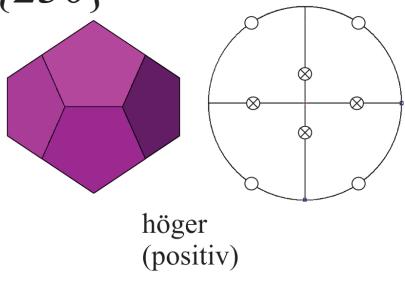
$\{\bar{1}23\}$ negativ
 rechts



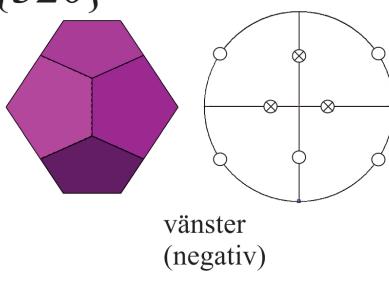
Diese stereographischen Projektionen beinhalten keinerlei Symmetrieelemente, es handelt sich hier lediglich um Bezugslinien

Det kubiska kristallsystemet

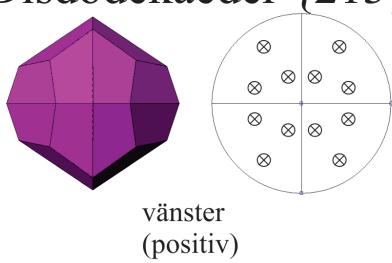
Pentagondodekaeder
 $\{230\}$



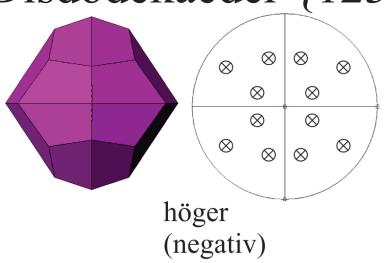
Pentagondodekaeder
 $\{320\}$



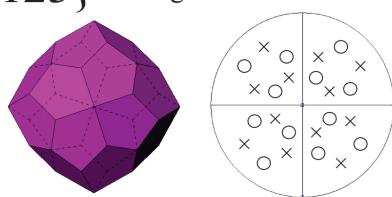
Disdodekaeder $\{213\}$



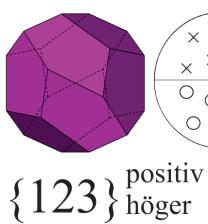
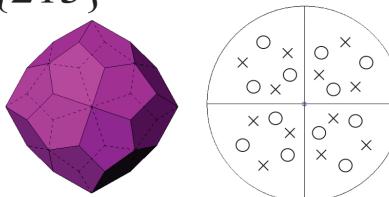
Disdodekaeder $\{123\}$



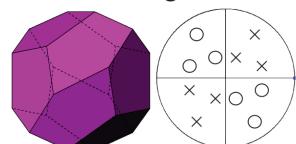
Pentagonikositetraeder
 $\{123\}$



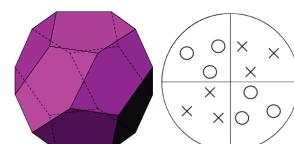
Pentagonikositetraeder
 $\{213\}$



$\{\bar{1}23\}$ negativ
 höher



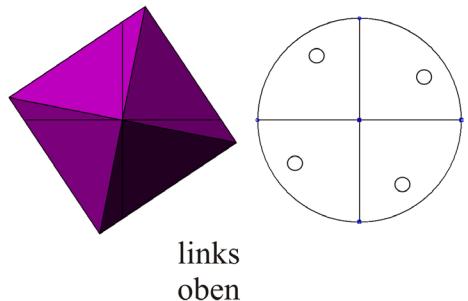
$\{\bar{2}13\}$ negativ
 vänster



Dessa stereografiska projektioner innehåller ej symmetrielement, de visar enbart referenslinjer.

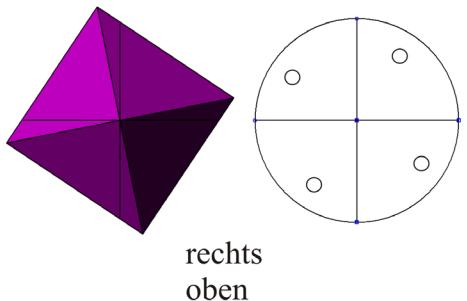
Tetragonales Kristallsystem

Pyramide {321}



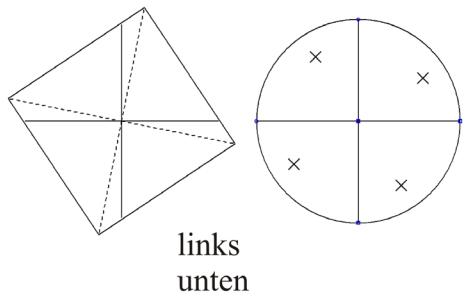
links
oben

Pyramide {231}



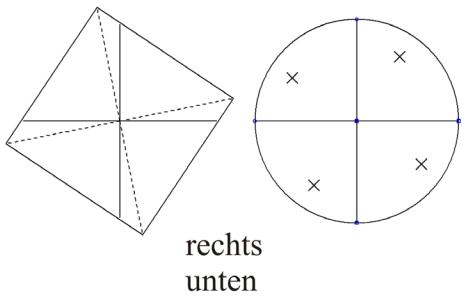
rechts
oben

Pyramide {32̄1}



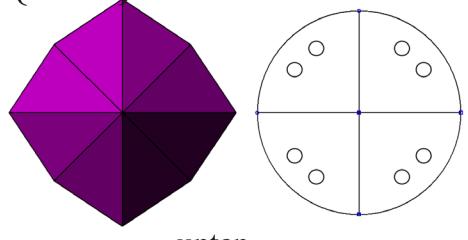
links
unten

Pyramide {23̄1}



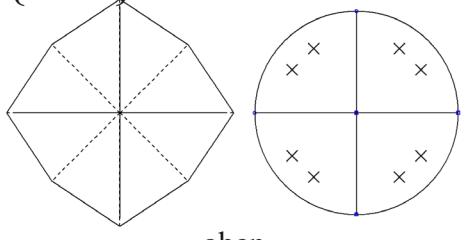
rechts
unten

Ditetrag. Pyramide
{321}



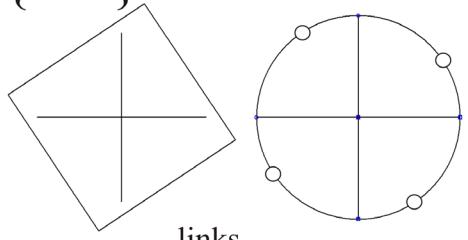
unten

Ditetrag. Pyramide
{32̄1}



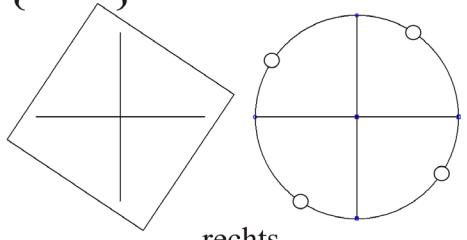
oben

Prisma III. Stellung
{320}



links

Prisma III. Stellung
{230}

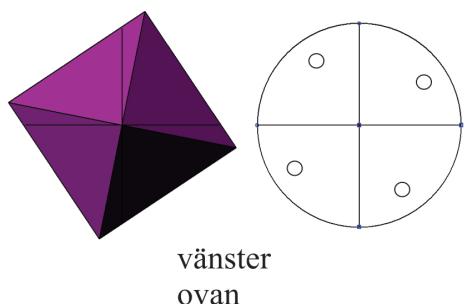


rechts

Diese stereographischen Projektionen beinhalten keinerlei Symmetrieelemente; es handelt sich hier lediglich um Bezugslinien.

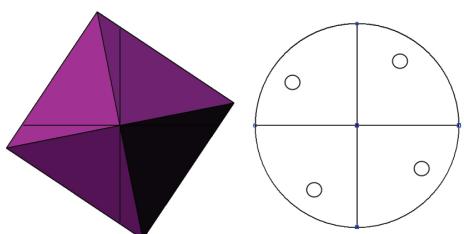
Det tetragonala kristallsystemet

Pyramid {321}



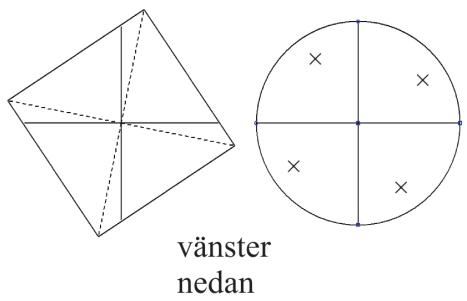
vänster
ovan

Pyramid {231}



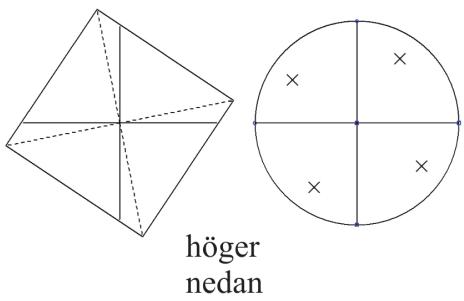
höger
ovan

Pyramid {32 $\bar{1}$ }



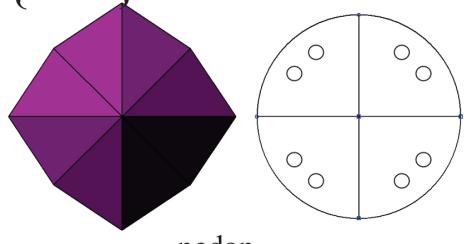
vänster
nedan

Pyramid {23 $\bar{1}$ }



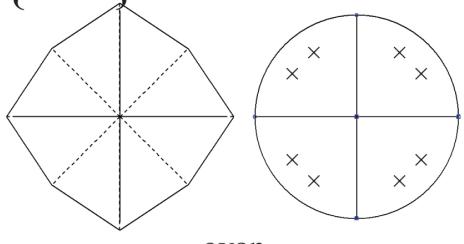
höger
nedan

Ditetrag. Pyramid
{321}



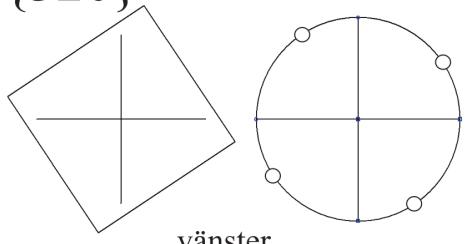
nedan

Ditetrag. Pyramid
{32 $\bar{1}$ }



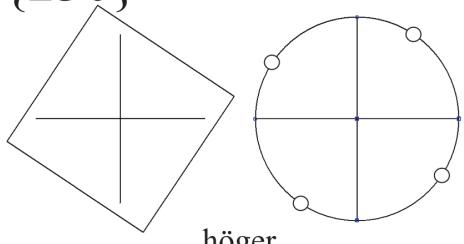
ovan

Prisma III.Ställning
{320}



vänster

Prisma III. Ställning
{230}

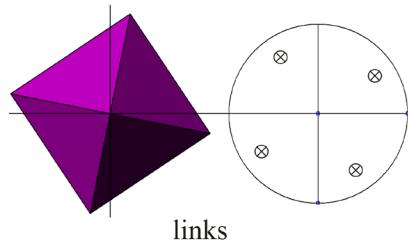


höger

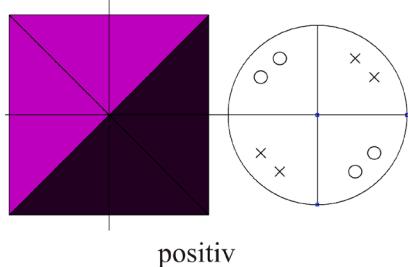
Dessa stereografiska projektioner innehåller ej symmetrielement, de visar enbart referenslinjer.

Tetragonales Kristallsystem

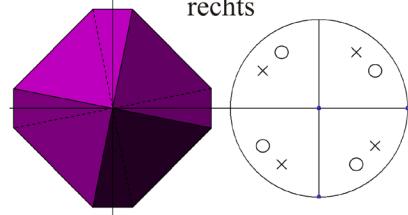
Dipyramide {321}



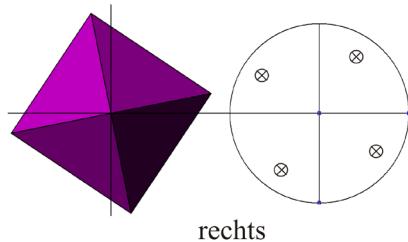
Skalenoeder {321}



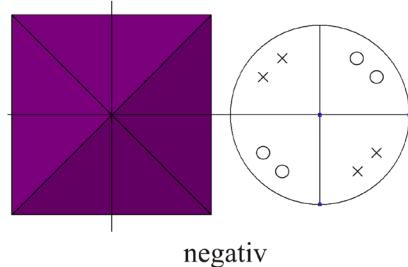
Trapezoeder {321}



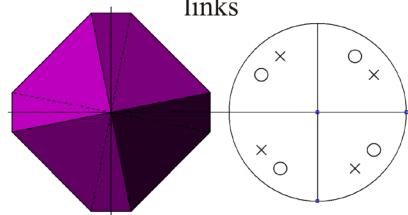
Dipyramide {231}



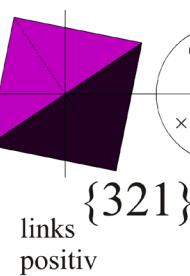
Skalenoeder {3̄21}



Trapezoeder {231}



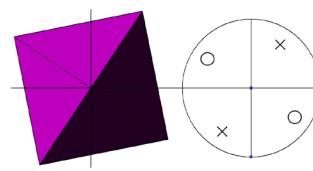
Diese stereographischen Projektionen beinhalten keinerlei Symmetrieelemente, es handelt sich hier lediglich um Bezugslinien



Tetragonales Disphenoid

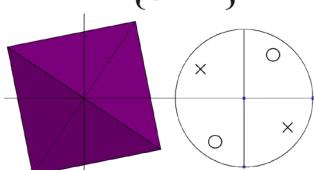
links negativ

{3̄21}

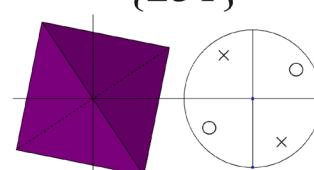


rechts negativ

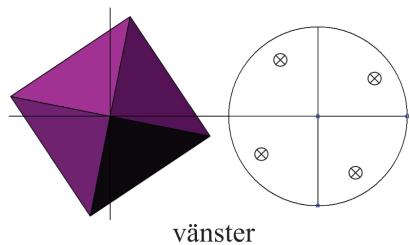
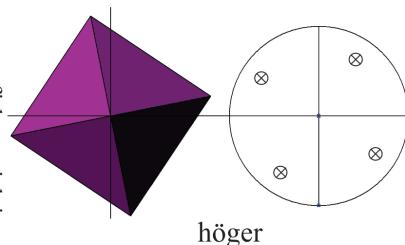
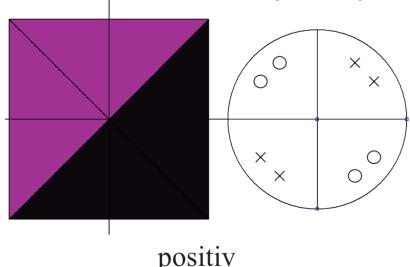
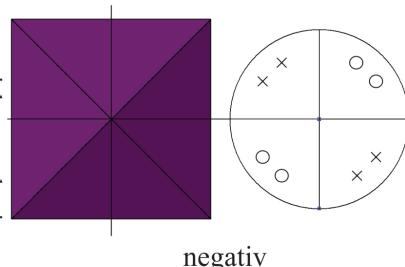
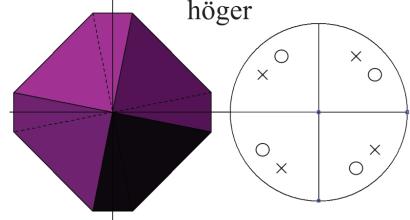
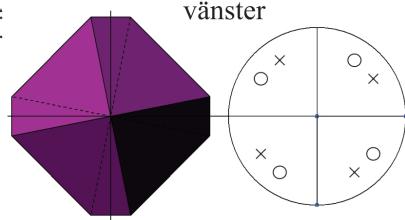
{231}



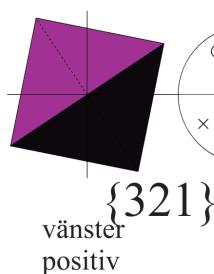
rechts positiv



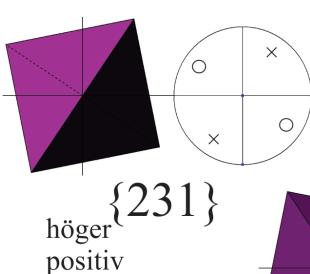
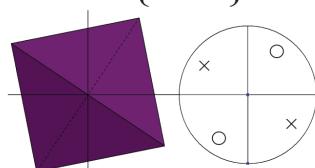
Det tetragonala kristallsystemet

Dipyramid $\{321\}$ Dipyramid $\{231\}$ Skalenoeder $\{321\}$ Skalenoeder $\{\bar{3}21\}$ Trapezoeder $\{321\}$ Trapezoeder $\{231\}$ 

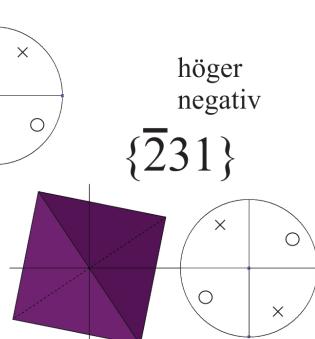
Tetragonal Disphenoid



$\{321\}$
vänster
negativ



$\{231\}$
höger
negativ

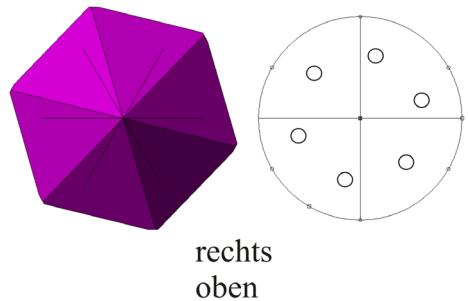


$\{\bar{2}31\}$
höger
negativ

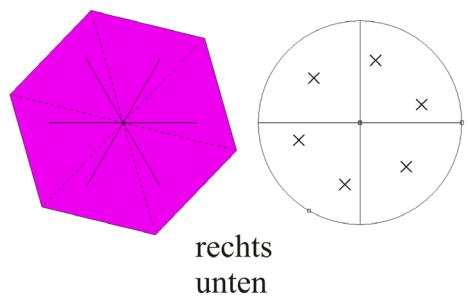
Dessa stereografiska projektioner innehåller ej symmetrielement, de visar enbart referenslinjer.

Hexagonales Kristallsystem

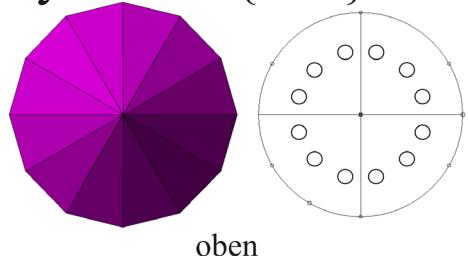
Pyramide {132}



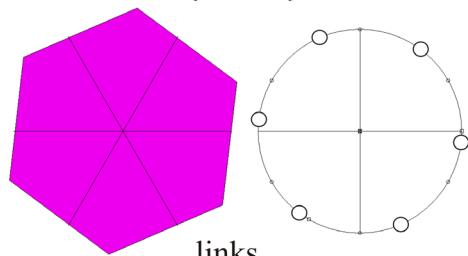
Pyramide {13 $\bar{2}$ }



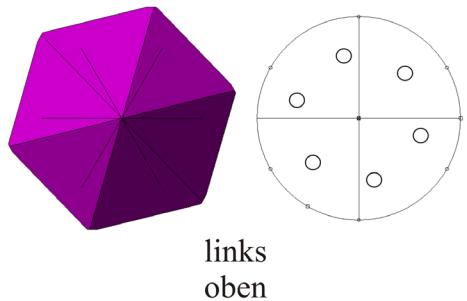
Dihexagonale Pyramide {312}



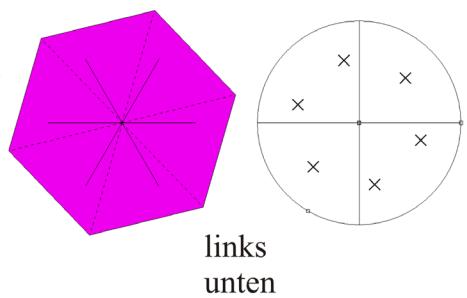
Prisma {320}



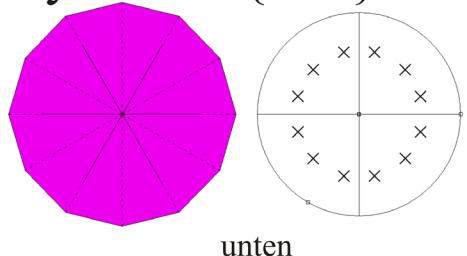
Pyramide {312}



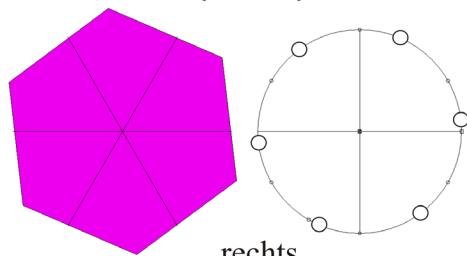
Pyramide {31 $\bar{2}$ }



Dihexagonale Pyramide {31 $\bar{2}$ }



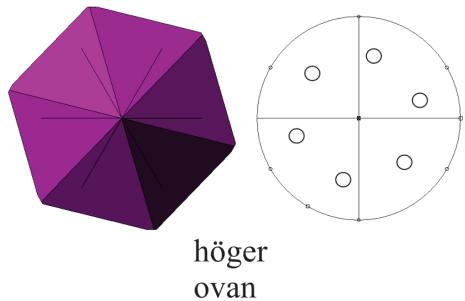
Prisma {230}



Diese stereographischen Projektionen beinhalten keinerlei Symmetrieelemente, es handelt sich hier lediglich um Bezugslinien

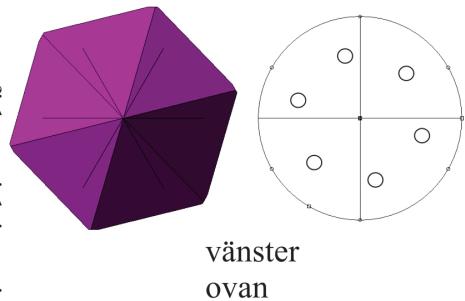
Det hexagonala kristallsystemet

Pyramid {132}



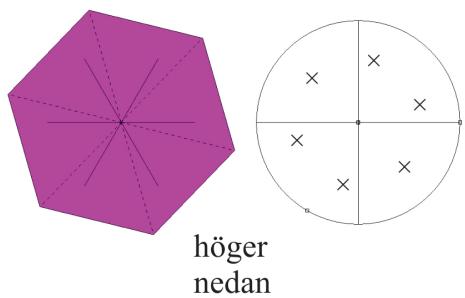
höger
ovan

Pyramid {312}



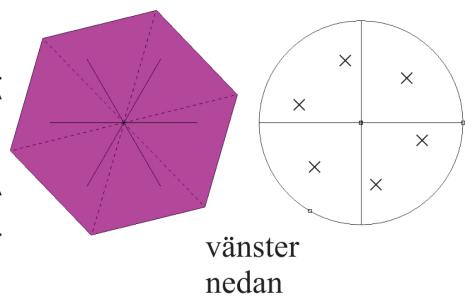
vänster
ovan

Pyramide {13 $\bar{2}$ }



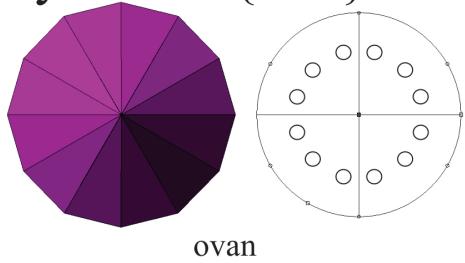
höger
nedan

Pyramide {31 $\bar{2}$ }



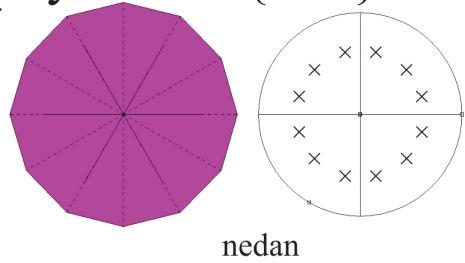
vänster
nedan

Dihexagonale
Pyramide {312}



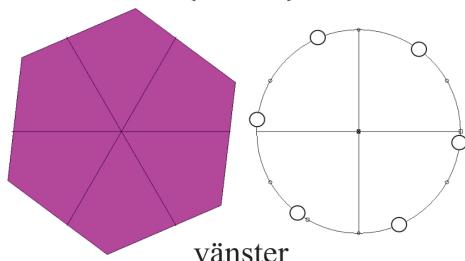
ovan

Dihexagonale
Pyramide {31 $\bar{2}$ }



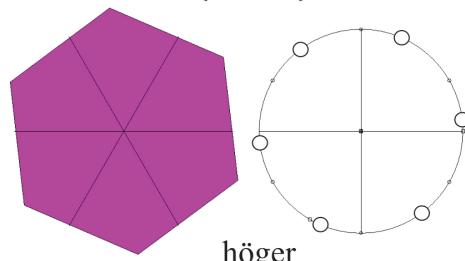
nedan

Prisma {320}



vänster

Prisma {230}

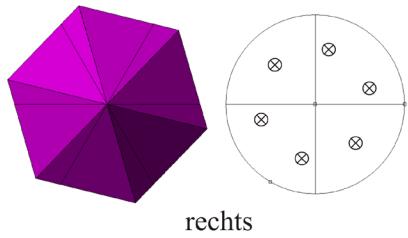


höger

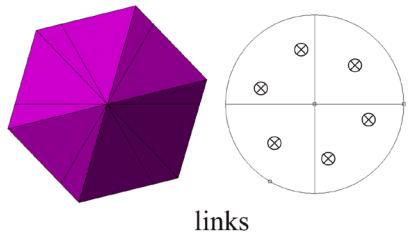
Dessa stereografiska projektioner innehåller ej symmetrielement, de visar enbart referenslinjer.

Hexagonales Kristallsystem

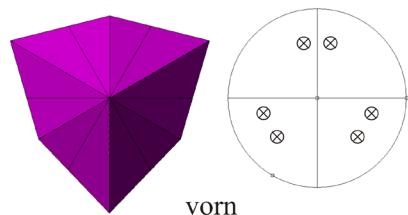
Dipyramide {132}



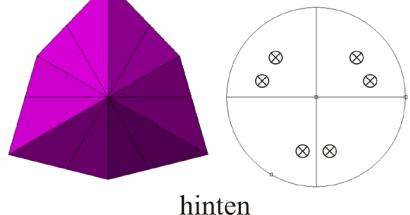
Dipyramide {312}



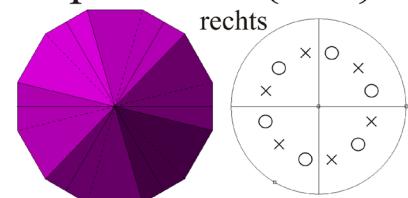
Ditrigonale
Dipyramide {132}



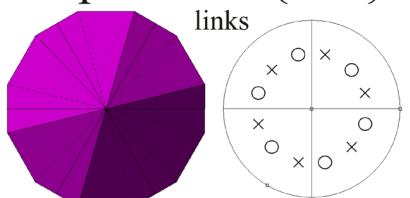
Ditrigonale
Dipyramide {312}



Trapezoeder {132}



Trapezoeder {312}

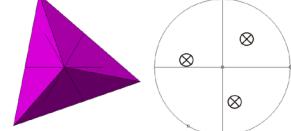


Diese stereographischen Projektionen beinhalten keinerlei Symmetrieelemente, es handelt sich hier lediglich um Bezugslinien

Trigonale Dipyramide



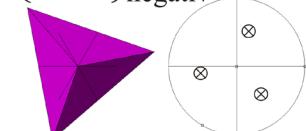
$\{1\bar{3}2\}$ rechts negativ



$\{312\}$ links positiv

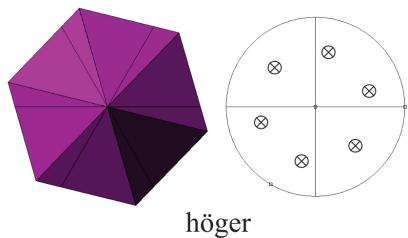


$\{\bar{3}12\}$ links negativ

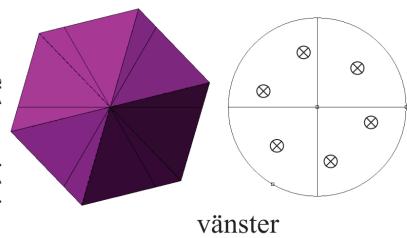


Det hexagonala kristallsystemet

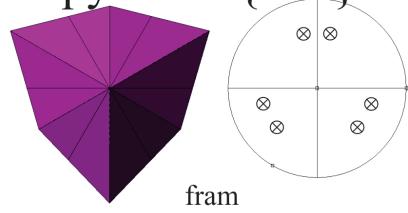
Dipyramid $\{132\}$



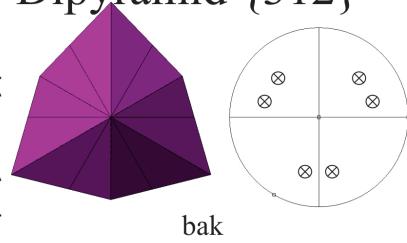
Dipyramid $\{312\}$



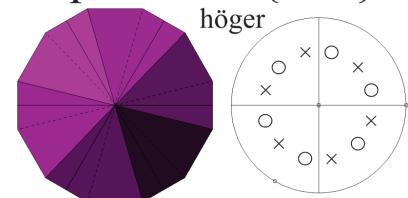
Ditrigonal
Dipyramid $\{132\}$



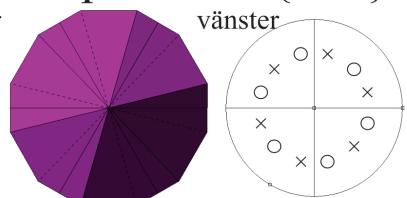
Ditrigonal
Dipyramid $\{312\}$



Trapezoeder $\{132\}$



Trapezoeder $\{312\}$



Trigonal Dipyramid



$1\bar{3}2$ höger negativ



$\{312\}$ vänster positiv

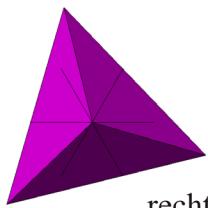
$\{\bar{3}12\}$ vänster negativ



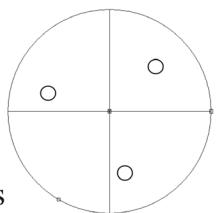
Dessa stereografiska projektioner innehåller ej symmetrielement, de visar enbart referenslinjer.

Trigonales Kristallsystem

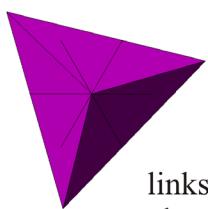
Pyramide {312}



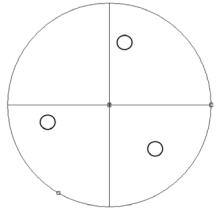
rechts
oben
vorn



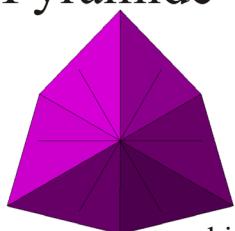
Pyramide {132}



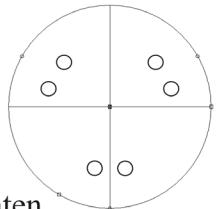
links
oben
vorn



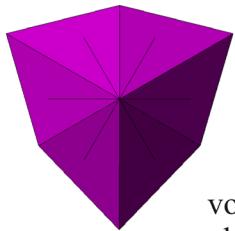
Ditrigonale
Pyramide {312}



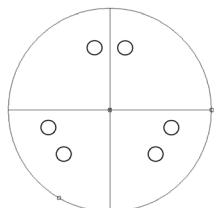
hinten
oben



Ditrigonale
Pyramide {132}

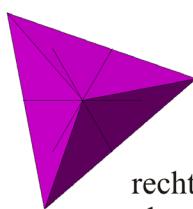


vorn
oben

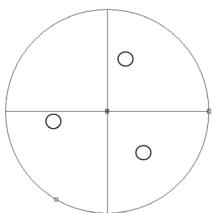


Diese stereographischen Projektionen beinhalten keinerlei Symmetrieelemente, es handelt sich hier lediglich um Bezugslinien

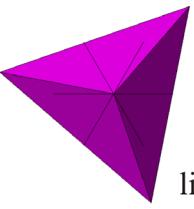
Pyramide {312}



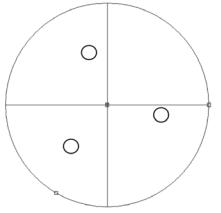
rechts
oben
hinten



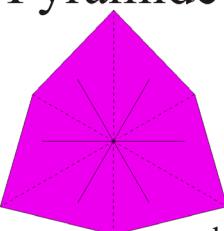
Pyramide {132}



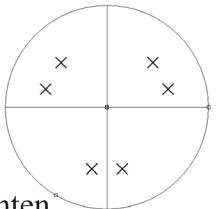
links
oben
hinten



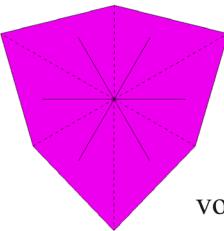
Ditrigonale
Pyramide {312}



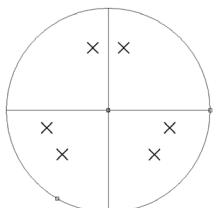
hinten
unten



Ditrigonale
Pyramide {132}



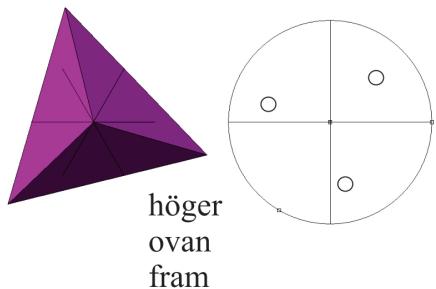
vorn
unten



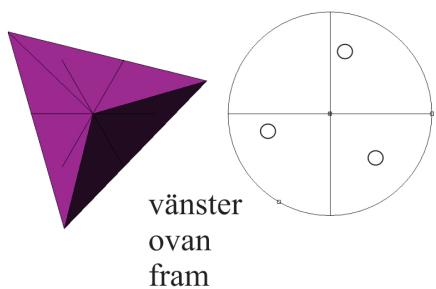
analog
dazu
“unten”

Det trigonala kristallsystemet

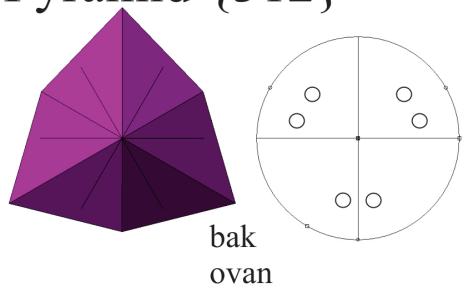
Pyramid {312}



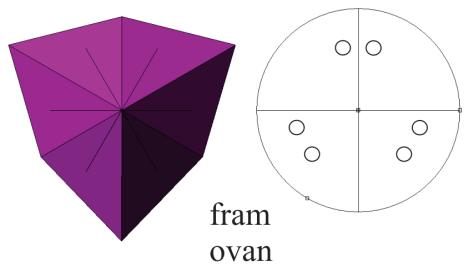
Pyramid {132}



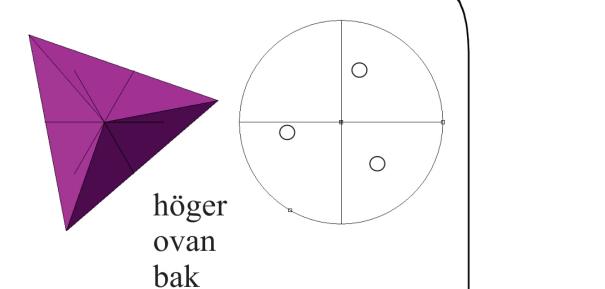
Ditrigonal
Pyramid {312}



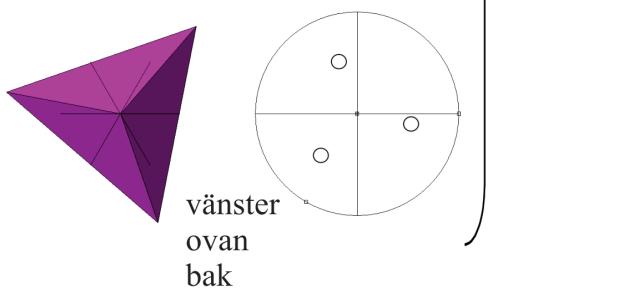
Ditrigonal
Pyramid {132}



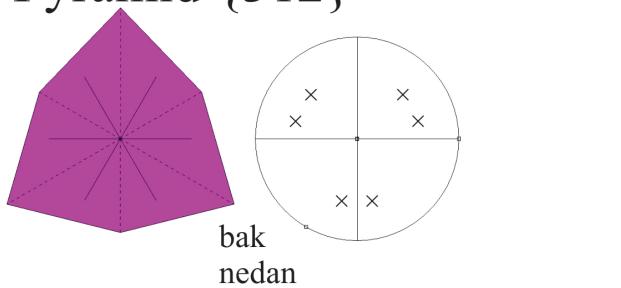
Pyramid {312}



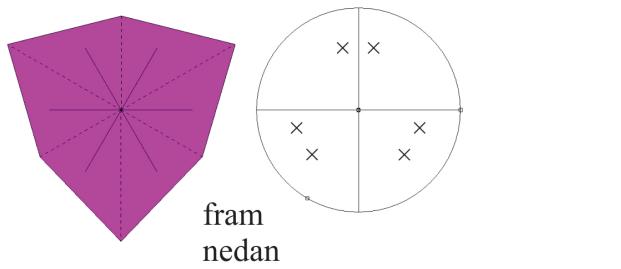
Pyramid {132}



Ditrigonal
Pyramid {312}



Ditrigonal
Pyramid {132}

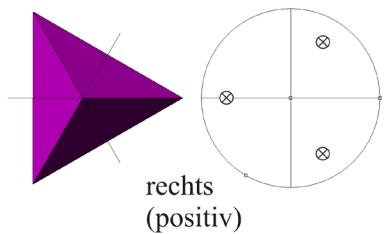


Dessa stereografiska projektioner innehåller ej symmetrielement, de visar enbart referenslinjer.

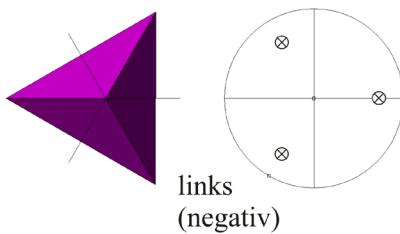
analog
till
"nedan"

Trigonales Kristallsystem

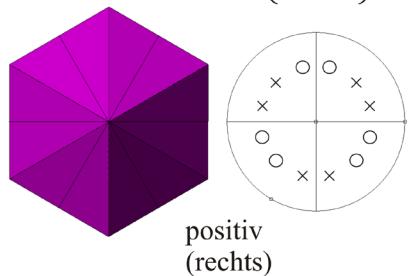
Dipyramide $\{332\}$



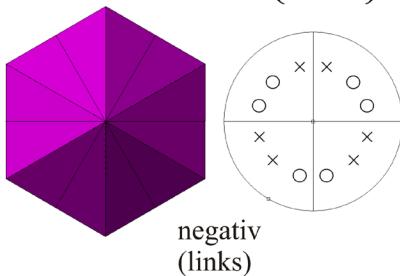
Dipyramide $\{\overline{3}\overline{3}2\}$



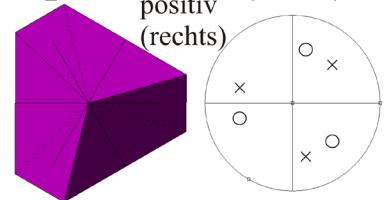
Ditrigonaler Skalenoeder $\{132\}$



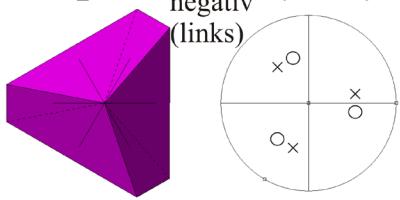
Ditrigonaler Skalenoeder $\{312\}$



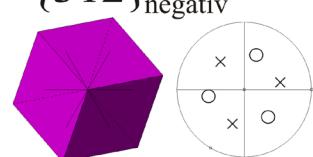
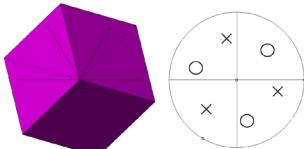
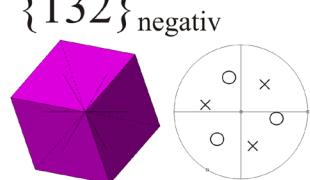
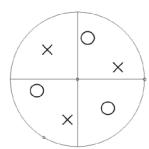
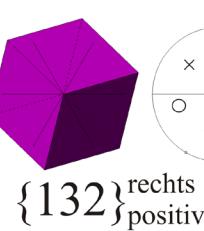
Trapezoeder $\{132\}$



Trapezoeder $\{\overline{1}32\}$

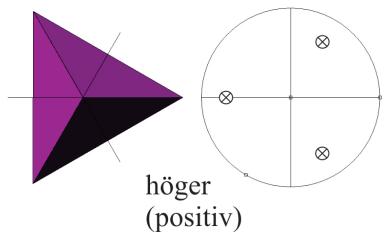


Diese stereographischen Projektionen beinhalten keinerlei Symmetrieelemente, es handelt sich hier lediglich um Bezugslinien.

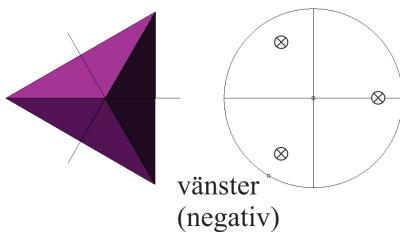


Det trigonala kristallsystemet

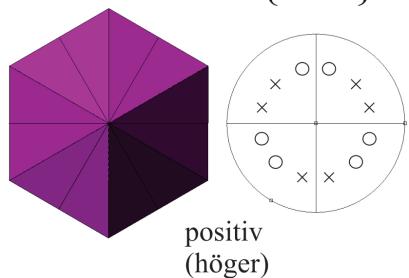
Dipyramid $\{332\}$



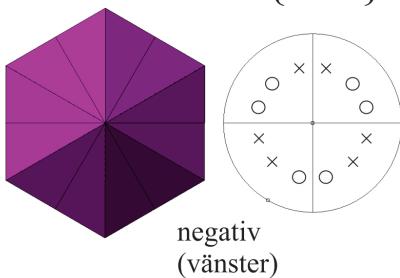
Dipyramid $\{\overline{3}\overline{3}2\}$



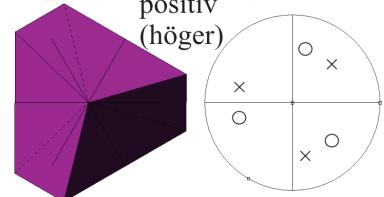
Ditrigonal
Skalenoeder $\{132\}$



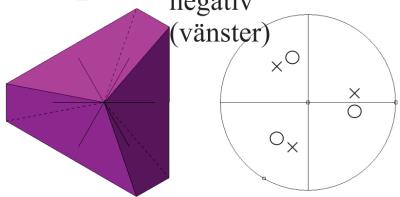
Ditrigonal
Skalenoeder $\{312\}$



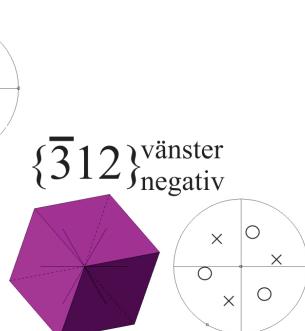
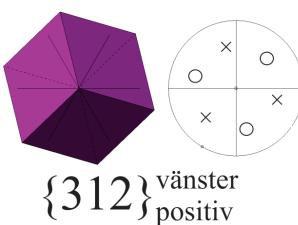
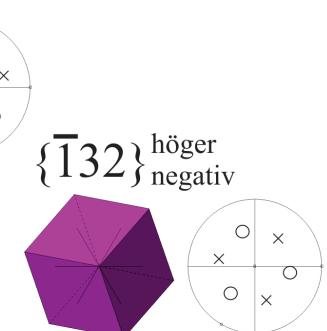
Trapezoeder $\{132\}$



Trapezoeder $\{\overline{1}32\}$



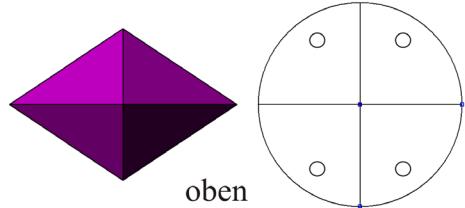
Trigonal Romboeder



Dessa stereografiska projektioner innehåller ej symmetrielement, de visar enbart referenslinjer.

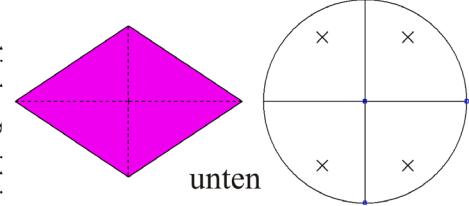
Orthorhombisches Kristallsystem

Rhombische Pyramide {321} | Rhombische Pyramide {321}

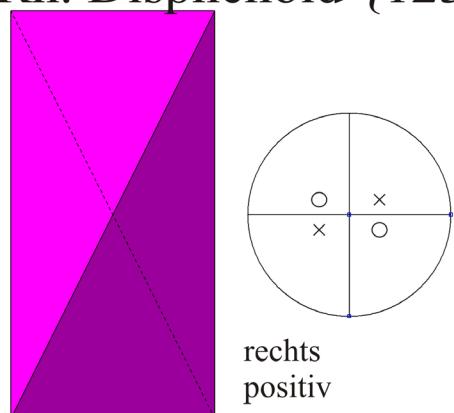


Diese stereographischen Projektionen beinhalten keinerlei Symmetrieelemente, es handelt sich hier lediglich um Bezugslinien

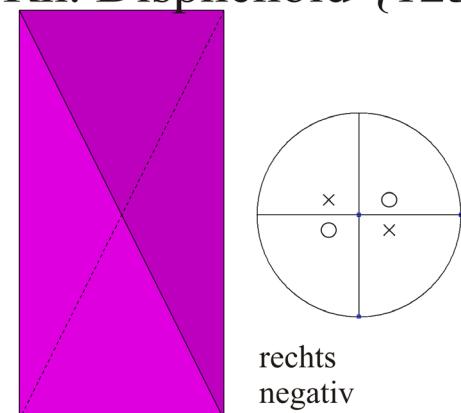
{321}



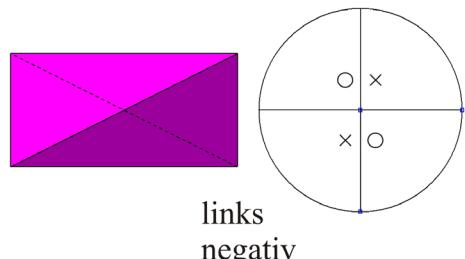
Rh. Disphenoid {123}



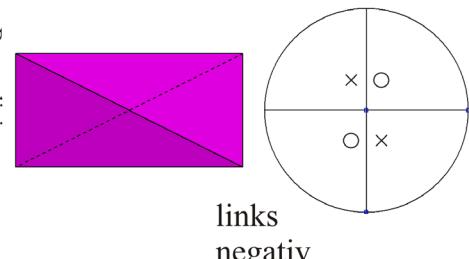
Rh. Disphenoid {1̄23}



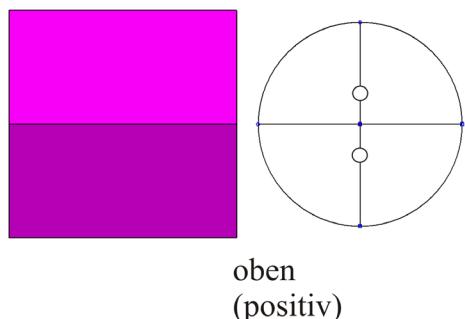
Rh. Disphenoid {213}



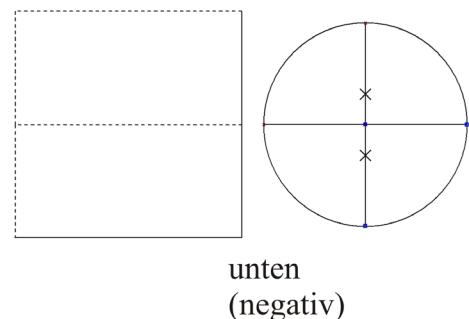
Rh. Disphenoid {2̄13}



Doma II. Stellung
{203}

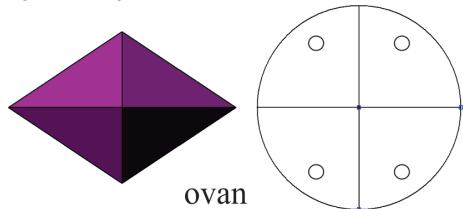


Doma II. Stellung
{2̄03}

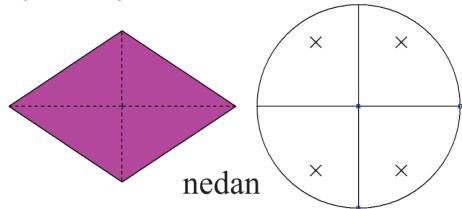


Det ortorombiska kristallsystemet

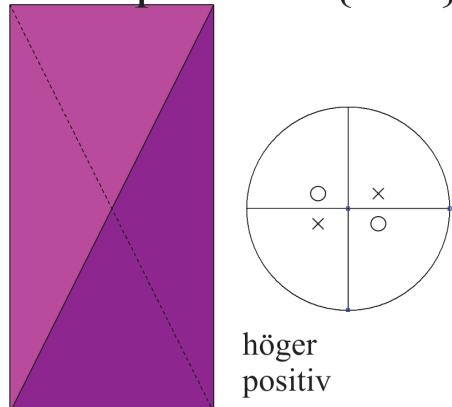
Rombisk Pyramid
 $\{321\}$



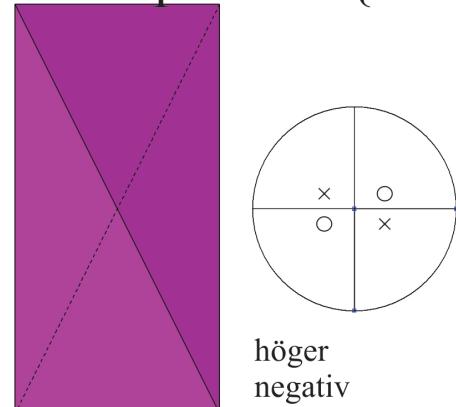
Rombisk Pyramid
 $\{321\}$



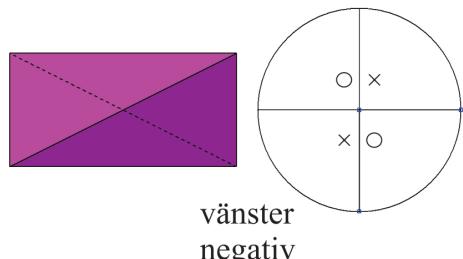
R. Disphenoid $\{123\}$



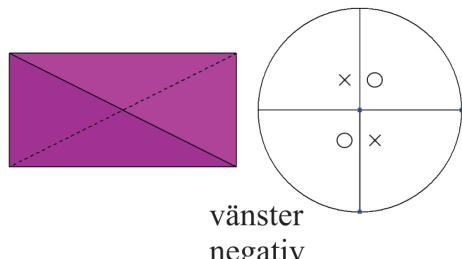
R. Disphenoid $\{\bar{1}23\}$



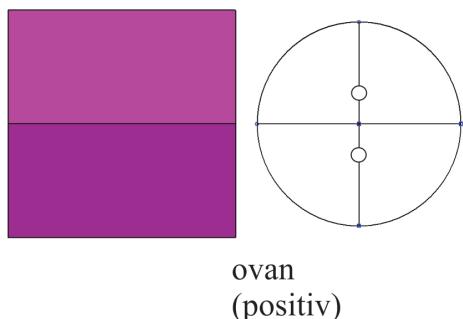
R. Disphenoid $\{213\}$



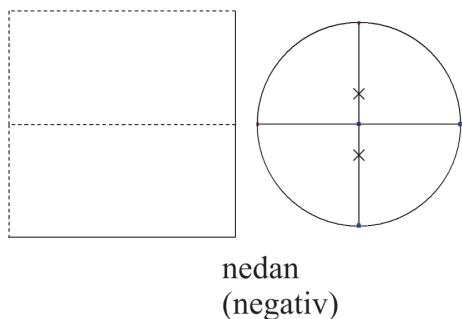
R. Disphenoid $\{\bar{2}13\}$



Doma II. Ställning
 $\{203\}$



Doma II. Ställning
 $\{\bar{2}03\}$



Dessa stereografiska projektioner innehåller ej symmetrielement, de visar enbart referenslinjer. Här ledigl. om Bezugslinjer.

System	Klasse	Symmetrieelement	polare Richtungen im Kristall	nichtpolare Richtungen im Kristall
triklin	1	-	* alle	keine
monoklin	2	$\vec{1\bullet}$	* \mathbf{b}	alle $\perp \mathbf{b}$
	m	$1m$ ($m \equiv \overline{2}$)	a, c und alle Zonen die in (010) liegen	\mathbf{b}
orthorhombisch	mm2	$1\vec{\bullet} + 1m + 1m$	* \mathbf{c}	alle $\perp \mathbf{c}$
tetragonal	4	$1\vec{\diamond}$	* \mathbf{c}	alle $\perp \mathbf{c}$
	4mm	$1\vec{\diamond} + 2m + 2m$	* \mathbf{c}	alle $\perp \mathbf{c}$
trigonal	3	$\vec{\#}$	* \mathbf{c} und alle Zonen $\perp \mathbf{c}$	keine
	32	$1\# + 3\vec{\bullet}$	a ₁ , a ₂ , a ₃ und alle Zonen $\perp \mathbf{c}$	alle $\perp \mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3$
	3m	$1\vec{\#} + 3m$	* \mathbf{c}	a ₁ , a ₂ , a ₃
hexagonal	6	$1\vec{\lozenge}$	* \mathbf{c}	alle $\perp \mathbf{c}$
	$\overline{6}$	$1\lozenge \equiv \# + m$	* a ₁ , a ₂ , a ₃ und alle Zonen $\perp \mathbf{c}$	\mathbf{c}
	6mm	$1\vec{\lozenge} + 3m + 3m$	* \mathbf{c}	alle $\perp \mathbf{c}$
	$\overline{6}_{2m}$	$1\lozenge + 3\vec{\bullet} + 3m$	alle \bullet	a ₁ , a ₂ , a ₃ und alle Zonen \perp auf \bullet die dazwischenliegen
kubisch	23	$3\bullet + 4\vec{\#}$	a ₁ , a ₂ , a ₃	alle $\perp \mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3$
	$\overline{4}_{3m}$	$3\lozenge + 4\vec{\#} + 6m$	a ₁ , a ₂ , a ₃	alle $\perp \mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3$

Weitere azentrische Klassen mit polaren Richtungen: 222, 4, 422, 42m, 622, 432

* = Klassen mit einzigartigen polaren Achsen, zu denen keine äquivalenten Achsen existieren:
ferroelektrische Stoffe

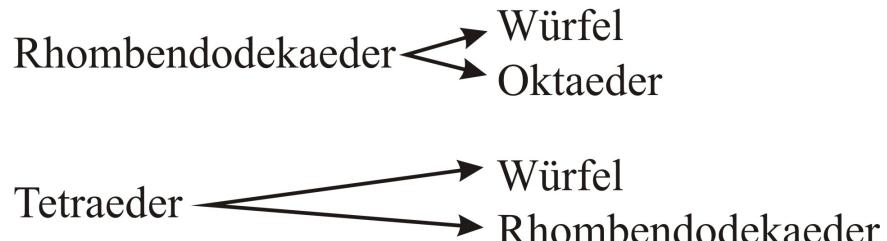
System	Klass	Symmetrielement	Första riktningar i kristallen	Andra riktningar i kristallen
tritisk	1	-	* $\bar{a} \bar{b} \bar{c}$	inget
monoklin	2	$1\bar{t}$	* b	$\bar{a} \bar{b} \perp b$
	m	$1m$ ($m = \bar{2}$)	a, c och alla zoner som ligger i (010)	b
orthorombisk	mm2	$1\bar{t} + 1m + 1m$	* g	$\bar{a} \bar{b} \perp g$
tetragonal	4	$1\bar{d}$	* c	$\bar{a} \bar{b} \perp c$
	4mm	$1\bar{d} + 2m + 2m$	* c	$\bar{a} \bar{b} \perp c$
trigonell	3	\bar{d}	* c och alla zoner $\perp c$	inget
	32	$1\# + 3\bar{t}$	a_1, a_2, a_3 och alla zoner $\perp c$	$\bar{a} \bar{b} \perp a_1, a_2, a_3$
	3m	$1\bar{d} + 3m$	* g	a_1, a_2, a_3
hexagonell	6	$1\bar{d}$	* c	$\bar{a} \bar{b} \perp c$
	6	$1\# + m$	* a_1, a_2, a_3 och alla zoner $\perp c$	c
	6mm	$1\bar{d} + 3m + 3m$	* c	$\bar{a} \bar{b} \perp c$
	$\bar{6}2m$	$1\# + 3\bar{t} + 3m$	$\bar{a} \bar{b} \perp l$	a_1, a_2, a_3 och alla zoner $\perp p \& l$ som befinner sig emellan
kubisk	23	$3\# + 4\bar{t}$	a_1, a_2, a_3	$\bar{a} \bar{b} \perp a_1, a_2, a_3$
	$\bar{4}3m$	$3\# + 4\bar{t} + 6m$	a_1, a_2, a_3	$\bar{a} \bar{b} \perp a_1, a_2, a_3$

Vidare asentriska klasser med polära riktningar: 222, 4, 422, 42m, 622, 432

= klasser med unika polära axlar, som ej har ekvivalenta axlar. ferroelektriska ämnen

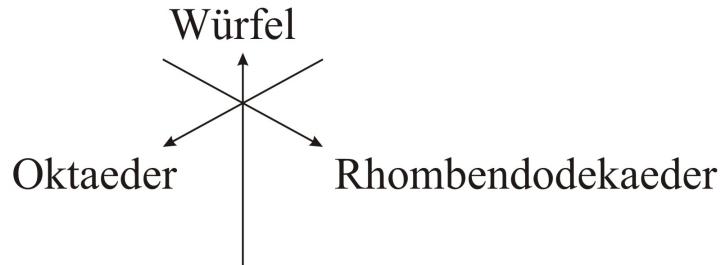
Die Kombination von Formen

Zwei Formen: Würfel ↔ Oktaeder



positiver Tetraeder ↔ negativer Tetraeder

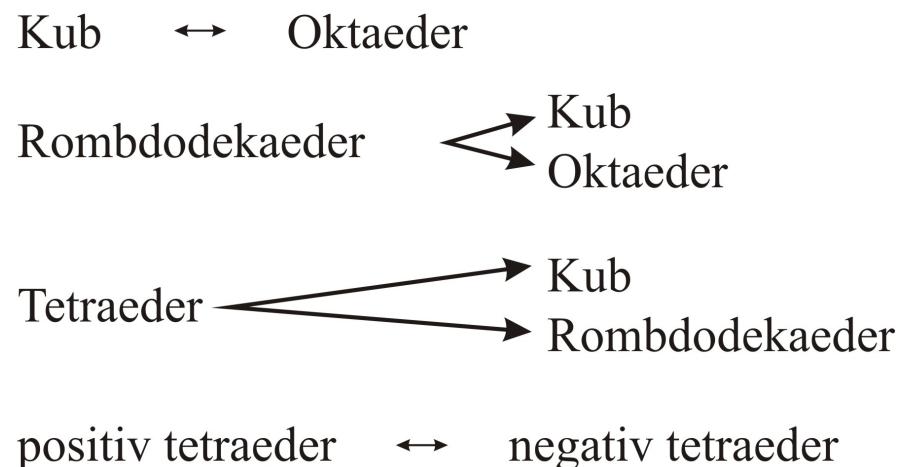
Drei Formen:



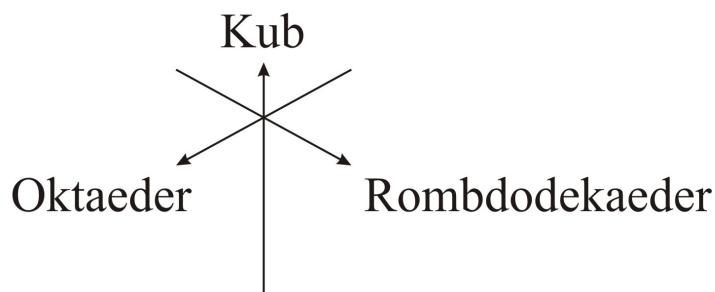
Kombinationen von Flächen und Steilen Rhomboedern

Kombination av former

Två former:

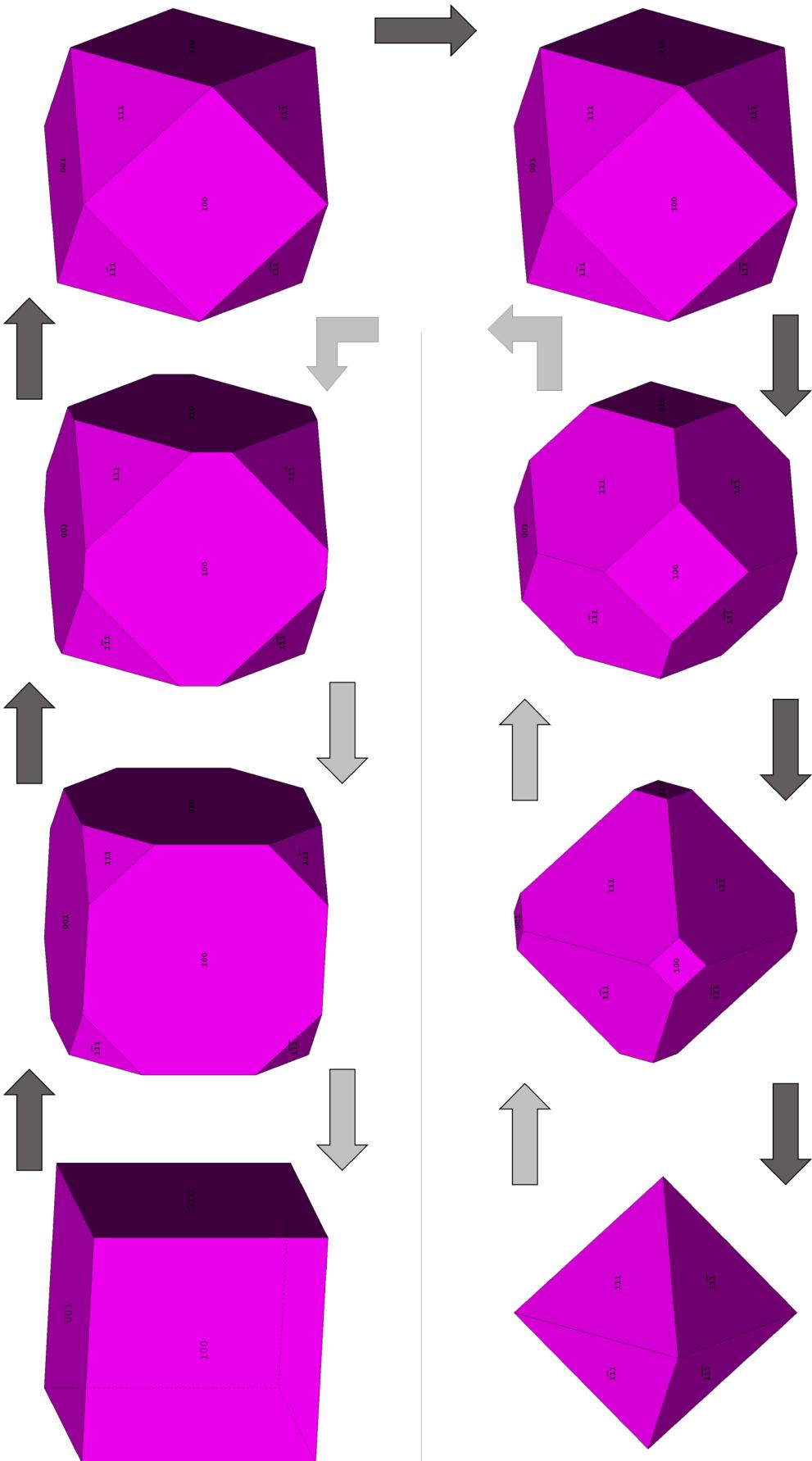


Tre former:

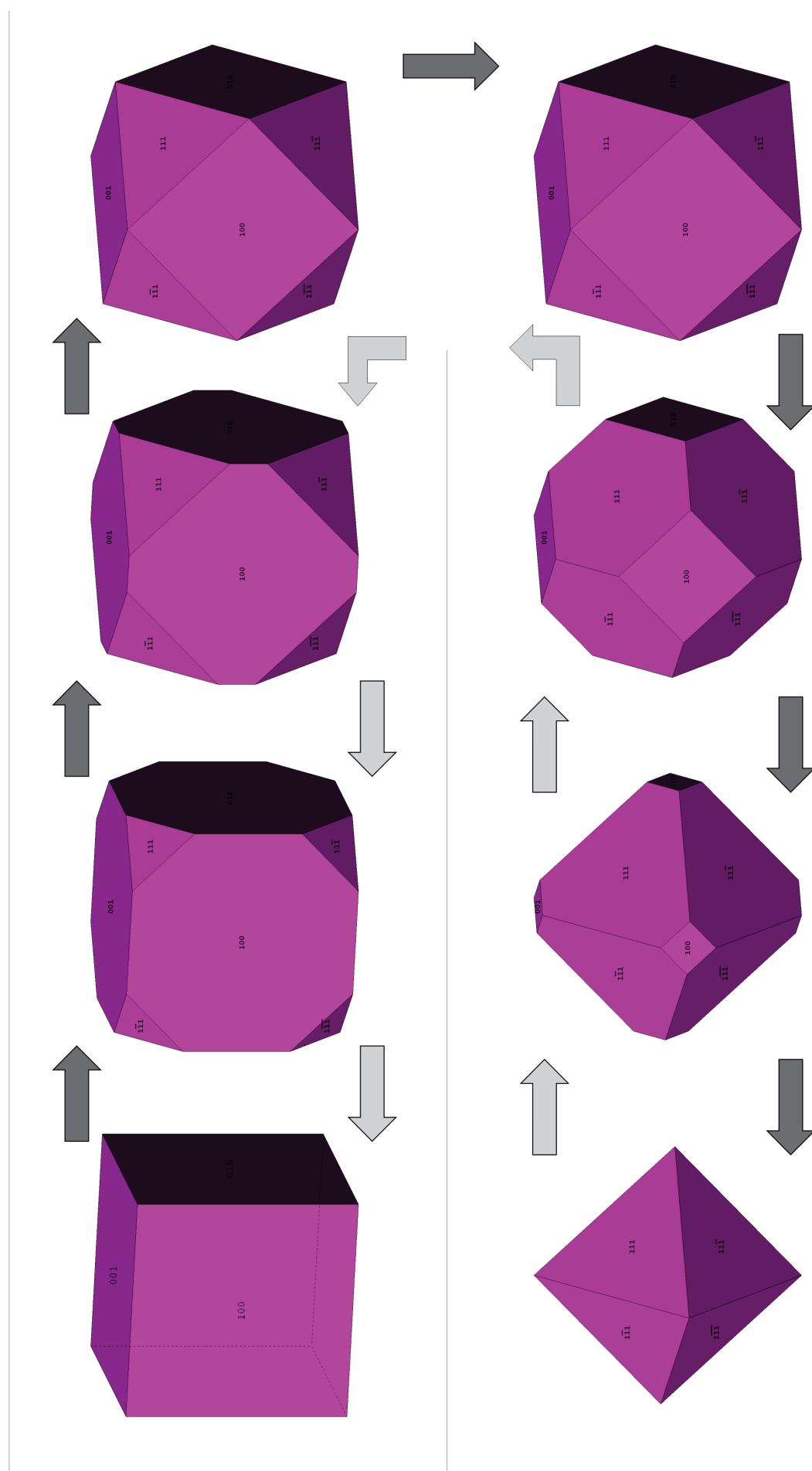


Kombination av plana och lutande romboedrar

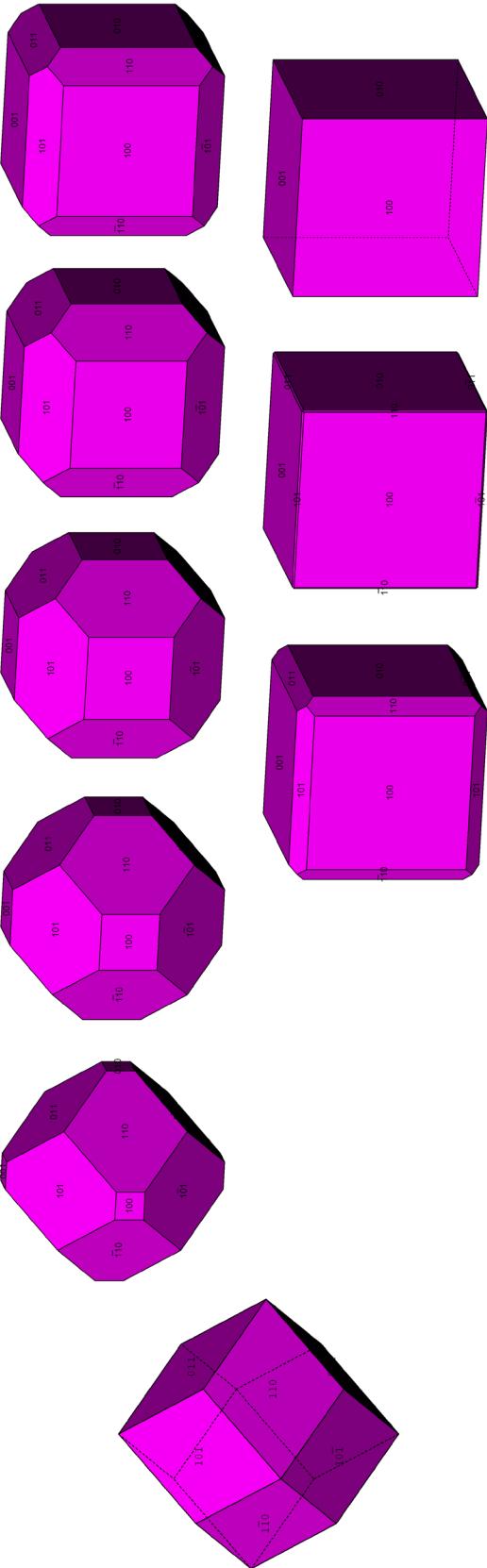
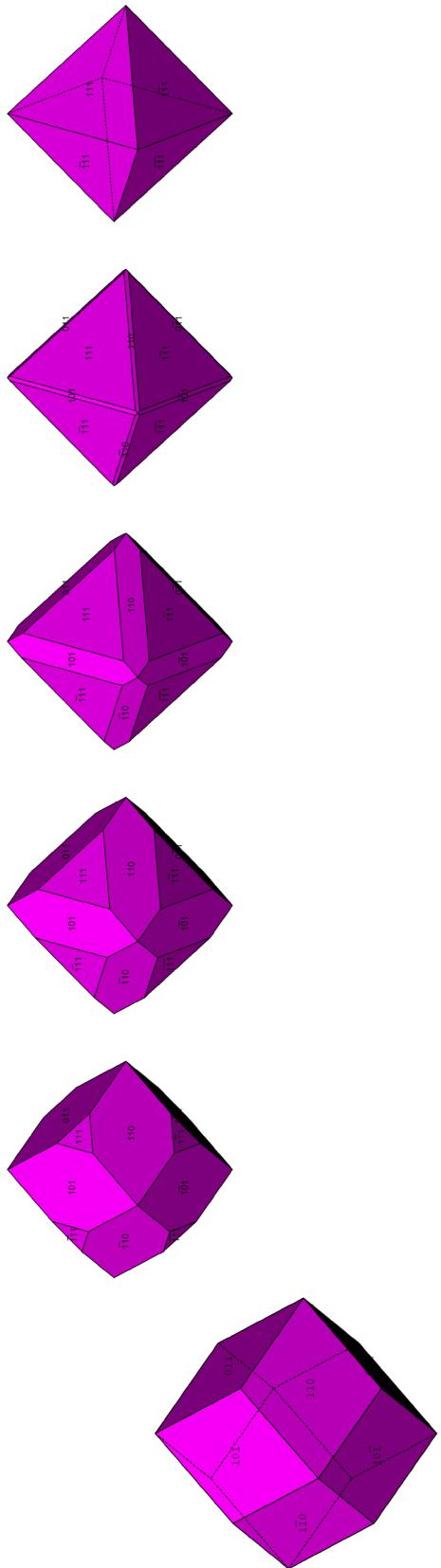
Vom Würfel zum Oktaeder



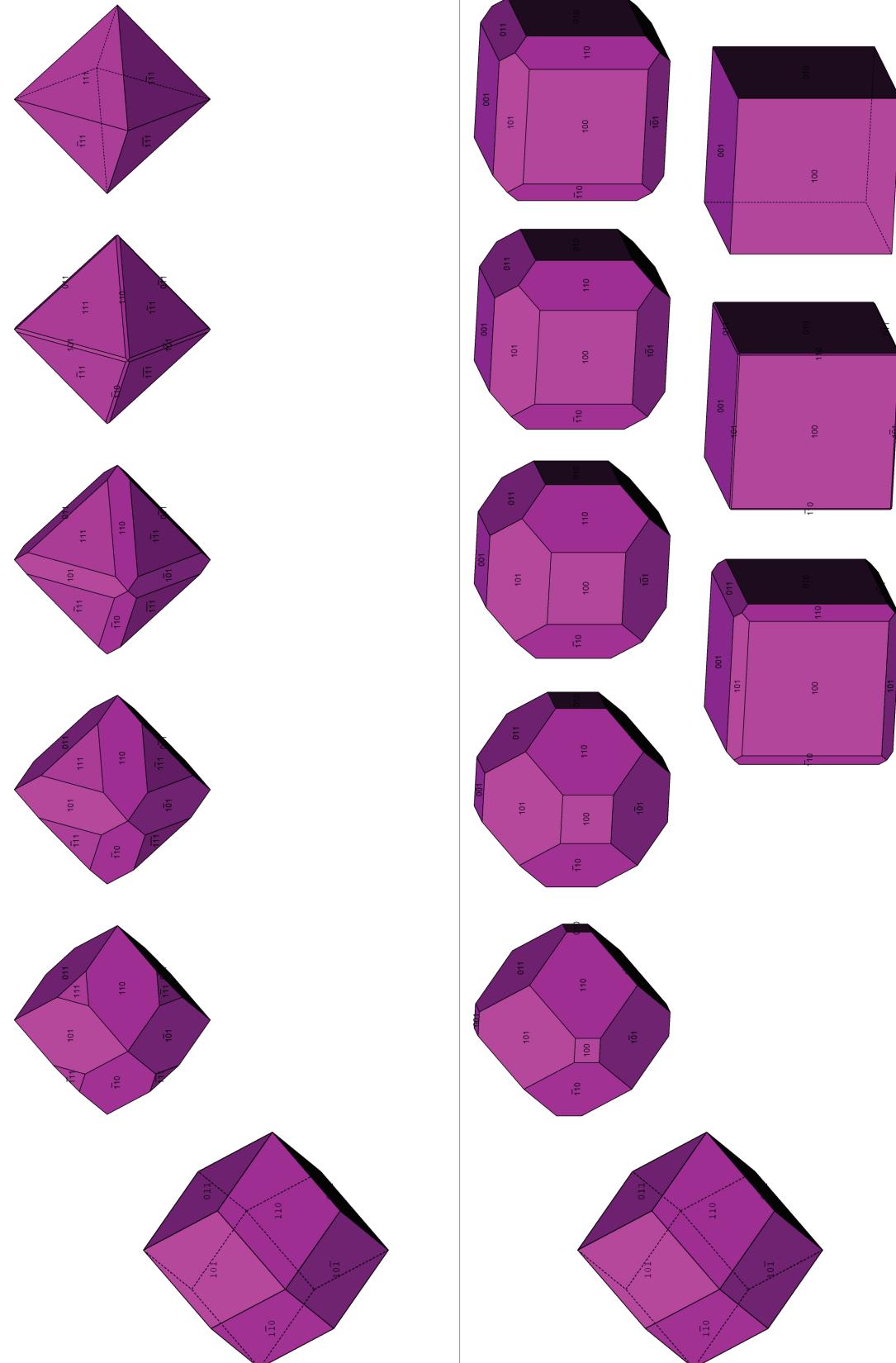
Från kub till oktaeder



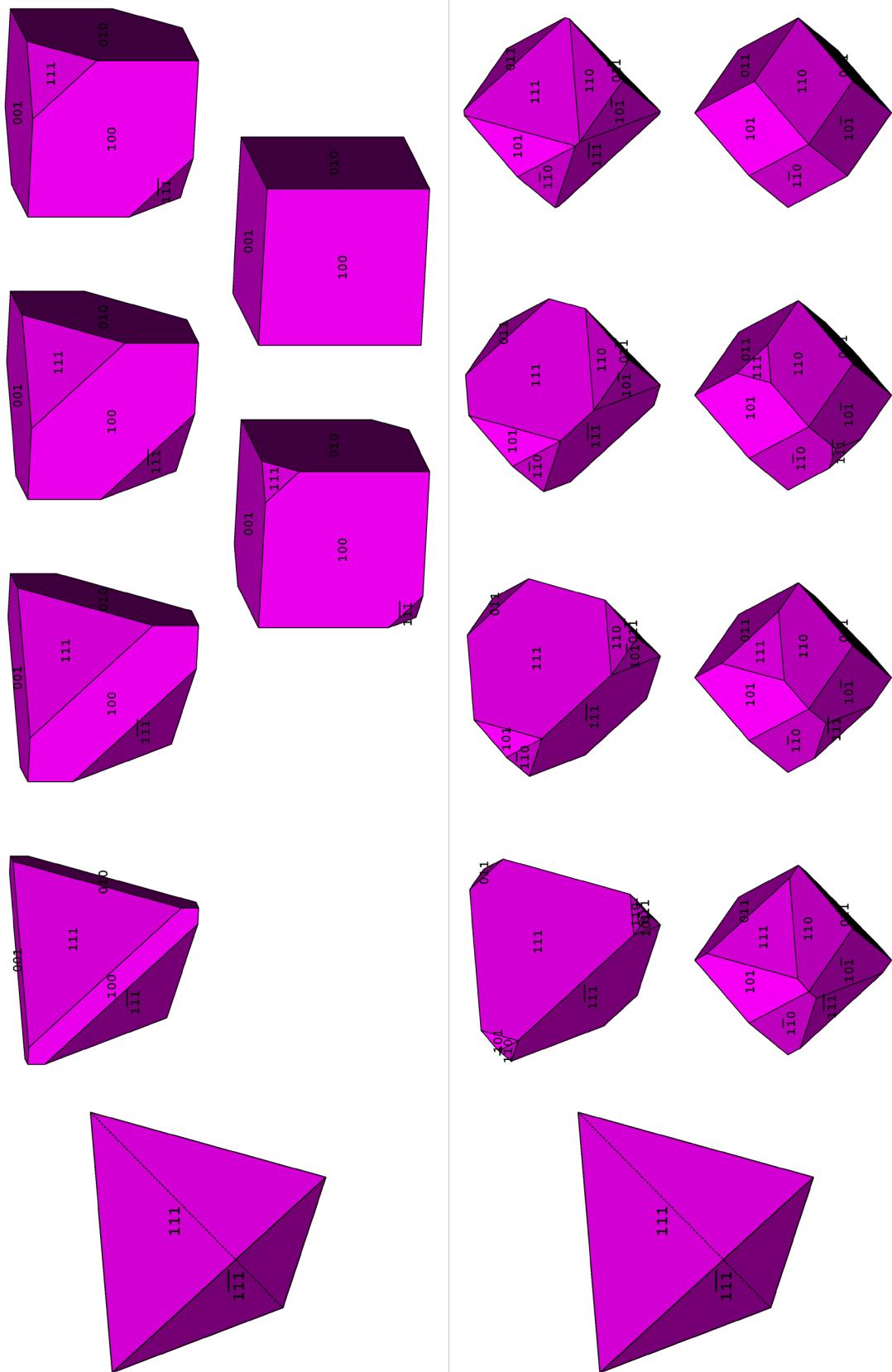
Kombination des Rhombendodekaeder mit Oktaeder und Würfel



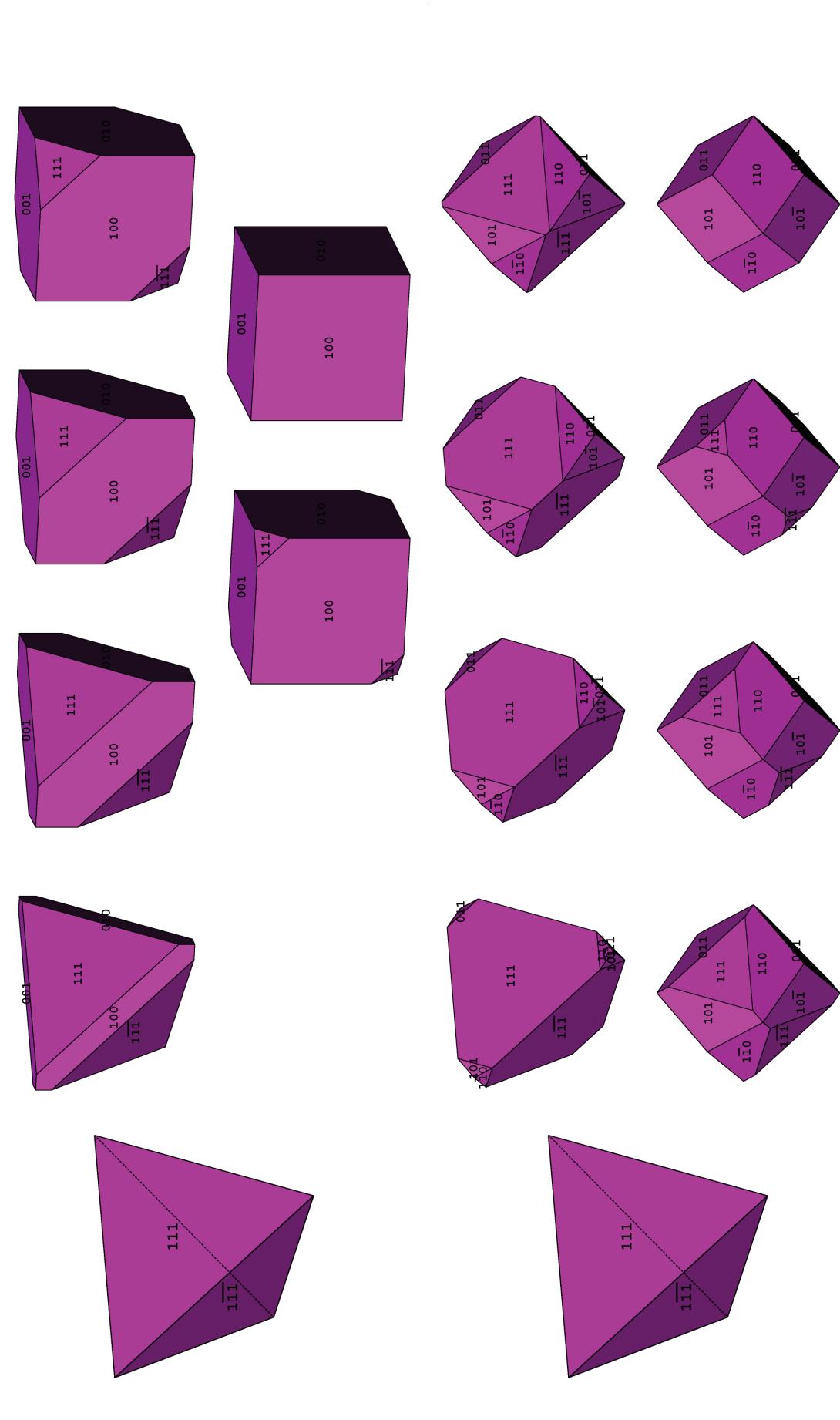
Kombination av rombdodekaeder med oktaeder och kub



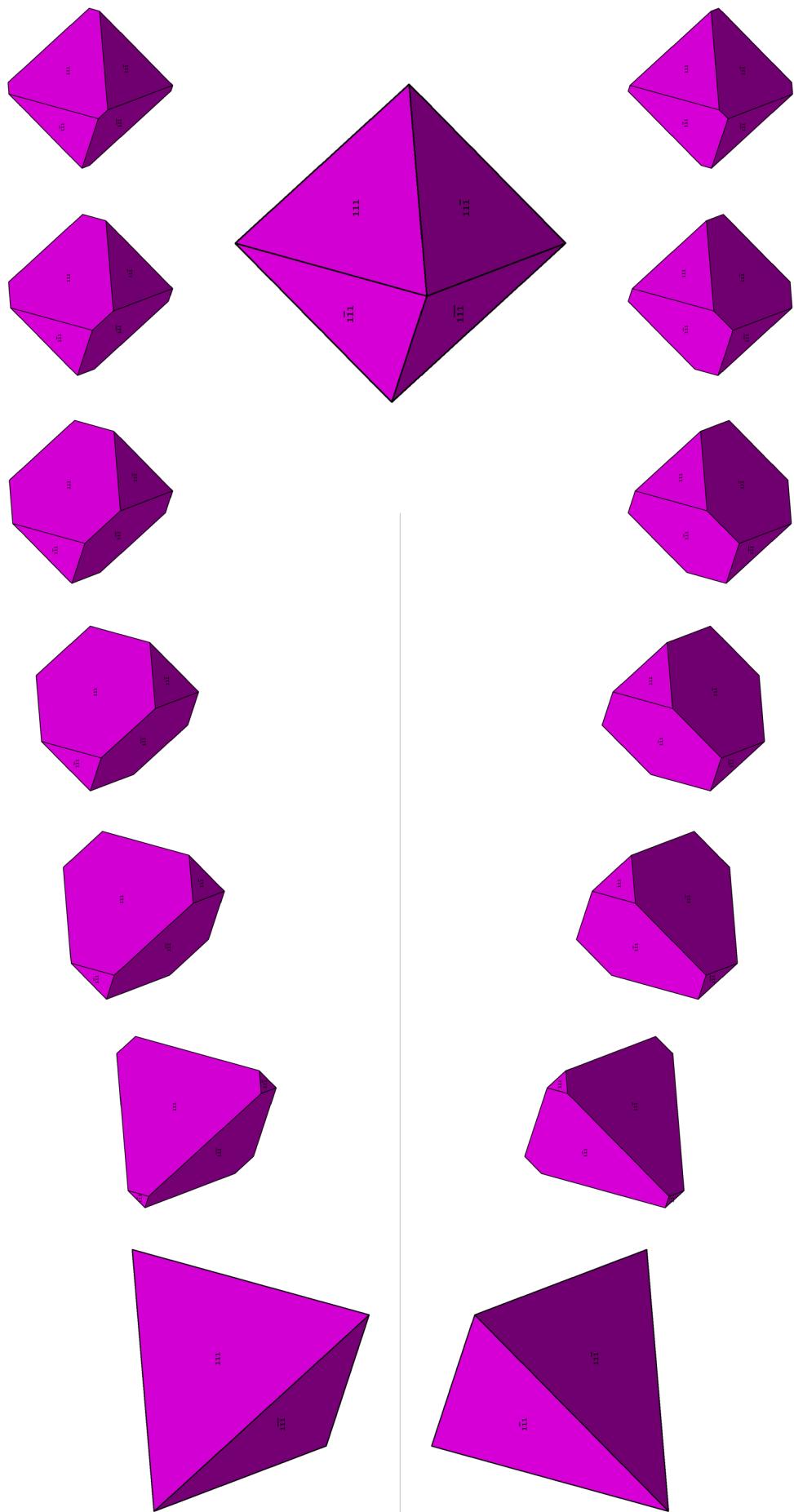
Kombination des Tetraeder mit Würfel und Rhombendodekaeder



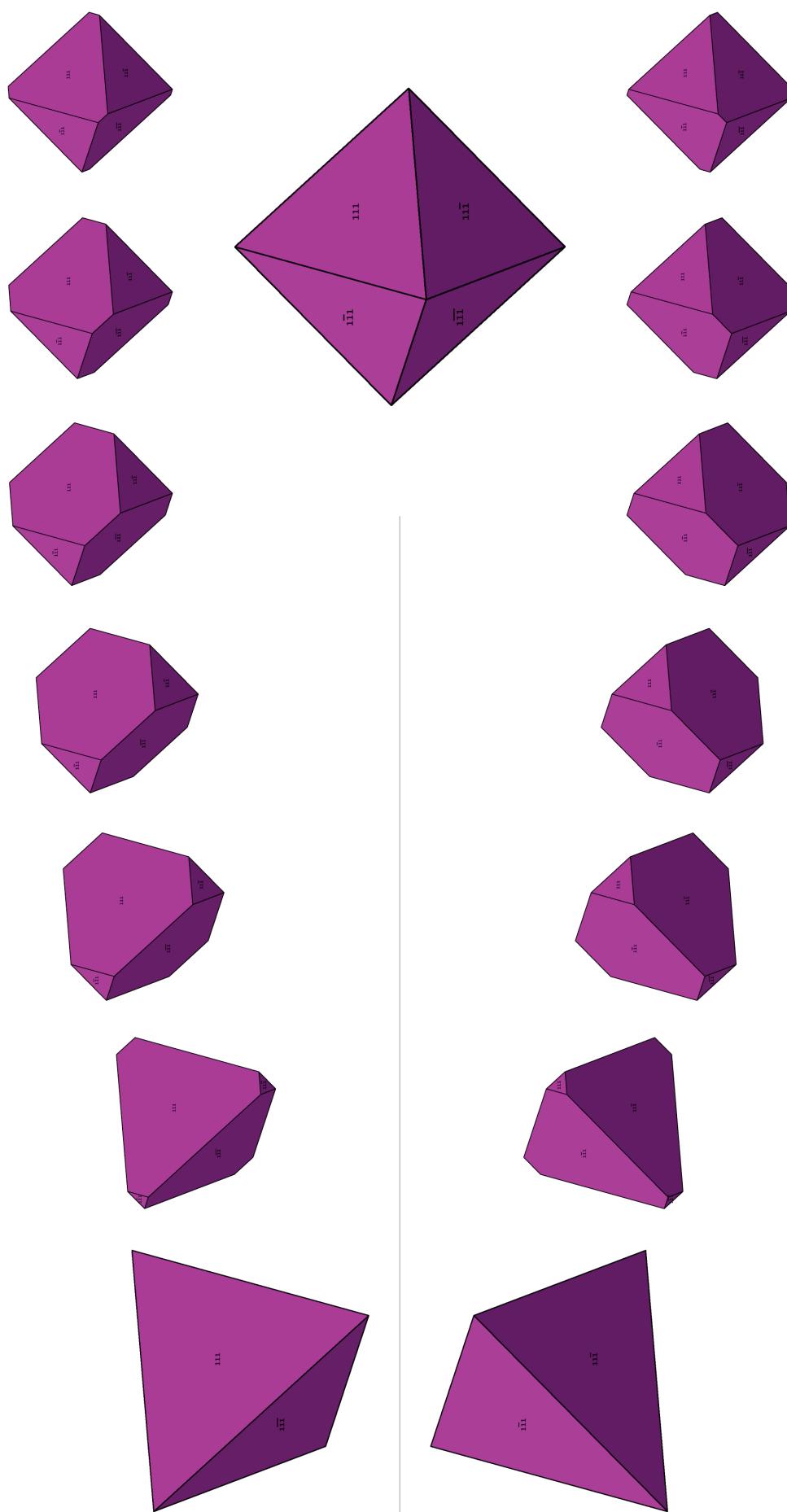
Kombination av tetraeder med kub och rombdodekaeder



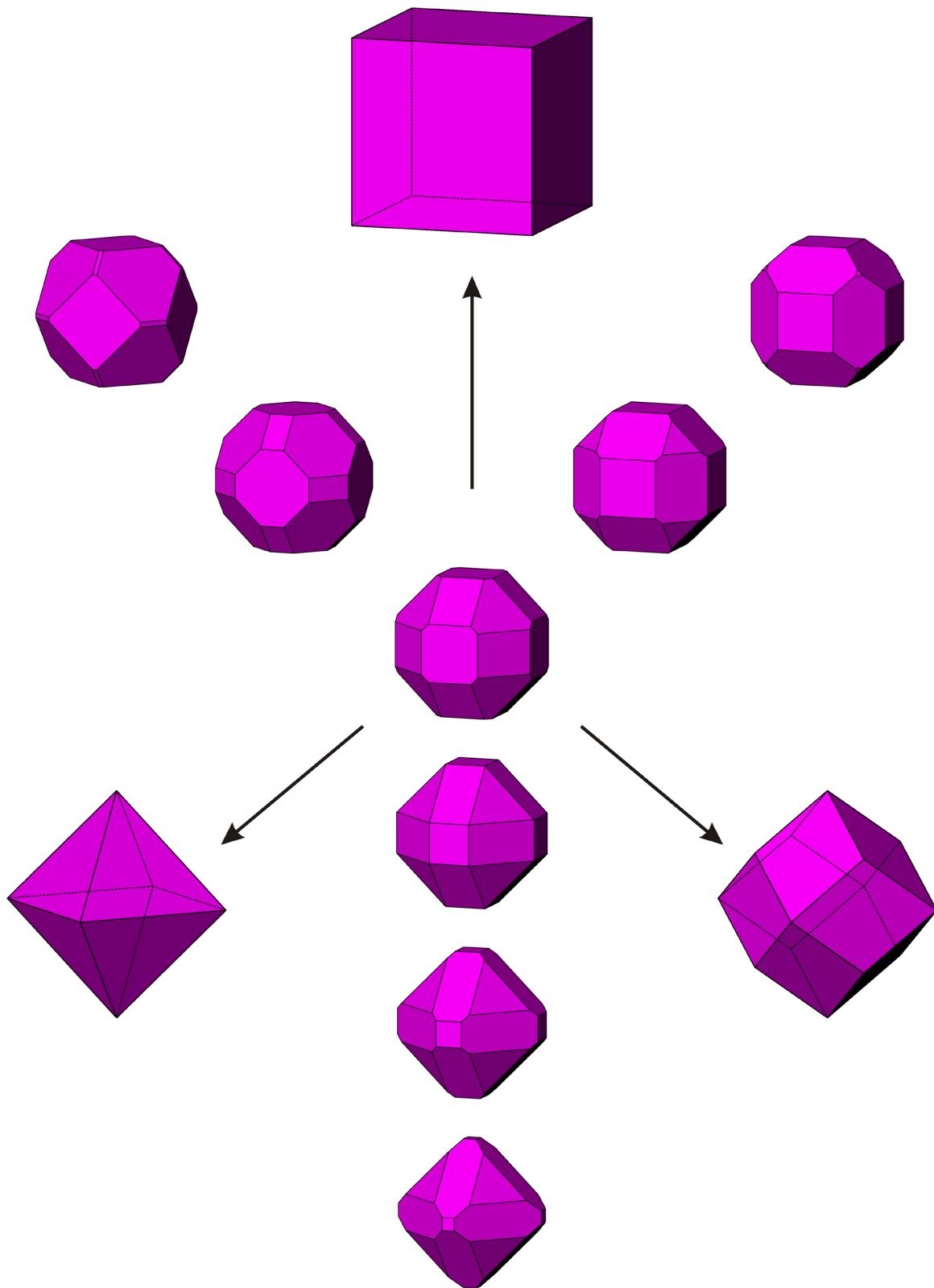
Kombination von positivem und negativem Tetraeder



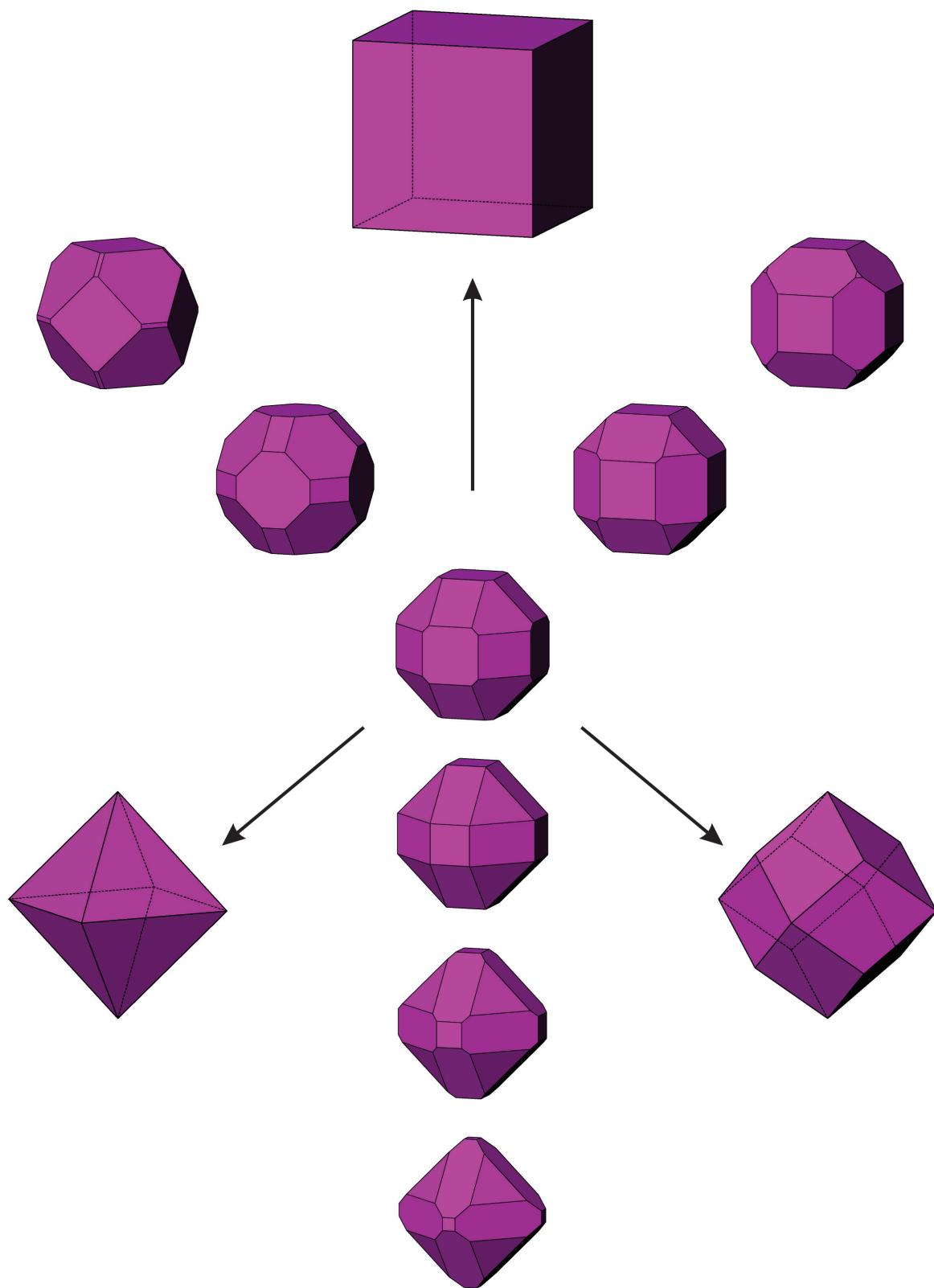
Kombination av positiva och negativa tetraedrar



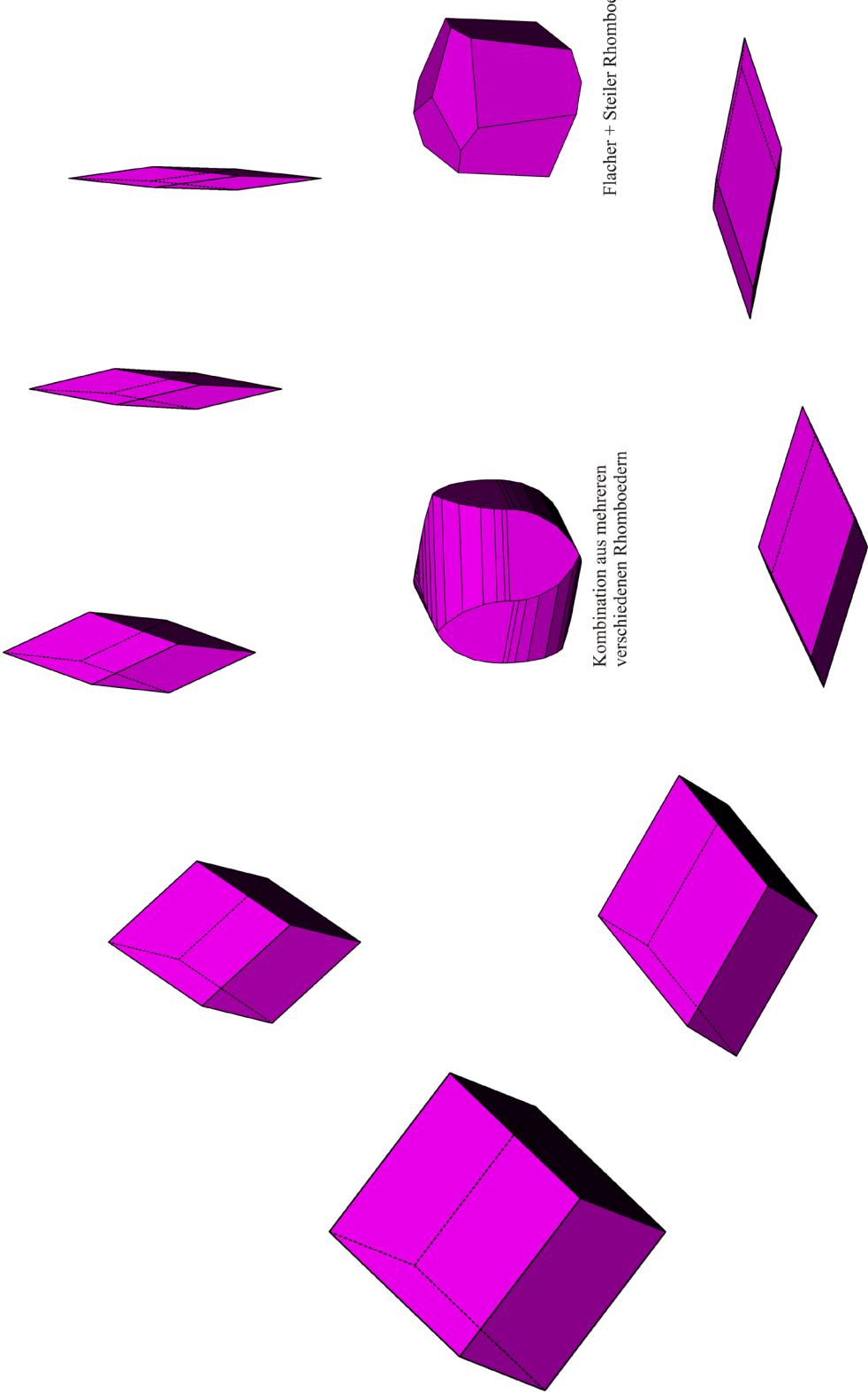
Kombinationen aus Würfel, Oktaeder und Rhombendodekaeder



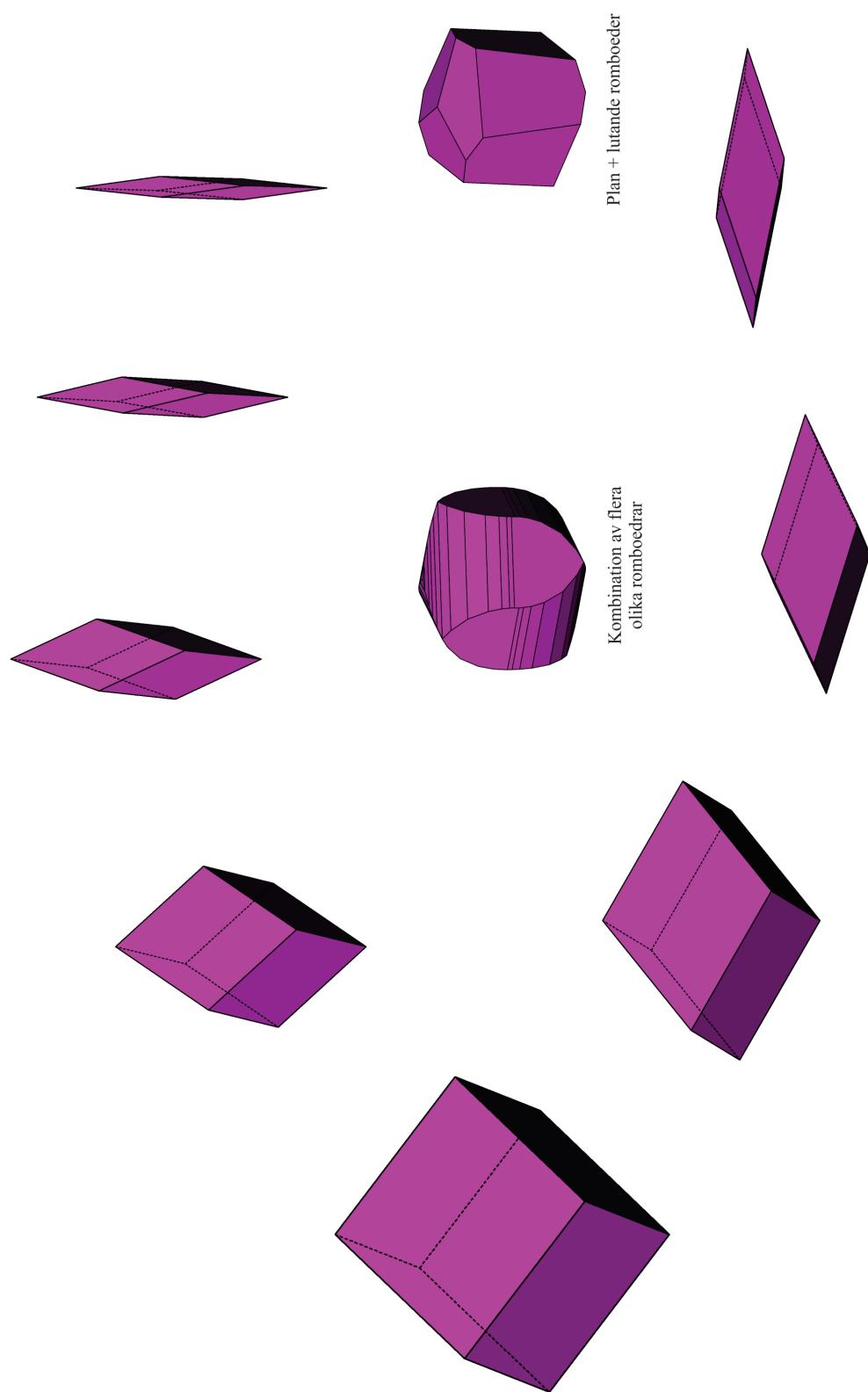
Kombination av kub, oktaeder och rombdodekaeder



Verschieden steile und flache Rhomboeder



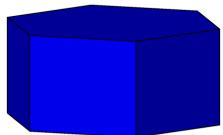
Olika plana och lutande romboedrar



**Einige ausgewählte Formen
und Kombinationen
nach Mineralbeispielen**

Några utvalda former och kombinationer enligt exempel på mineral

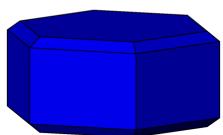
Apatit:



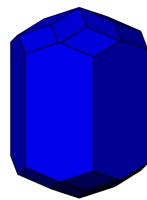
Hexagonales Prisma
Basispinakoid



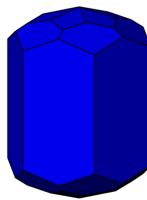
Hexagonales Prisma
Hex. Dipyramide I. St.
Hex. Dipyramide II. St.



Hexagonales Prisma
Basispinakoid
Hex. Dipyramide I. St.



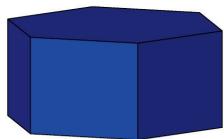
Hexagonales Prisma
Hex. Dipyramide I. St.
Hex. Dipyramide II. St.



Hexagonales Prisma
Hex. Dipyramide I. St.
Hex. Dipyramide II. St.

Chemische Zusammensetzung
Kristallsystem
Elementarzelle
Raumgruppe
Ausbildung

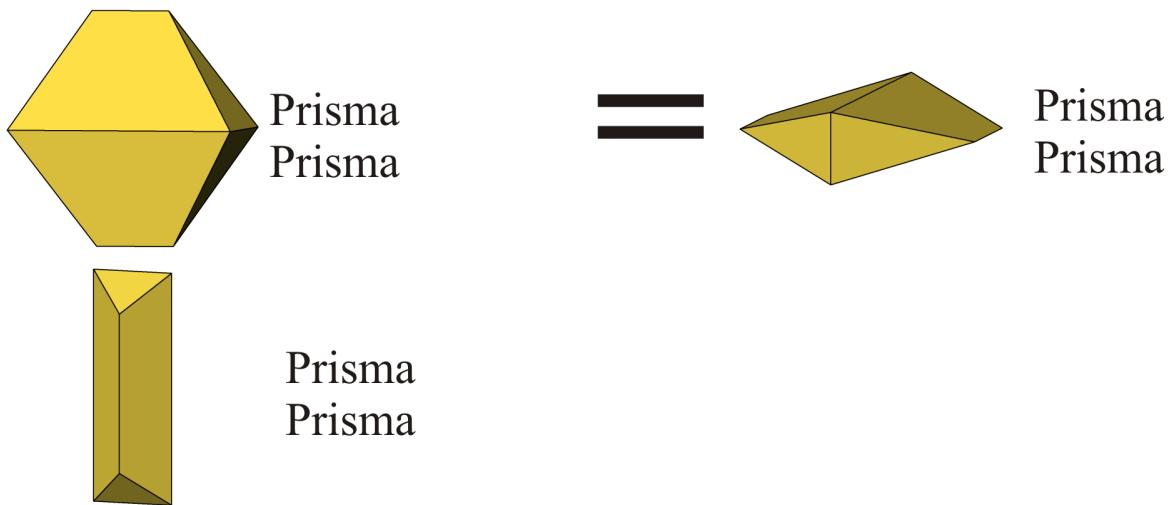
: $\text{Ca}_5[(\text{PO}_4)_3(\text{F},\text{Cl},\text{OH})]$
: Hexagonal, 6/m
: $a_0=9.38 \text{ \AA}$, $c_0=6.89 \text{ \AA}$
: P 63/m
: Derb, eingewachsen, körnig, kryptokristallin, krustenartig, xx
säulig, dicktafelig, nadelig

Apatit:Hex. Prisma
BaspinakoidHex. Prisma
Hex. Dipyramid I. St.
Hex. Dipyramid II. St.Hex. Prisma
Baspinakoid
Hex. Dipyramid I. St.Hex. Prisma
Hex. Dipyramide I. St.
Hex. Dipyramide II. St.Hex. Prisma
Hex. Dipyramide I. St.
Hex. Dipyramide II. St.

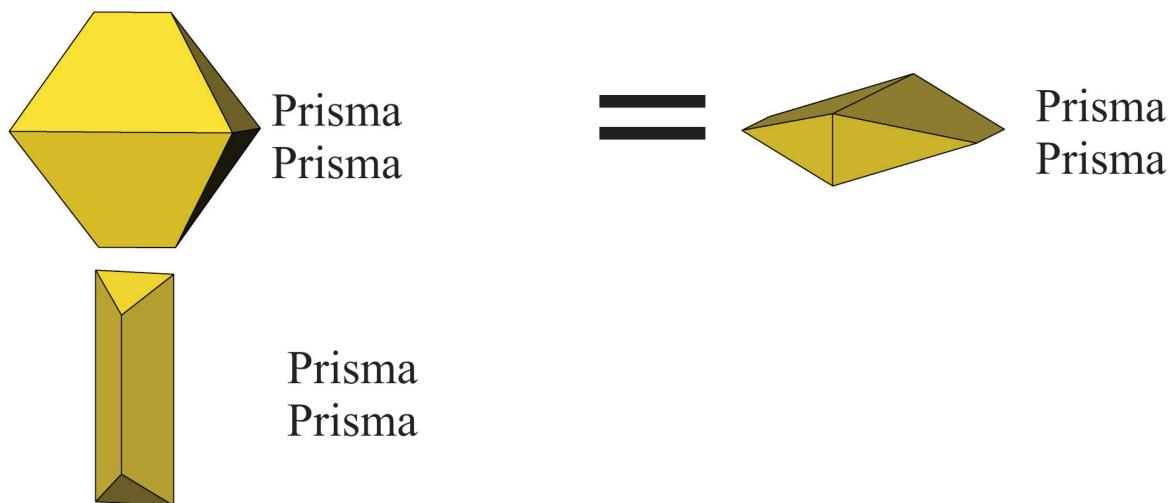
Kemisk fomel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: $\text{Ca}_5[(\text{PO}_4)_3(\text{F},\text{Cl},\text{OH})]$
: Hexagonal, 6/m
: $a_o = 9.38 \text{ \AA}$, $c_o = 6.89 \text{ \AA}$
: P 63/m
: massiv, inåtväxande, kornig, kryptokristallin, skorpartad,
xx kolumnär, tavelformad, strålig

Arsenopyrit:



Chemische Zusammensetzung	: FeAsS
Kristallsystem	: Monoklin, pseudorhombisch
Elementarzelle	: $a_0 = 5.74 \text{ \AA}$, $b_0 = 5.68 \text{ \AA}$, $c_0 = 5.79 \text{ \AA}$, $\beta = 112.17^\circ$
Raumgruppe	: P 21/c
Ausbildung	: idiomorphe Kristalle, körnig

Arsenopyrit:

Kemisk formel

: FeAsS

Kristallsystem

: Monoklin, pseudorombisk

Enhtscell

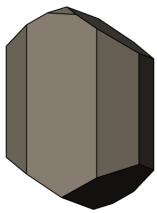
: $a_0 = 5.74 \text{ \AA}$, $b_0 = 5.68 \text{ \AA}$, $c_0 = 5.79 \text{ \AA}$, $\beta = 112.17^\circ$

Rymdgrupp

: P 21/c

Kemiska egenskaper

: idiomorf kristall, kornig

Augit:

Pinakoid
Prisma
Pinakoid
Pinakoid
Prisma



Pinakoid
Prisma
Pinakoid
Pinakoid
Prisma

Chemische Zusammensetzung

: (Ca, Mg, Fe, Al, Ti) $[(\text{Si}, \text{Al})_2\text{O}_6]$

Kristallsystem

: Monoklin

Elementarzelle

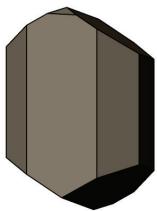
: $a_o = 9.69 \text{ \AA}$, $b_o = 8.84 \text{ \AA}$, $c_o = 5.28 \text{ \AA}$, $\beta = 106.3^\circ$

Raumgruppe

: C 2/c

Ausbildung

: Kurzprismatische bis tafelige xx, achteckige Querschnitt,
oft zonar aufgebaut

Augit:

Pinakoid
Prisma
Pinakoid
Pinakoid
Prisma

=



Pinakoid
Prisma
Pinakoid
Pinakoid
Prisma

Kemisk formel

: (Ca, Mg, Fe, Al, Ti) $[(Si, Al)_2O_6]$

Kristallsystem

: Monoklin

Enhetscell

: $a_o = 9.69 \text{ \AA}$, $b_o = 8.84 \text{ \AA}$, $c_o = 5.28 \text{ \AA}$, $\beta = 106.3^\circ$

Rymdgupp

: C 2/c

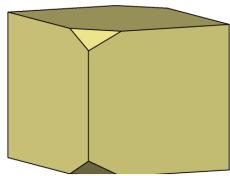
Kemiska egenskaper

: kortprismatisk till bladformig xx, åttakantig tvärsnitt

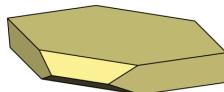
Baryt:



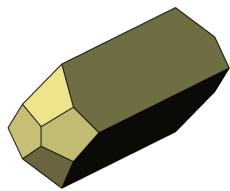
Basispinakoid
Prisma



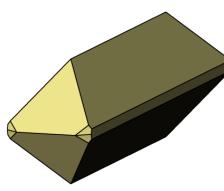
Basispinakoid
Prisma
Prisma



Basispinakoid
Prisma
Prisma



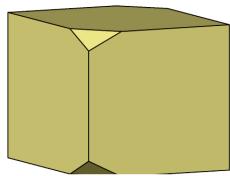
Prisma
Prisma
Prisma



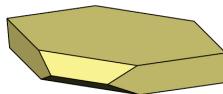
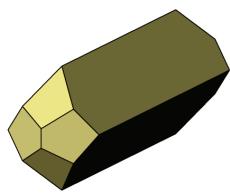
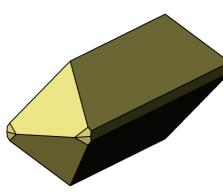
Prisma
Prisma
Pinakoid
Dipyramide

Chemische Zusammensetzung
Kristallsystem
Elementarzelle
Raumgruppe
Ausbildung

: BaSO_4
: Rhombisch, 2/m 2/m 2/m
: $a_o = 8.88\text{\AA}$, $b_o = 5.45\text{\AA}$, $c_o = 7.15\text{\AA}$
: P b n m
: Dicht, feinkristallin, grobspälig, blättrig, xx meist tafelig oder
meißelförmig

Baryt:Baspinakoid
PrismaBaspinakoid
Prisma
Prisma

=

Baspinakoid
Prisma
PrismaPrisma
Prisma
PrismaPrisma
Prisma
Pinakoid
Dipyramid

Kemisk formel

: BaSO₄

Kristallsystem

: Rhombisch, 2/m 2/m 2/m

Enhetscell

: $a_0 = 8.88\text{\AA}$, $b_0 = 5.45\text{\AA}$, $c_0 = 7.15\text{\AA}$

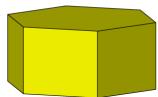
Rymdgrupp

: P b n m

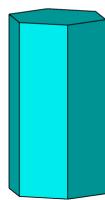
Kemiska egenskaper

: tät, finkristallin, grovspatig, bladrig, xx mest tavel- eller mejselformad

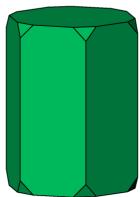
Beryll:



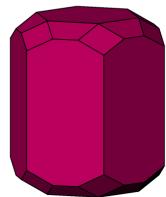
Hexagonales Prisma
Basispinakoid



Hexagonales Prisma
Basispinakoid



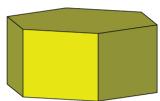
Hexagonales Prisma
Basispinakoid
Hex. Dipyramide II. St.



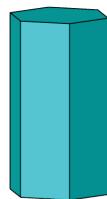
Hexagonales Prisma
Basispinakoid
Hex. Dipyramide I. St.
Hex. Dipyramide II. St.

Chemische Zusammensetzung
Kristallsystem
Elementarzelle
Raumgruppe
Ausbildung

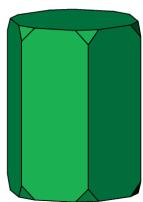
: $\text{Be}_3\text{Al}_2[\text{Si}_6\text{O}_{18}]$
: hexagonal
: $a_0 = 9.22\text{\AA}$, $c_0 = 9.19\text{\AA}$
: P 6/m m c
: säulig, stengelig, dominierend Prisma (1 0 – 1 0) und
Pinakoid (0 0 1)

Beryll:

Hex. Prisma
Baspinakoid



Hex. Prisma
Baspinakoid



Hex. Prisma
Baspinakoid
Hex. Dipyramid II. St.



Hex. Prisma
Baspinakoid
Hex. Dipyramid I. St.
Hex. Dipyramid II. St.

Kemisk formel

: $\text{Be}_3\text{Al}_2[\text{Si}_6\text{O}_{18}]$

Kristallsystem

: hexagonal

Enhetscell

: $a_o = 9.22\text{\AA}$, $c_o = 9.19\text{\AA}$

Rymdgrupp

: P 6/m m c

Kemiska egenskaper

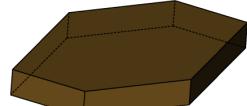
: kolumnär, acikulär, dominerande prisma (1 0 - 1 0)
och pinakoid (0 0 0 1)

Biotit:



Basispinakoid
Prisma
Pinakoid

=



Basispinakoid
Prisma
Pinakoid



Basispinakoid
Prisma
Pinakoid
Prisma

Chemische Zusammensetzung

: $K(Mg, Fe)_3[(OH)_2 / AlSi_3O_{10}]$

Kristallsystem

: Monoklin, trioktaedrisches Dreischichtsilikat

Elementarzelle

: $a_0 = 5.35 \text{ \AA}$, $b_0 = 9.26 \text{ \AA}$, $c_0 = 10.23 \text{ \AA}$, $\beta = 100.3^\circ$

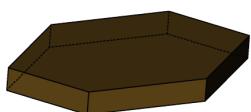
Raumgruppe

: C 2/m

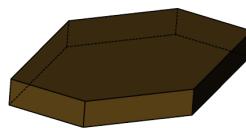
Ausbildung

: Tafelig, plattig, schuppig

Biotit:



Baspinakoid
Prisma
Pinakoid



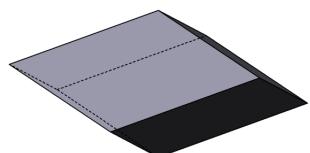
Baspinakoid
Prisma
Pinakoid



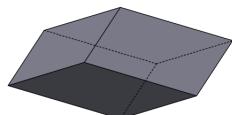
Baspinakoid
Prisma
Pinakoid
Prisma

Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

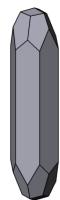
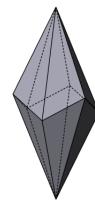
: K₂(Mg, Fe)₃[(OH)₂ / AlSi₃O₁₀]
: Monoklin, trioktaedrisk 2:1 phyllosilikat
: $a_0 = 5.35 \text{ \AA}$, $b_0 = 9.26 \text{ \AA}$, $c_0 = 10.23 \text{ \AA}$, $\beta = 100.3^\circ$
: C 2/m
: tavelformad, plåtliknande, fjällande

Calcit:

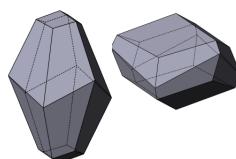
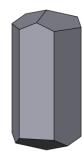
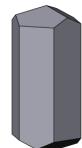
positiver Rhomboeder

negativer
Rhomboeder

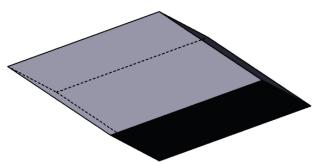
negativer Rhomboeder

pos. Rhomboeder
Prisma
Skalenoeder

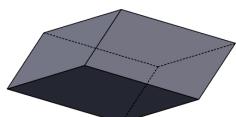
Skalenoeder

Skalenoeder
(+)-RhomboederPrisma
(-)-RhomboederPrisma
(+)-Rhomboeder

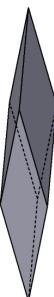
Chemische Zusammensetzung	: CaCO_3
Kristallsystem	: Trigonal, -3m
Elementarzelle	: $a_0 = 4.99$, $c_0 = 17.06$
Raumgruppe	: R-3c
Ausbildung	: Gesteinsbildend, dicht, oolithisch, derb grobspätig, sehr verschieden (formenreiches Mineral!), z.B. Rhomboeder und Skalenoeder, säulige xx u.a

Kalcit:

Positiv Romboeder



Negativ Romboeder



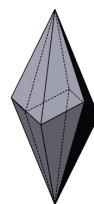
Negativ Romboeder



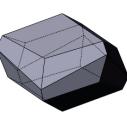
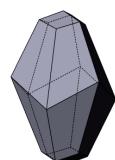
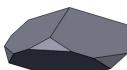
Positiv Romboeder

Prisma

Skalenoeder



Skalenoeder

Skalenoeder
(+)-RomboederPrisma
(-)-RomboederPrisma
(+)-Romboeder

Kemisk formel

: CaCO_3

Kristallsystem

: Trigonal, -3m

Enhetscell

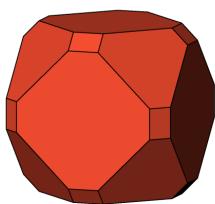
: $a_0 = 4.99$, $c_0 = 17.06$

Rymdgrupp

: R-3c

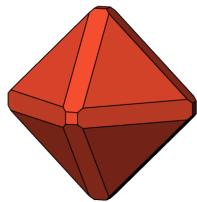
Kemiska egenskaper

: bergartsbildande, tät, massiv, grovspatig, xx mycket olika (formrikta mineral!) t.ex.: romboeder och skalenoder, kolumnär xx bl.a.

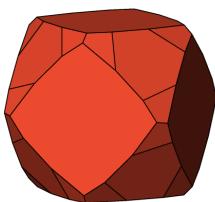
Cuprit:

Hexaeder
Oktaeder
Rhombendodekaeder

=



Hexaeder
Oktaeder
Rhombendodekaeder



Hexaeder
Oktaeder
Pentagonikositetraeder

Chemische Zusammensetzung

: Cu₂O

Kristallsystem

: Kubisch

Elementarzelle

: $a_0=4.27 \text{ \AA}$

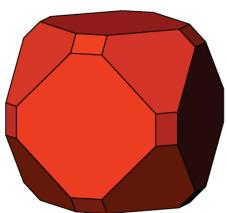
Raumgruppe

: Pn3m

Ausbildung

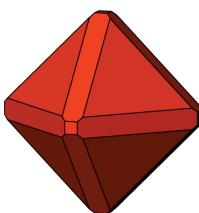
: Derb, eingesprengt. Würfel, Oktaeder, nadelige

Kuprit:

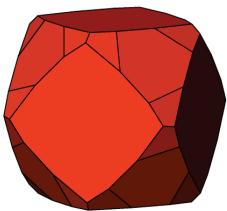


Hexaeder
Oktaeder
Rombdodekaeder

=



Hexaeder
Oktaeder
Rombdodekaeder



Hexaeder
Oktaeder
Pentagonikositetraeder

Kemisk formel

: Cu₂O

Kristallsystem

: Kubisk

Enhetscell

: $a_0 = 4.27 \text{ \AA}$

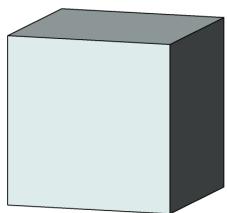
Rymdgrupp

: Pn3m

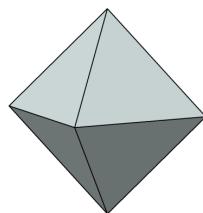
Kemiska egenskaper

: massiv, insprängd, kubisk, oktaedrisk, nälig x

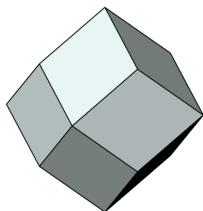
Diamant:



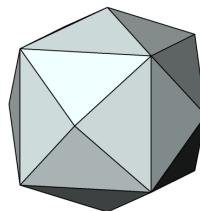
Hexaeder



Oktaeder



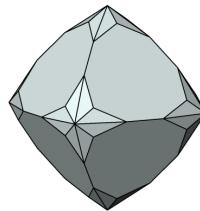
Rhombendodekaeder



Tetrakishexaedra



Hexakisoktaeder

Oktaeder
Hexakisoktaeder

Chemische Zusammensetzung

: C

Kristallsystem

: Kubisch

Elementarzelle

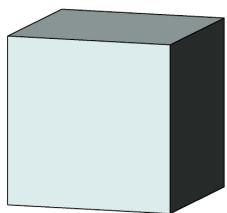
: $a_0 = 3.559 \text{ \AA}$

Raumgruppe

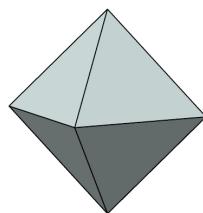
: F d3m

Ausbildung

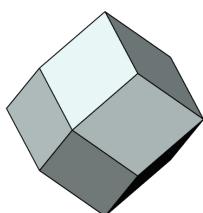
: Oktaeder, Rhombendodekaeder, Würfel,
meist abgerundet

Diamant:

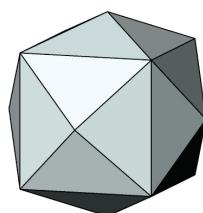
Hexaeder



Oktaeder



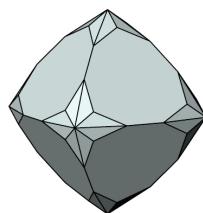
Rombdodekaeder



Tetrakishexaedron



Hexakisoktaeder

Oktaeder
Hexakisoktaeder

Kemisk formel

: C

Kristallsystem

: Kubisk

Enhetscell

: $a_0 = 3.559 \text{ \AA}$

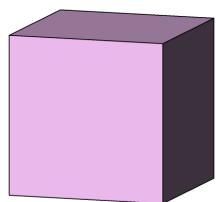
Rymdgrupp

: F d3m

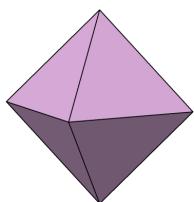
Kemiska egenskaper

: oktaedrisk, rombisk, kubisk, xx mest avrundad

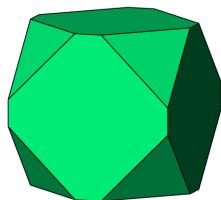
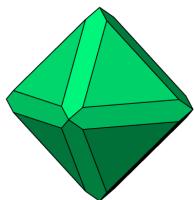
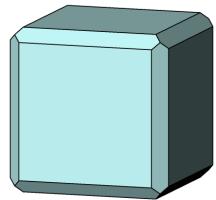
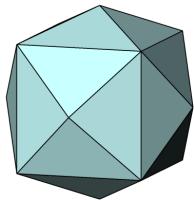
Fluorit:



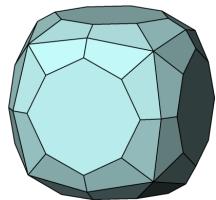
Hexaeder



Oktaeder

Hexaeder
OktaederOktaeder
RhombendodekaederHexaeder
Rhombendodekaeder

Tetrakishexaeder

Hexaeder
Hexakisoktaeder

Chemische Zusammensetzung

: CaF_2

Kristallsystem

: Kubisch

Elementarzelle

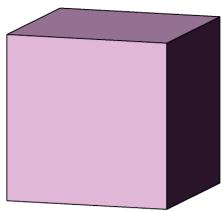
: $a_0 = 5.46 \text{ \AA}$

Raumgruppe

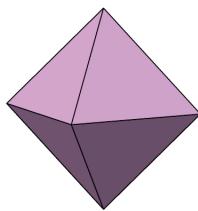
: F m3m

Ausbildung

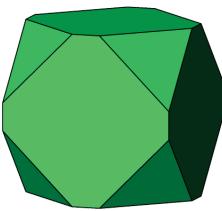
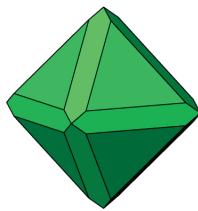
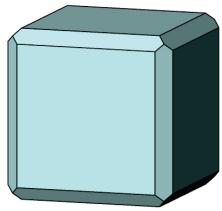
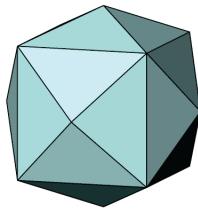
: Derb, grobspälig, Würfel, Oktaeder,
Rhombendodekaeder, oft grobkristallin

Fluorit:

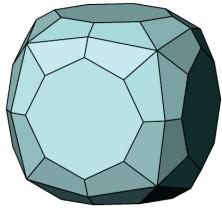
Hexaeder



Oktaeder

Hexaeder
OktaederOktaeder
RombdodekaederHexaeder
Rombdodekaeder

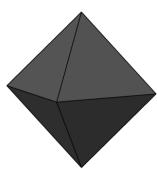
Tetrakiso hexaeder

Hexaeder
Hexakisoktaeder

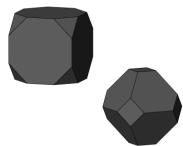
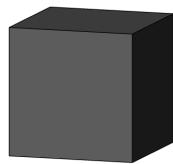
Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: CaF_2
: Kubisk
: $a_0 = 5.46 \text{ \AA}$
: F m3m
: massiv, grovspatig, kubisk, oktaedrisk, rombdodekaeder, ofta grovkristallin

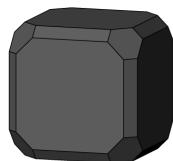
Galenit:



Oktaeder

div.
Kub-Oktaeder

Würfel

Würfel
Oktaeder
Rhombendodekaeder

Chemische Zusammensetzung

: PbS

Kristallsystem

: Kubisch, NaCl-Gitter

Elementarzelle

: $a_0 = 5.94 \text{ \AA}$

Raumgruppe

: Fm 3 m

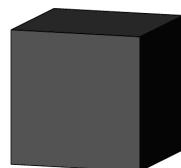
Ausbildung

: Derb, eingesprengt, Würfel, Oktaeder,
Rhombendodekaeder, oft Kombinationen

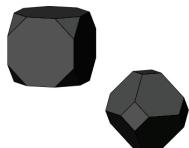
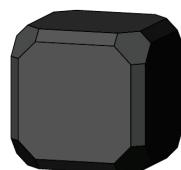
Galenit:



Oktaeder



Kub

olika
Kub-OktaederKub
Oktaeder
Rombdodekaeder

Kemisk formel

: PbS

Kristallsystem

: Kubisk, NaCl-gitter

Enhetscell

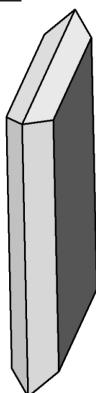
: $a_0 = 5.94 \text{ \AA}$

Rymdgrupp

: F m 3 m

Kemiska egenskaper

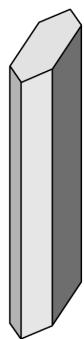
: massiv, insprängd, kub, oktaeder, rombdodekaeder, ofta kombinationer

Gips:

Prisma
Prisma
Pinakoid



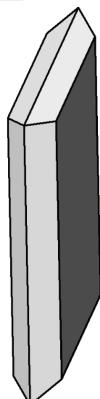
Prisma
Prisma
Prisma
Prisma
Pinakoid



Prisma
Basispinakoid
Pinakoid

Chemische Zusammensetzung
Kristallsystem
Elementarzelle
Raumgruppe
Ausbildung

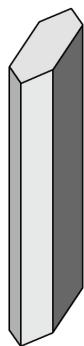
: $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
: Monoklin, 2/m
: $a_0 = 5.68\text{\AA}$, $b_0 = 15.18\text{\AA}$, $c_0 = 6.89\text{\AA}$, $\beta = 113.83^\circ$
: A 2/a
: Dicht, feinkörnig, faserig, xx nadelig, primatisch,
tafelig, oft Schwalbenschwanzzwillinge

Gips:

Prisma
Prisma
Pinakoid



Prisma
Prisma
Prisma
Prisma
Pinakoid

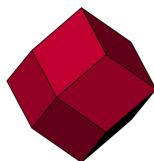


Prisma
Baspinakoid
Pinakoid

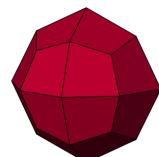
Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
: Monoklin, 2/m
: $a_0 = 5.68\text{\AA}$, $b_0 = 15.18\text{\AA}$, $c_0 = 6.89\text{\AA}$, $\beta = 113.83^\circ$
: A 2/a
: tät, finkornig, fibrös, xx strålig, prismatisk, bladformig,
ofta svalstjärtstvillingar

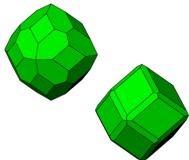
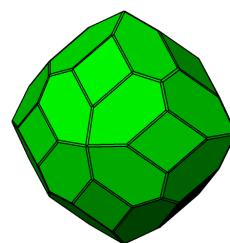
Granat:



Rhombendodekaeder



Deltoidikositetraeder

Rhombendodekaeder
DeltoidikositetraederRhombendodekaeder
Deltoidikositetraeder
Tetrakis hexaeder
Hexakisoktaeder
Trisoktaeder

Chemische Zusammensetzung

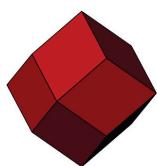
$$: X_3Y_2[SiO_4]_3$$

X: Mg, Fe²⁺, Mn²⁺, Ca (8er Koordinat.)
 Y: Al, Fe³⁺, Cr³⁺, V³⁺ (6er Koordinat)
 Für (SiO₄) auch (AlO₄) oder (OH)

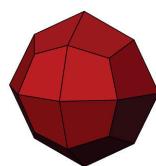
Kristallsystem
Ausbildung

: Kubisch
 : Rhombendodekaeder (110), Deltoidikositetraeder (211)

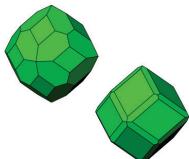
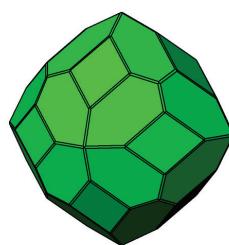
„Pyralspite“Pyrop: $Mg_3Al_2[SiO_4]_3$ Almandin: $Fe_3Al_2[SiO_4]_3$ Spressartin: $Mn_3Al_2[SiO_4]_3$ **“Ugrandite”**Uwarowit: $Ca_3Cr_2[SiO_4]_3$ Grossular: $Ca_3Al_2[SiO_4]_3$ Andradit: $Ca_3Fe_2[SiO_4]_3$

Granat:

Rombdodekaeder



Deltoidikositetraeder

Rombdodekaeder
DeltoidikositetraederRombdodekaeder
Deltoidikositetraeder
Tetrakis hexaeder
Hexakisoktaeder
Trisoktaeder

Kemisk formel

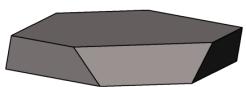
 $: X_3Y_2[SiO_4]_3$ X: Mg, Fe²⁺, Mn²⁺, Ca (8. Koord.)Y: Al, Fe³⁺, Cr³⁺, V³⁺ (6. Koord.)För (SiO₄) även (AlO₄) eller (OH)

: Kubisk

: Rombdodekaeder (110), Deltoidikositetraeder (211)

Kristallsystem
Kemiska egenskaper**„Pyralspiter“**Pyrop: $Mg_3Al_2[SiO_4]_3$ Almandin: $Fe_3Al_2[SiO_4]_3$ Spressartin: $Mn_3Al_2[SiO_4]_3$ **“Ugranditer”**Uwarowit: $Ca_3Cr_2[SiO_4]_3$ Grossular: $Ca_3Al_2[SiO_4]_3$ Andradit: $Ca_3Fe_2[SiO_4]_3$

Hämatit:

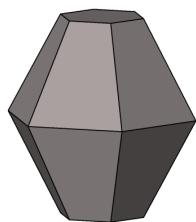


Rhomboeder
Basispinakoid

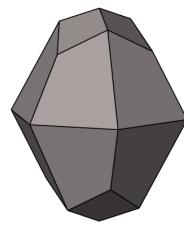
=



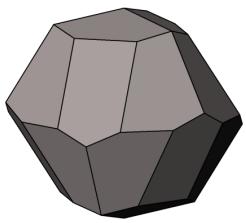
Rhomboeder
Basispinakoid



Dipyramide
Basispinakoid



Rhomboeder
Dipyramide



Rhomboeder
Dipyramide
Rhomboeder

Chemische Zusammensetzung

: Fe_2O_3

Kristallsystem

: Trigonal

Elementarzelle

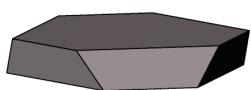
: $a_0 = 5.03\text{\AA}$, $c_0 = 13.74\text{\AA}$

Raumgruppe

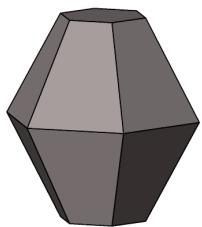
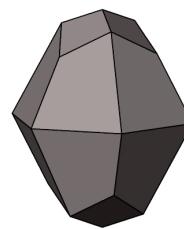
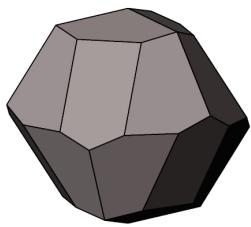
: R -3c

Ausbildung

: Erdig, schuppig, radialstrahlig, knollig, nierig, xx
tafelig, plattig

Hematit:Romboeder
Baspinakoid

=

Romboeder
BaspinakoidDipyramid
BaspinakoidRomboeder
DipyramidRomboeder
Dipyramid
Romboeder

Kemisk formel : Fe₂O₃
 Kristallsystem : Trigonal
 Enhetscell : a₀= 5.03Å, c₀=13.74Å
 Rymdgrupp : R -3c
 Kemiska egenskaper : jordig, fjällande, radialstrålig, knölig, xx tavelformad,
 plåtliknande

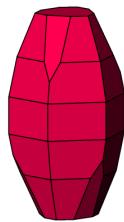
Korund:



Prisma
Basispinakoid



Prisma
Basispinakoid
Dipyramide

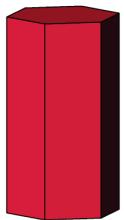


Prisma
Basispinakoid
Dipyramide
Dipyramide
Rhomboeder

Chemische Zusammensetzung
Kristallsystem
Elementarzelle
Raumgruppe
Ausbildung

: Al_2O_3
: Trigonal
: $a_0=4.75 \text{ \AA}$, $c_0=12.98 \text{ \AA}$
: R-3c
: Eingesprengt, säulige bis tonnenförmig, meist mit Flächenstreifung

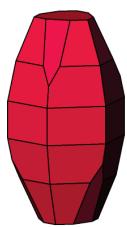
Korund:



Prisma
Baspinakoid



Prisma
Baspinakoid
Dipyramid



Prisma
Baspinakoid
Dipyramid
Dipyramid
Romboeder

Kemisk formel

: Al_2O_3

Kristallsystem

: Trigonal

Enhetscell

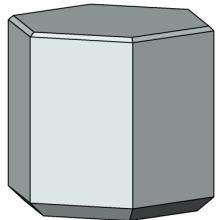
: $a_0=4.75 \text{ \AA}$, $c_0= 12.98 \text{ \AA}$

Rymdgrupp

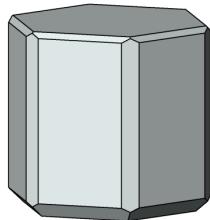
: R-3c

Kemiska egenskaper

: insprängd, kolumnär till tunnformad, ofta med striationer

Nephelin:

Prisma
Basispedion
Basispedion
Pyramide
Pyramide

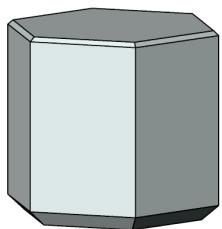


Prisma
Basispedion
Basispedion
Pyramide
Pyramide
Prisma

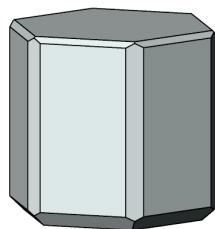
Chemische Zusammensetzung
Kristallsystem
Elementarzelle
Raumgruppe
Ausbildung

: $\text{KNa}_3[\text{Al SiO}_4]_4$
: Hexagonal
: $a_0 = 9.99 \text{ \AA}$, $c_0 = 8.37 \text{ \AA}$
: $P\bar{6}_3$
: Derb, selten säulig

Nefelin:



Prisma
Baspedion
Baspedion
Pyramid
Pyramid



Prisma
Baspedion
Baspedion
Pyramid
Pyramid
Prisma

Kemisk formel

: $\text{KNa}_3[\text{Al SiO}_4]_4$

Kristallsystem

: Hexagonal

Enhetscell

: $a_0 = 9.99 \text{ \AA}$, $c_0 = 8.37 \text{ \AA}$

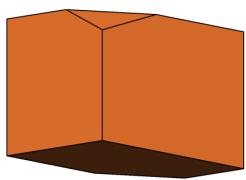
Rymdgrupp

: $P\ 6_3$

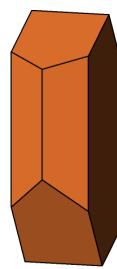
Kemiska egenskaper

: massiv, sällan kolumnär

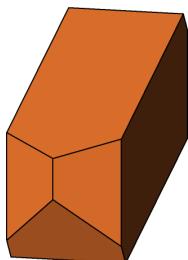
Orthoklas:



Prisma
Pinakoid
Pinakoid

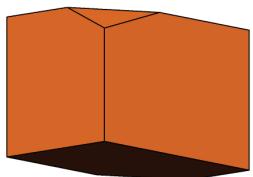


Prisma
Basispinakoid
Pinakoid
Pinakoid

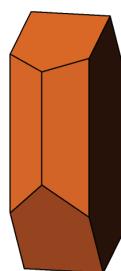


Prisma
Pinakoid
Basispinakoid
Pinakoid

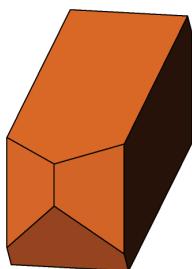
Chemische Zusammensetzung	: $K[Al Si_3 O_8]$ „Kalifeldspat“
Kristallsystem	: Monoklin
Elementarzelle	: $a_o = 8.62 \text{ \AA}$, $b_o = 12.99 \text{ \AA}$, $c_o = 7.19 \text{ \AA}$, $\beta = 116.02^\circ$
Raumgruppe	: C 2/m
Ausbildung	: Gesteinsbildend, tafelig, prismatisch, häufig Zwillinge (Karlsbader, Manebacher, Bavenoer Gesetz)

Ortoklas:

Prisma
Pinakoid
Pinakoid



Prisma
Baspinakoid
Pinakoid
Pinakoid

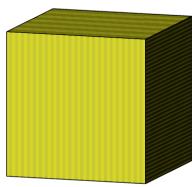


Prisma
Pinakoid
Baspinakoid
Pinakoid

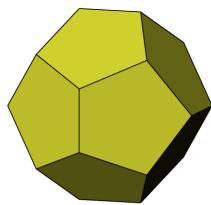
Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: $K[Al Si_3 O_8]$ „Kalifältspat“
: Monoklin
: $a_0 = 8.62 \text{ \AA}$, $b_0 = 12.99 \text{ \AA}$, $c_0 = 7.19 \text{ \AA}$, $\beta = 116.02^\circ$
: C 2/m
: bergartsbildande, xx tavelformad, prismatisk, ofta tvillingar (Karlsbad-, Manebach-, Baveno-regel)

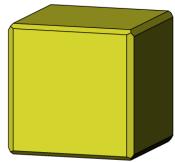
Pyrit:



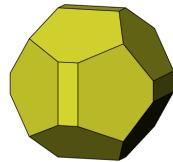
Würfel (Hexaeder) mit
Flächenstreifung



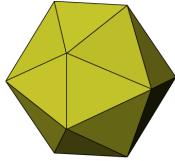
Pentagondodekaeder



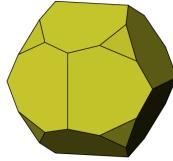
Pentagondodekaeder
Würfel (Hexaeder)



Pentagondodekaeder
Würfel (Hexaeder)



Pentagondodekaeder
Oktaeder
= "Pseudo-Ikosaeder"



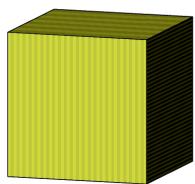
Pentagondodekaeder
Oktaeder

Chemische Zusammensetzung
Kristallsystem

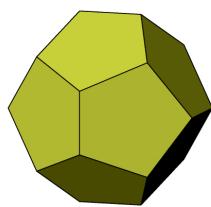
: FeS₂
: Kubisch: Struktur: ähnlich NaCl, S₂-Hanteln liegen
parallel (1 1 1)

Elementarzelle
Raumgruppe
Ausbildung

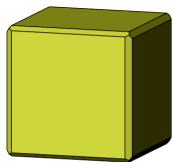
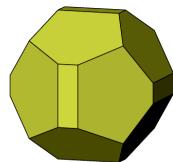
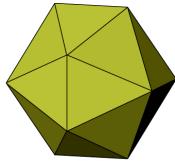
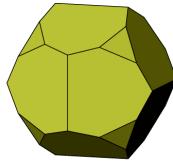
: $a_0 = 5.42 \text{ \AA}$
: P a 3
: Derb, eingesprengt, Würfel (oft mit Flächenstreifung),
Oktaeder, Pentagondodekaeder

Pyrit:

Kub med striationer



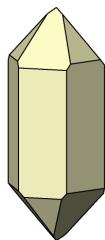
Pentagondodekaeder

Pentagondodekaeder
KubPentagondodekaeder
KubPentagondodekaeder
Oktaeder
= "Pseudo-Ikosaeder"Pentagondodekaeder
Oktaeder

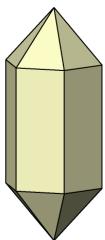
Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: FeS₂
: Kubisk (struktur lik NaCl)
: $a_0 = 5.42 \text{ \AA}$
: P a 3
: massiv, insprängd, kub (ofta med striationer), oktaeder, pentagondodekaeder

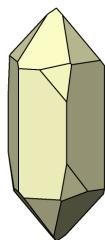
Quarz:



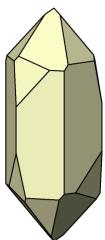
Hexagonales Prisma
pos. Rhomboeder
neg. Rhomboeder



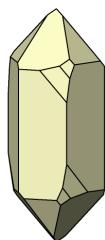
Hexagonales Prisma
Hex. Dipyramide
Hochquarz!
(andere Symetrie)



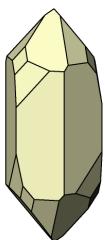
Hexagonales Prisma
pos. Rhomboeder
neg. Rhomboeder
rechter Trapezoeder



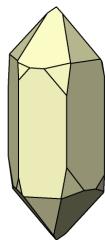
Hexagonales Prisma
pos. Rhomboeder
neg. Rhomboeder
linker Trapezoeder



Hexagonales Prisma
pos. Rhomboeder
neg. Rhomboeder
rechter Trapezoeder
rechte Dipyramide

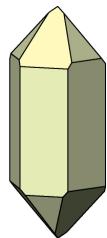


Hexagonales Prisma
pos. Rhomboeder
neg. Rhomboeder
linker Trapezoeder
linke Dipyramide

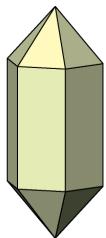


Hexagonales Prisma
pos. Rhomboeder
neg. Rhomboeder
“linker”
“rechter” Trapezoeder

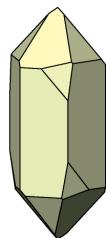
Chemische Zusammensetzung	: SiO ₂
Kristallsystem	: Trigonal
Elementarzelle	: $a_0 = 4.91 \text{ \AA}$, $c_0 = 5.40 \text{ \AA}$
Raumgruppe	: P 3 ₁ 2 1, P 3 ₂ 2 1
Ausbildung	: derb, schöne Kristalle, z.T. wasserklar

Kvarts:

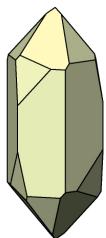
Hex. Prisma
pos. Romboeder
neg. Romboeder



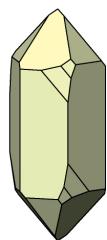
Hex. Prisma
Hex. Dipyramid
Högkvarts
(andra symmetrier)



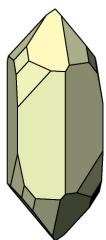
Hex. Prisma
pos. Romboeder
neg. Rhomboeder
höger Trapezoeder



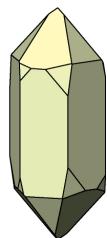
Hex. Prisma
pos. Romboeder
neg. Romboeder
vänster Trapezoeder



Hex. Prisma
pos. Romboeder
neg. Romboeder
höger Trapezoeder
höger Dipyramid



Hexa. Prisma
pos. Rhomboeder
neg. Rhomboeder
vänster Trapezoeder
vänster Dipyramid

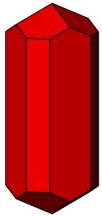


Hex. Prisma
pos. Romboeder
neg. Romboeder
“vänster”
“höger” Trapezoeder

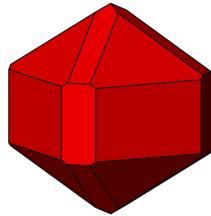
Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: SiO₂
: Trigonal
: $a_0 = 4.91 \text{ \AA}$, $c_0 = 5.40 \text{ \AA}$
: P 3₁ 2 1, P 3₂ 2 1
: massiv, fina kristaller, delvis färglös

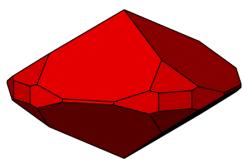
Rutil:



Prisma
Prisma
Dipyramide



Prisma
Prisma
Dipyramide
Dipyramide

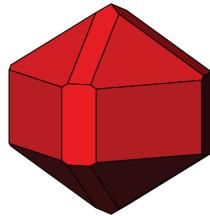


Prisma
Prisma
Dipyramide
Dipyramide
ditetragonales Prisma

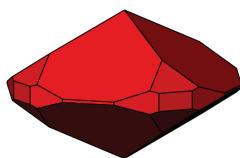
Chemische Zusammensetzung	: TiO_2
Kristallsystem	: Tetragonal
Elementarzelle	: $a_0=4.594\text{\AA}$, $c_0=2.958\text{\AA}$
Raumgruppe	: $P\bar{4}/mnm$
Ausbildung	: Derb, nadelige, stengelig, häufig Verzwilligung (Winkel 120°)

Rutil:

Prisma
Prisma
Dipyramid



Prisma
Prisma
Dipyramid
Dipyramid

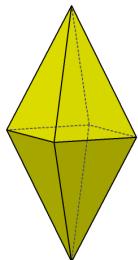


Prisma
Prisma
Dipyramid
Dipyramid
Ditetragonal Prisma

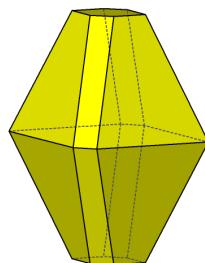
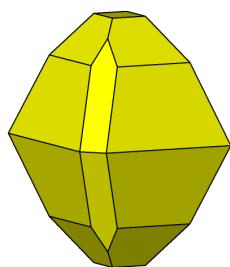
Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: TiO_2
: Tetragonal
: $a_0=4.594\text{\AA}$, $c_0=2.958\text{\AA}$
: $P\bar{4}/mnm$
: massiv, strålig, acikulär, ofta tvillingar (vinkel 120°)

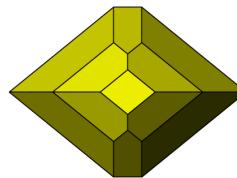
Schwefel:



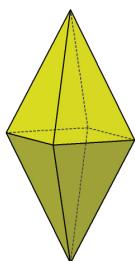
Dipyramide

Dipyramide
Basispinakoid
PrismaDipyramide
Dipyramide
Basispinakoid
Prisma

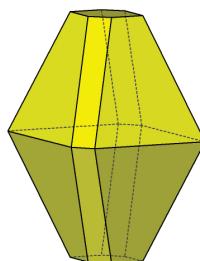
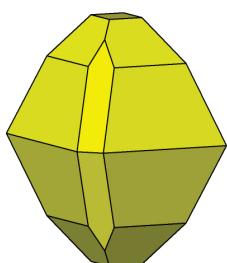
=

**Kopfbild**
Dipyramide
Dipyramide
Basispinakoid
Prisma

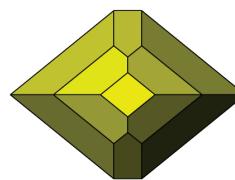
Chemische Zusammensetzung	: S
Kristallsystem	: orthorhombisch
Elementarzelle	: $a_0 = 10.45 \text{ \AA}$, $b_0 = 12.85 \text{ \AA}$, $c_0 = 24.46 \text{ \AA}$
Raumgruppe	: F ddd
Besonderheiten	: bis 95° orthorhombisch, ab 95° monoklin, Schmelzpunkt $119,2^\circ\text{C}$ Ringförmige S_8 -Moleküle, zwischen den Molekülen nur Van-der-Waalsche Bindung
Ausbildung	: Derbe, dichte, erdige Aggregate, pyramidale und sphenoidische xx

Svavel:

Dipyramid

Dipyramid
Baspinakoid
PrismaDipyramid
Dipyramid
Baspinakoid
Prisma

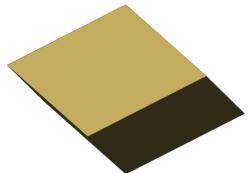
=

*Bild från ovan*
Dipyramid
Dipyramid
Baspinakoid
Prisma

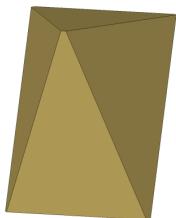
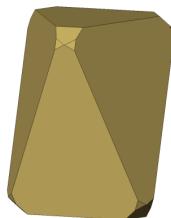
Kemisk formel : S
 Kristallsystem : ortorombisk
 Enhetscell : $a_0 = 10.45 \text{ \AA}$, $b_0 = 12.85 \text{ \AA}$, $c_0 = 24.46 \text{ \AA}$
 Rymdgrupp : F ddd
 Särdrag : till 95° ortorombisk, från 95° monoklin,
 smältpunkt $119,2^\circ\text{C}$
 Ringformade S_8 -molekyler, mellan molekylerna endast
 Van-der-Waal-bindning

Kemiska egenskaper : massiv, tät, jordiga aggregater, pyramidal och
 sphenoid xx

Siderit:



Rhomboeder

Rhomboeder
SkalenoederRhomboeder
Skalenoeder
Skalenoeder
RhomboederRhomboeder
BasispinakoidRhomboeder
Basispinakoid
Rhomboeder
Skalenoeder

Chemische Zusammensetzung

: FeCO_3

Kristallsystem

: Trigonal, -3m

Elementarzelle

: $a_0 = 4.72$, $c_0 = 15.46$

Raumgruppe

: R -3c

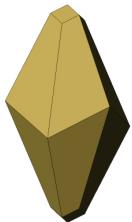
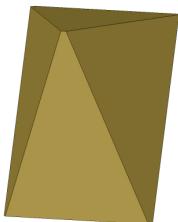
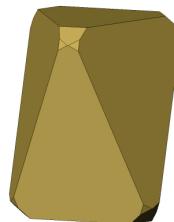
Ausbildung

: Feinkörnig bis grobspätig, rhomboedrische xx

Siderit:



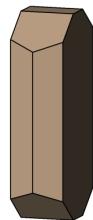
Romboeder

Romboeder
SkalenoederRomboeder
Skalenoeder
Skalenoeder
RomboederRomboeder
BaspinakoidRomboeder
Baspinakoid
Romboeder
Skalenoeder

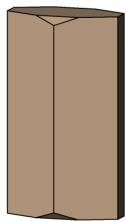
Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: FeCO_3
: Trigonal, -3m
: $a_0 = 4.72$, $c_0 = 15.46$
: R -3c
: finkornig till grovspatig, romboedrisk xx

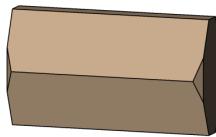
Staurolith:



Prisma
Basispinakoid
Pinakoid
Prisma



Prisma
Basispinakoid
Pinakoid
Prisma

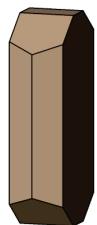


Prisma
Basispinakoid
Pinakoid
Prisma

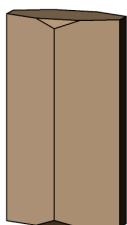
Chemische Zusammensetzung
Kristallsystem
Elementarzelle
Raumgruppe
Ausbildung

: $(\text{Fe}, \text{Mg})_2\text{Al}_9(\text{Si}, \text{Al})_4\text{O}_{20}(\text{O}, \text{OH})_2$
: Monoklin
: $a_o = 7.863 \text{ \AA}$, $b_o = 16.61 \text{ \AA}$, $c_o = 5.65 \text{ \AA}$, $\beta = 90-93^\circ$
: C 2/m
: Gesteinsbildend, tafelig, prismatisch, häufig

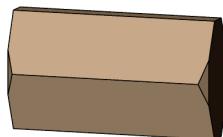
Staurolit:



Prisma
Baspinakoid
Pinakoid
Prisma



Prisma
Baspinakoid
Pinakoid
Prisma

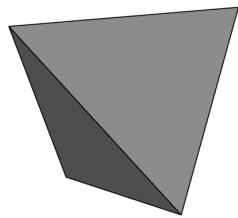


Prisma
Baspinakoid
Pinakoid
Prisma

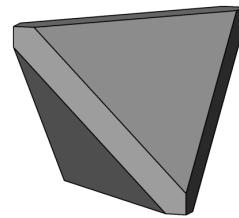
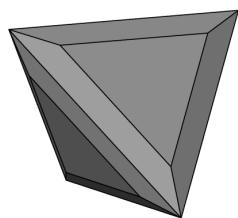
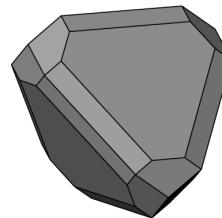
Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: $(\text{Fe}, \text{Mg})_2\text{Al}_9(\text{Si}, \text{Al})_4\text{O}_{20}(\text{O}, \text{OH})_2$
: Monoklin
: $a_0 = 7.863 \text{ \AA}$, $b_0 = 16.61 \text{ \AA}$, $c_0 = 5.65 \text{ \AA}$, $\beta = 90-93^\circ$
: C 2/m
: bergartsbildande, xx tavelformad, prismatisk, vanligt förekommande

Tetraedrit:



Tetraeder

Tetraeder
HexaederTetraeder
TristetraederTetraeder
Tristetraeder
Rhomboeder

Chemische Zusammensetzung

: Cu₁₂Sb₄S₁₃, z. T. mit Ag-, Hg, Zn-Gehalten

Kristallsystem

: kubisch

Elementarzelle

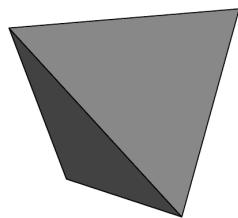
: $a_0=10.36 \text{ \AA}$

Raumgruppe

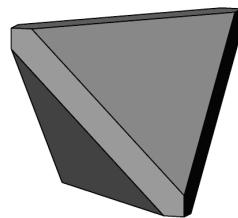
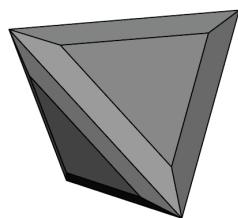
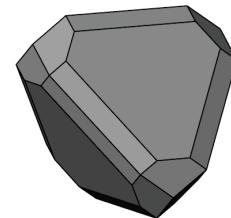
: I -4 3 m

Ausbildung

: derb, tetraedr. Ausbildung, mit Calcit, Quarz
verwachsen

Tetraedrit:

Tetraeder

Tetraeder
HexaederTetraeder
TristetraederTetraeder
Tristetraeder
Romboeder

Kemisk formel

: Cu₁₂Sb₄S₁₃, z. T. med Ag-, Hg, Zn

Kristallsystem

: kubisk

Enhetscell

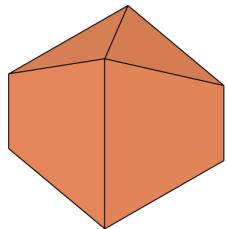
: $a_0=10.36 \text{ \AA}$

Rymdgrupp

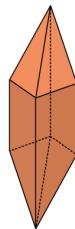
: I -4 3 m

Kemiska egenskaper

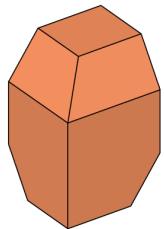
: massiv, tetraedrisk med Kalcit och Kvarts

Titanit:

Prisma
Prisma



Prisma
Prisma

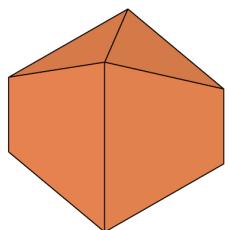


Prisma
Basispinakoid
Prisma

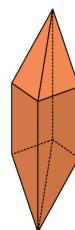
Chemische Zusammensetzung
Kristallsystem
Elementarzelle
Raumgruppe
Ausbildung

: CaTi [O / SiO₄]
: Monoklin
: $a_0=7.06\text{\AA}$, $b_0=8.71\text{\AA}$, $c_0=6.56\text{\AA}$, $\beta=113.8^\circ$
: P2₁/a
: Eingesprengter, oft Briefkuvertförmig, stengelig,
tafelig

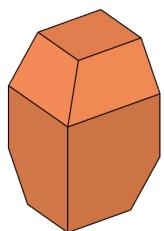
Titanit:



Prisma
Prisma



Prisma
Prisma

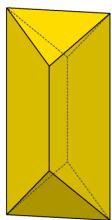


Prisma
Baspinakoid
Prisma

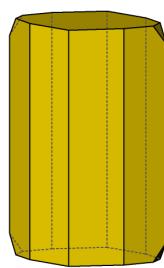
Kemisk formel
Kristallsystem
Enhetscell
Rymdgrupp
Kemiska egenskaper

: CaTi [O / SiO₄]
: Monoklin
: $a_0=7.06\text{ \AA}$, $b_0=8.71\text{ \AA}$, $c_0=6.56\text{ \AA}$, $\beta=113.8^\circ$
: P2₁/a
: insprängd, xx ofta kuvertformad, acikulär, tavelformad

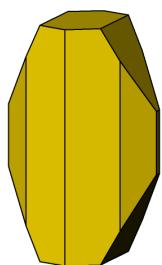
Topas:



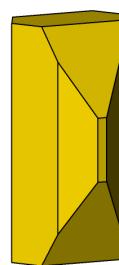
Prisma
Basispinakoid



Prisma
Prisma
Basispinakoid
Prisma



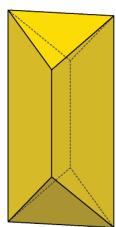
Prisma
Prisma
Basispinakoid
Prisma
Pinakoid



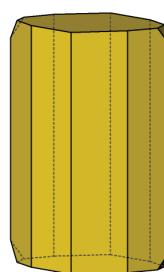
Prisma
Prisma
Basispinakoid
Prisma
Pinakoid

Chemische Zusammensetzung
Kristallsystem
Elementarzelle
Raumgruppe
Ausbildung

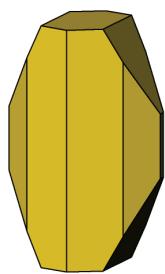
: $\text{Al}_2[\text{F}_2 / \text{SiO}_4]$
: Orthorhombisch
: $a_0 = 4.65\text{\AA}$, $b_0 = 8.8\text{\AA}$, $c_0 = 8.4\text{\AA}$
: P b n m
: Körnig, stengelig, prismatisch, meißelförmig

Topas:

Prisma
Baspinakoid



Prisma
Prisma
Baspinakoid
Prisma



Prisma
Prisma
Baspinakoid
Prisma
Pinakoid



Prisma
Prisma
Baspinakoid
Prisma
Pinakoid

Kemisk formel

: $\text{Al}_2[\text{F}_2 / \text{SiO}_4]$

Kristallsystem

: Ortorombisk

Enhetscell

: $a_0 = 4.65\text{\AA}$, $b_0 = 8.8\text{\AA}$, $c_0 = 8.4\text{\AA}$

Rymdgrupp

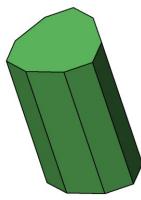
: P b n m

Kemiska egenskaper

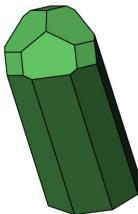
: Kornig, xx acikulär, prismatisk, mejselformad

Turmalin:

versch. Köpfe:



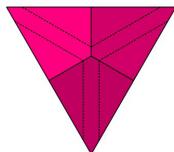
Basispedion
Trigonales Prisma
Hexagonales Prisma



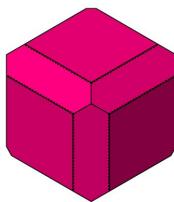
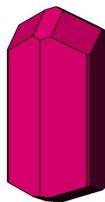
Pyramide
Pyramide
Trigonales Prisma
Hexagonales Prisma



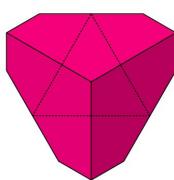
Pyramide
Pyramide
Trigonales Prisma
Hexagonales Prisma



Pyramide
Trigonales Prisma
Pyramide
Pyramide



Pyramide
Pyramide
Trigonales Prisma
Pyramide
Pyramide



Pyramide
Trigonales Prisma
Hexagonales Prisma
Pyramide
Basispedion

Chemische Zusammensetzung

: XY₃Z₆ [(OH, F)₄ / (BO₃)₃ / Si₆O₁₈]

X: Na, Ca;

Y: Mg, Li, Fe, Mn, Al;

Z: Al, Fe, Cr

: Trigonal, polare c-Achse

: a₀= 15.92 Å, c₀= 7.19 Å

: R 3 m

: Säulige, Stängelige, nadelige xx, radialstrahlig
deutl. erkennbare Längsstreifung

Kristallsystem

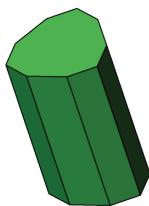
Elementarzelle

Raumgruppe

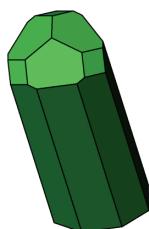
Ausbildung

Turmalin:

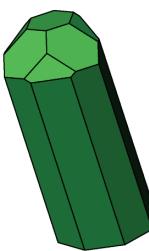
olika huvuden:



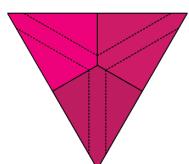
Baspedion
Trig. Prisma
Hex. Prisma



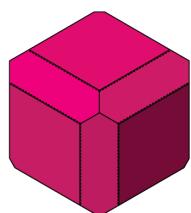
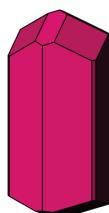
Pyramid
Pyramid
Trig. Prisma
Hex. Prisma



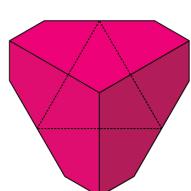
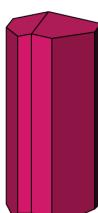
Pyramid
Pyramid
Trig. Prisma
Hex. Prisma



Pyramid
Trig. Prisma
Pyramid
Pyramid



Pyramid
Pyramid
Trig. Prisma
Pyramid
Pyramid



Pyramid
Trig. Prisma
Hex. Prisma
Pyramid
Baspedion

Kemisk formel

: XY₃Z₆ [(OH, F)₄ / (BO₃)₃ / Si₆O₁₈]

X: Na, Ca;

Y: Mg, Li, Fe, Mn, Al;

Z: Al, Fe, Cr

Kristallsystem

: Trigonalt, polar c-axel

Enhetscell

: a₀= 15.92 Å, c₀= 7.19 Å

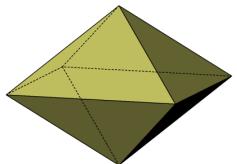
Rymdgrupp

: R 3 m

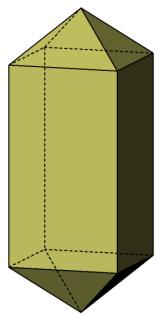
Kemiska egensaper

: Kolumnär, acikulär, nålig xx, radialstrålig, tydligt igenkännbara längs-striationer

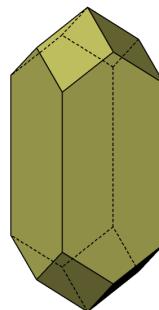
Zirkon:



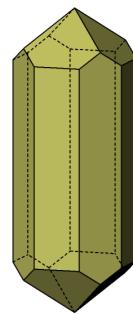
Dipyramide



Dipyramide
und Prisma
II. Stellung



Dipyramide
und Prisma
I. Stellung



Dipyramide
Prisma I. St.
Prisma II. St.

Chemische Zusammensetzung

: ZrSiO_4 , enthält diadoch Hf, SEE

Kristallsystem

: Tetragonal

Elementarzelle

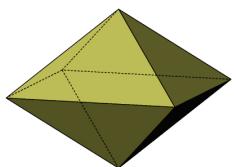
: $a_0 = 6.60 \text{ \AA}$, $c_0 = 5.98 \text{ \AA}$

Raumgruppe

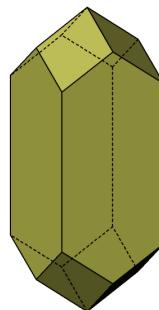
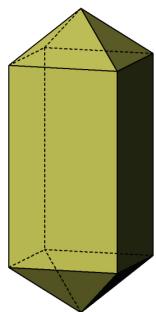
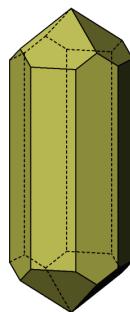
: $I\bar{4}_1/a\ m\ d$

Ausbildung

: Körner, häufig idiomorph, kurzsäulig, prismatisch

Zirkon:

Dipyramid

Dipyramid
och Prisma
I. StällningDipyramid
och Prisma
II. StällningDipyramid
Prisma I. St.
Prisma II. St.

Kemisk formel

: ZrSiO₄, med Hf, SEE

Kristallsystem

: Tetragonal

Enhetscell

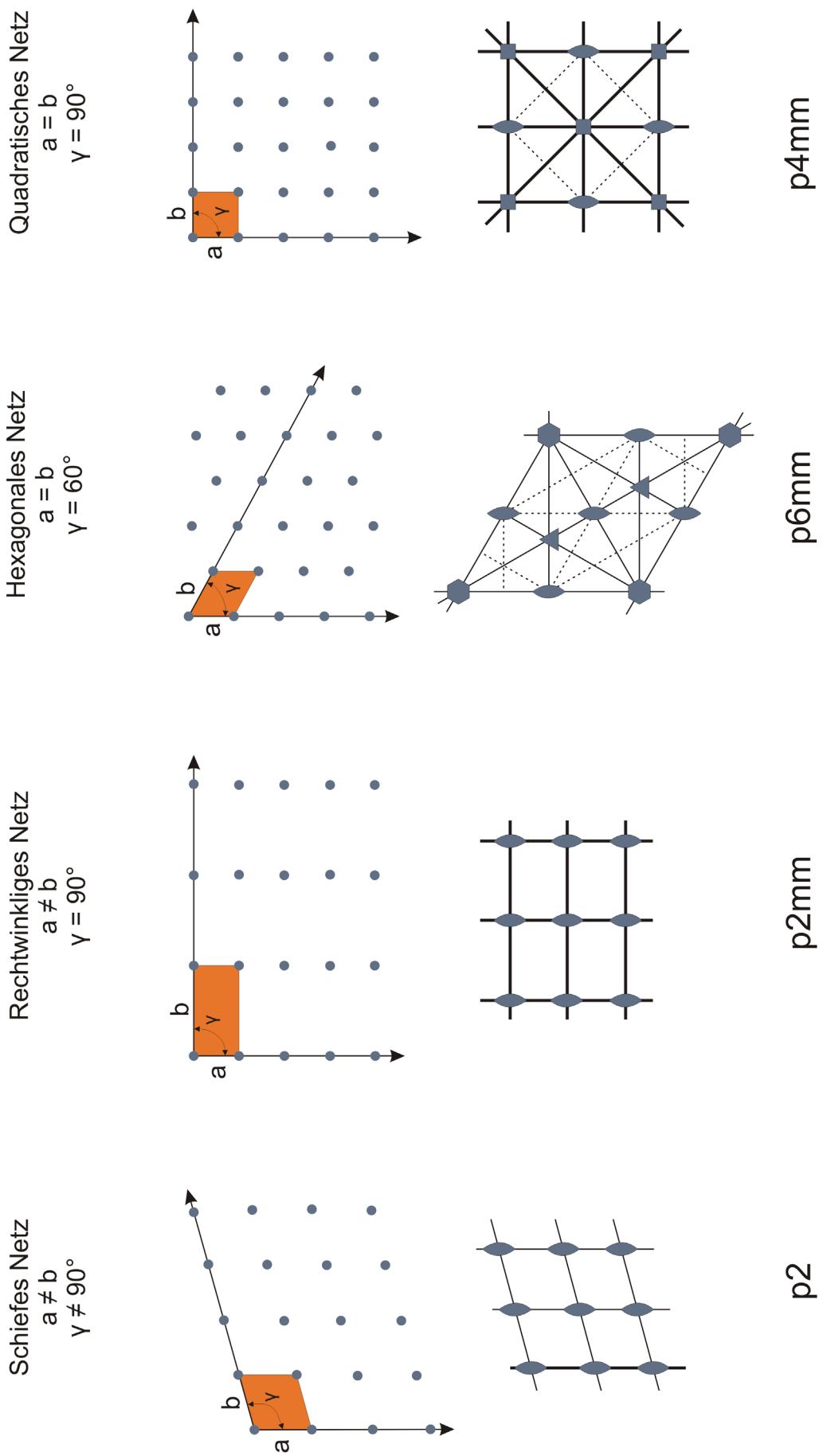
: $a_0 = 6.60 \text{ \AA}$, $c_0 = 5.98 \text{ \AA}$

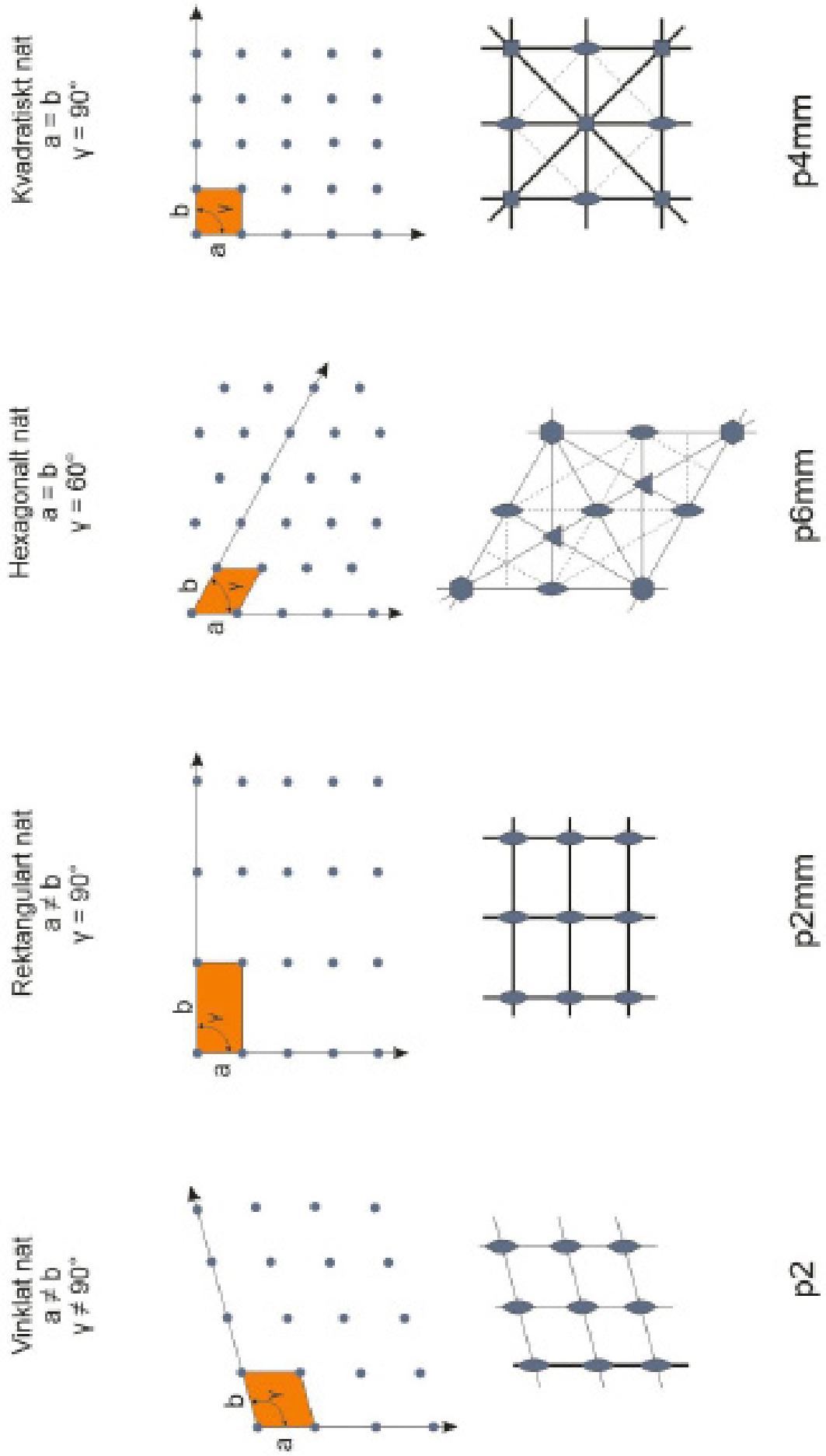
Rymdgrupp

: I 4₁/a m d

Kemiska egenskaper

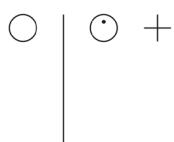
: kornig, ofta idiomorf xx, kolumnär, prismatisk





Symbolik der Symmetrieebenen

Symmetrieoperation	Symbol	senkrecht zur Zeichenebene	Symbol	parallel	Bemerkung
Spiegelung	m				falls die Spiegelebene über der Zeichenebene liegt, wird die Höhe in Bruchteilen der Gitterkonstante angegeben $\frac{1}{4}$ = Spiegelebene liegt um $\frac{1}{4}$ über der Zeichenebene in der Elementarzelle
Gleit-spiegelung, achsigal	a, b				Gleitspiegelung um $\bar{a}/2 \parallel a\text{-Achse}$ $\bar{b}/2 \parallel b\text{-Achse}$ $\bar{c}/2 \parallel c\text{-Achse}$ falls die Spiegelebene über d. Zeichenebene liegt, wird die Höhe in Bruchteilen der Gitterkonstante angegeben
	c			keines	
Gleit-spiegelung, diagonal	n				$\bar{t}(\bar{a}+\bar{b})/2 \parallel (001)$ $\bar{t}(\bar{a}+\bar{c})/2 \parallel (010)$ $t(b+c)/2 \parallel (100)$ im tetragonalen und kubischen Fall $\bar{t}(\bar{a}+\bar{b}+\bar{c})/2 \parallel (111)$
Diamant- gleit- spiegelung	d				$\bar{t}(\bar{a}-\bar{b})/4$ $\bar{t}(a-\bar{c})/4$ $t(b-c)/4$ im tetragonalen und kubischen Fall $\bar{t}(\bar{a}-\bar{b}+\bar{c})/4$



Wirkung einer Spiegelebene \perp zur Projektionsebene:
Original- und Bildpunkt werden durch ein Komma voneinander unterschieden. Die Lage der Projektionsebene wird durch + (oberhalb) oder - (unterhalb) beschrieben.

Symboler för symmetriplan

Symmetri-operation	Symbol	vinkelrätt	Symbol mot ritplanet	parallel	Anmärkning
Spegling	m				Ifall spegelplanet ligger ovan ritplanet, anges höjden som bråkdelen av gitterkonstanten. $\frac{1}{4}$ = spegelplanet ligger $\frac{1}{4}$ över ritplanet i enhetscellen
Glidspegling, axial	a, b				Glidspegling med $\bar{a}/2 \parallel a$ -axel $\bar{b}/2 \parallel b$ -axel $\bar{c}/2 \parallel c$ -axel Ifall spegelplanet ligger ovan ritplanet, anges höjden som bråkdelen av gitterkonstanten.
	c				ingen
Glidspegling, diagonal	n				$\bar{t}(\bar{a}+\bar{b})/2 \parallel (001)$ $\bar{t}(\bar{a}+\bar{c})/2 \parallel (010)$ $\bar{t}(\bar{b}+\bar{c})/2 \parallel (100)$ om tetragonalt eller kubiskt $\bar{t}(\bar{a}+\bar{b}+\bar{c})/2 \parallel (111)$
Diamant- glidspegling	d				$\bar{t}(\bar{a}-\bar{b})/4$ $\bar{t}(\bar{a}-\bar{c})/4$ $\bar{t}(\bar{b}-\bar{c})/4$ om tetragonalt eller kubiskt $\bar{t}(\bar{a}-\bar{b}-\bar{c})/4$
		Verkan av spegelplan \perp mot projekionsplan: original- och bildpunkt särskiljs med ett komma. Projektionsplanets läge beskrivs med + (ovan) eller - (nedan).			

Symbolik der Symmetriearchsen

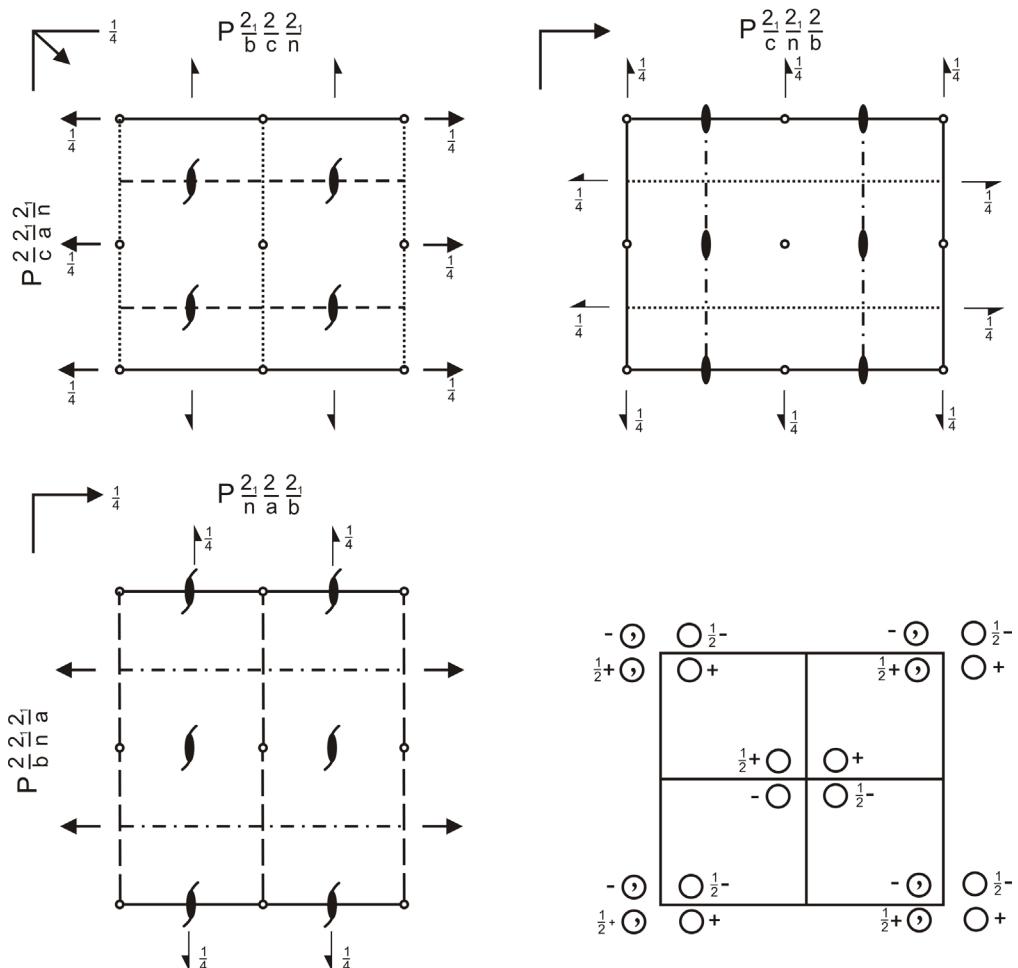
Symmetriearchse	Symbol	graphisches Symbol	Translation II Symmetriearchse bei rechtshändiger Symmetrieoperation
Symmetriearchse	1		keine
Inversionszentrum	$\bar{1}$	○	keine
2-zählige Drehung	2	●	keine
2-zählige Schraubung	2_1	◐	1/2
3-zählige Drehung	3	▲	keine
3-zählige Schraubung	3_1	▲	1/3
	3_2	▲	2/3
3-zählige Inversionsdrehachse	$\bar{3}$	▲	keine
4-zählige Drehung	4	◆	keine
4-zählige Schraubung	4_1	◆	1/4
	4_2	◆	1/2
	4_3	◆	3/4
4-zählige Inversionsdrehachse	$\bar{4}$	◆	keine
6-zählige Drehung	6	○	keine
6-zählige Schraubung	6_1	○	1/6
	6_2	○	2/6
	6_3	○	3/6
	6_4	○	4/6
	6_5	○	5/6
6-zählige Inversionsdrehachse	$\bar{6}$	○	keine

Symboler för symmetriaxlar

Symmetriaxel	Symbol	Grafisk symbol	Translation II symmetriaxel vid högerhänd symmetrioperation
symmetriaxel	1		ingen
inversionscentrum	$\bar{1}$	○	ingen
tvåfaldig rotation	2	●	ingen
tvåfaldig skuvning	2_1	◐	1/2
trefaldig rotation	3	▲	ingen
trefaldig skruvning	3_1	▲	1/3
	3_2	▲	2/3
trefaldig inversionsaxel	$\bar{3}$	▲	ingen
fyrfaldig rotation	4	◆	ingen
fyrfaldig skruvning	4_1	◆	1/4
	4_2	◆	1/2
	4_3	◆	3/4
fyrfaldig inversionsaxel	$\bar{4}$	◆	ingen
sexfaldig rotation	6	◆	ingen
sexfaldig skruvning	6_1	◆	1/6
	6_2	◆	2/6
	6_3	◆	3/6
	6_4	◆	4/6
	6_5	◆	5/6
sexfaldig inversionsaxel	$\bar{6}$	◆	ingen

Beispiel einer Raumgruppe **Pbcn**

Pbcn D_{2h}^{14} mmm Orthorhombisches Kristallsystem
 $P\bar{2}_1/b$ $2/c$ $2_1/n$ Patterson-Symmetrie Pmmm



Ursprung bei $\bar{1}$ in $1 c 1$

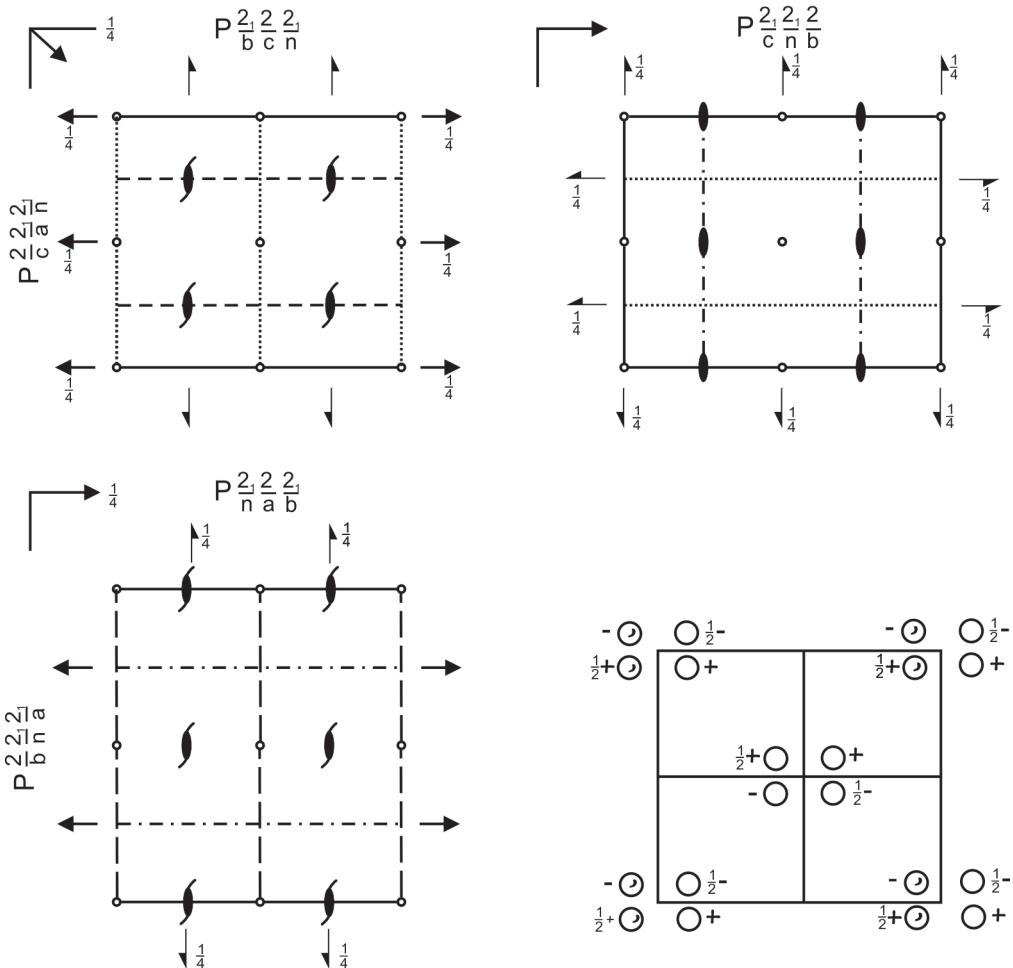
Asymmetrische Einheit $0 \leq x \leq \frac{1}{2}$ $0 \leq y \leq \frac{1}{2}$ $0 \leq z \leq \frac{1}{2}$

Symmetrie Operationen

- | | | | |
|----------------------------|---------------------------|-------------------------------|--------------------------------------|
| (1) 1 | (2) $2(0,0,\frac{1}{2})$ | $\frac{1}{4}, \frac{1}{4}, z$ | (3) $2 0, y, \frac{1}{4}$ |
| (4) $2(\frac{1}{2}, 0, 0)$ | $\bar{1} 0, 0, 0$ | | (6) $n(\frac{1}{2}, \frac{1}{2}, 0)$ |
| (7) $c x, 0, z$ | (8) $b \frac{1}{4}, y, z$ | | $x, y, \frac{1}{4}$ |

Exempel på rymdgrupp **Pbcn**

Pbcn D_{2h}^{14} mmm Ortorombiskt kristallsystem
 P 2₁/b 2/c 2₁/n Patterson-symmetri Pmmm



$\frac{1}{2}+\odot$	$\odot \frac{1}{2}-$	$\frac{1}{2}+\odot$	$\odot \frac{1}{2}-$
$\odot +$	$\frac{1}{2}+$	$\odot +$	$\frac{1}{2}-$
$\frac{1}{2}+$	$\odot -$	$\odot +$	$\frac{1}{2}-$
$\odot +$	$\frac{1}{2}-$	$\odot -$	$\frac{1}{2}+\odot$

Ursprung: $\bar{1}$ i 1 c 1

Asymmetrisk enhet: $0 \leq x \leq \frac{1}{2}$ $0 \leq y \leq \frac{1}{2}$ $0 \leq z \leq \frac{1}{2}$

Symmetrioperationer:

- | | | | |
|----------------|----------------|---------------------|------------------|
| (1) 1 | (2) 2(0,0,1/2) | 1/4,1/4,z | (3) 2 0,y,1/4 |
| (4) 2(1/2,0,0) | x,1/4,0 | (5) $\bar{1}$ 0,0,0 | (6) n(1/2,1/2,0) |
| (7) c x,0,z | | (8) b 1/4,y,z | x,y,1/4 |

Die 230 Raumgruppen

Kristallsystem	Punktgruppe	Raumgruppen			
Triklin	1	P1			
	-1	P1			
Monoklin	2	P2	P2 ₁	C2	
	M	Pm	Pc	Cm	Cc
	2/m	P2/m	P2 ₁ /m	C2/m	P2/c
		P2 ₁ /c	C2/c		
Orthorhombisch	222	P222	P222 ₁	P2 ₁ 2 ₁ 2	P2 ₁ 2 ₁ 2 ₁
		C222 ₁	C222	F222	I222
		I2 ₁ 2 ₁ 2 ₁			
		Pmm2	Pmc2 ₁	Pcc2	Pma2
		Pca2 ₁	Pnc2	Pmn2 ₁	Pba2
		Pna2 ₁	Pnn2	Cmm2	Cmc2 ₁
		Ccc2	Amm2	Abm2	Ama2
		Aba2	Fmm2	Fdd2	Imm2
		Iba2	Ima2		
		Pmmm	Pnnn	Pccm	Pban
	mmm	Pmma	Pnna	Pmna	Pcca
		Pbam	Pccn	Pbcm	Pnmm
		Pmmn	Pbcn	Pbca	Pnma
		Cmcm	Cmca	Cmmm	Cccm
		Cmma	Ccca	Fmmm	Fddd
		Immm	Ibam	Ibca	Imma
Tetragonal	4	P4	P4 ₁	P4 ₂	P4 ₃
		I4	I4 ₁		
		P-4	I-4		
		4/m	P4/m	P4/n	P4 ₂ /n
		I4/m	I4 ₁ /a		
		422	P422	P4 ₁ 22	P4 ₁ 2,2
			P4 ₂ 22	P4 ₃ 22	P4 ₃ 2,2
		I422	I4 ₁ 22		
		4mm	P4mm	P4 ₂ cm	P4 ₂ nm
		P4cc	P4nc	P4 ₂ mc	P4 ₂ bc
	-42m	I4mm	I4cm	I4 ₁ md	I4 ₁ cd
		P-42m	P-42c	P-42 ₁ m	P-42 ₁ c
		P-4m2	P-4c2	P-4b2	P-4n2
		I-4m2	I-4c2	I-42m	I-42d
		4/mmm	P4/mmm	P4/nbm	P4/nnc
		P4/mbm	P4/mnc	P4/nmm	P4/ncc
		P4 ₂ /mmc	P4 ₂ /mcm	P4 ₂ /nbc	P4 ₂ /nnm
		P4 ₂ /mbc	P4 ₂ /mmn	P4 ₂ /nmc	P4 ₂ /ncm
	4/mmm	I4/mmm	I4/mcm	I4 ₁ /amd	I4 ₁ /acd
Trigonal	3	P3	P3 ₁	P3 ₂	R3
		P-3	R-3		
		32	P312	P3 ₁ 12	P3 ₁ 21
		P3 ₂ 12	P3 ₂ 1	R32	
	3m	P3m1	P31m	P3c1	P31c
		R3m	R3c		
		P-31m	P-31c	P-3m1	P-3c1
		R-3m	R-3c		
Hexagonal	6	P6	P6 ₁	P6 ₅	P6 ₂
		P6 ₄	P6 ₃		
	-6	P-6			
		6/m	P6/m	P6 ₃ /m	
	622	P622	P6 ₁ 22	P6 ₅ 22	P6 ₂ 22
		P6422	P6 ₃ 22		
	6mm	P6mm	P6cc	P6 ₃ cm	P6 ₃ mc
		P-6m2	P-6c2	P-62m	P-62c
	-6m2	P6/mmm	P6/mcc	P6 ₃ /mm	P6 ₃ /mmc
Kubisch	23	P23	F23	I23	P2 ₁ 3
		I2 ₁ 3			
	m-3	Pm-3	Pn-3	Fm-3	Fd-3
		Im-3	Pa-3	Ia-3	
	432	P432	P4 ₂ 32	F432	F4 ₁ 32
		I432	P4 ₃ 2	P4 ₁ 32	I4 ₁ 32
	-43m	P-43m	F-43m	I-43m	P-43n
		F-43c	I-43d		
	m-3m	Pm-3m	Pn-3n	Pm-3n	Pn-3m
		Fm-3m	Fm-3c	Fd-3m	Fd-3c
		Im-3m	Ia-3d		

De 230 ryndgrupperna

Kristallsystem	Punktklasse	Ryndgrupper			
Tetraedrisk	1	P			
	-1	R			
Monoklin	2	P2	P2 ₁	C2	
	M	Pm	Pc	Cm	Cc
	m/m	P2/m	P2 ₁ /m	C2/m	P2/c
		P2/t	C2/t		
Orthorombisk	222	P222	P222 ₁	P2 ₁ 2 ₁ 2	P2 ₁ 2 ₁ 2 ₁
		C222	C222 ₁	F222	I222
		D ₂ 2 ₂ 2			
	m22	Pmc2 ₁	Pcc2	Pmc2	
		Pnc2	Pnc2	Pnc2	
		Pnc2 ₁	Pnc2	Cnc2 ₁	
		Ccc2	Ccc2	Ccc2	
		Amm2	Amm2	Amm2	
		Amm2	Fdd2	Imm2	
		Imm2	Imm2		
		Pmm2	Pmm	Pmm	
		Pmm	Pmm	Pmm	
		Pmm	Pmm	Pmm	
		Pmm	Pmm	Pmm	
		Cmma	Cmma	Cmma	
		Cmma	Cmma	Pmma	
		Imma	Imma	Imma	
Tetragonisk	4	P4	P4 ₁	P4 ₂	P4 ₃
		P4	P4 ₁		
		P4 ₁	I4 ₁		
	4/m	P4/m	P4/m ₁	P4/m	P4/m ₁
		P4/m	P4/m ₁		
		P4/m ₁	P4/m ₁		
		P4/m ₂	P4/m ₂	P4 ₁ 4 ₂	P4 ₁ 4 ₂
		P4/m ₂	P4/m ₂		
		I4/m	I4/m ₁		
		P4c	P4c	P4c	
		H4c	H4c	H4c	
		P4c	H4c		
		P4c	H4c		
		P4c ₂	P4c ₂	P4c ₂	
		P4c ₂	P4c ₂		
		I4c ₂	I4c ₂	I4c ₂	
		I4c ₂	I4c ₂		
Trigonisk	3	P3	P3 ₁	P3 ₂	I3
	-3	P-3	R-3		
	32	P312	P321	P3 ₁ 12	P3 ₁ 11
		P3 ₂ 12	P3 ₂ 11	R32	
	3m	P3m1	P31m	P3c1	P31c
		R3m	R3c		
		P-31m	P-31c	P-3m1	P-3c1
		R-3m	R-3c		
Hexagonisk	6	P6	P6 ₁	P6 ₂	P6 ₃
		P6 ₁	P6 ₁		
		P6 ₂	P6 ₂		
	-6	P6/m	P6/m		
	6/m	P6/m	P6/m		
	623	P623	P6 ₂ 3	P6 ₂ 3	P6 ₂ 3
		P623	P6 ₂ 3		
		P6/m ₂	P6/m ₂		
Kubisk	23	P23	F23	I23	P2 ₁ 3
		D ₂ 3			
	m-3	Pm-3	Pm-3	Pm-3	Pd-3
		Im-3	I ₁ -3	I ₁ -3	
		P433	P4 ₃ 3	P433	P4 ₃ 3
		I432	I4 ₃ 2	I4 ₃ 2	I4 ₃ 2
		P-43m	P-43m	I-43m	P-43m
-43m		P-43c	I-43d		
m-3m		Pm-3m	Pm-3c	Pm-3m	Pd-3m
		Pm-3m	Pm-3c	Pm-3m	Pd-3c

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