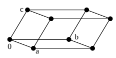
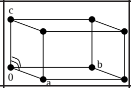
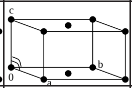
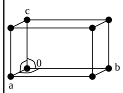
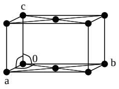
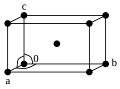
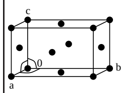
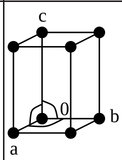
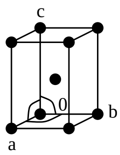
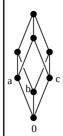
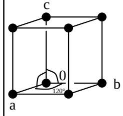
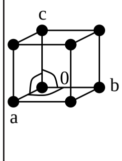
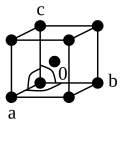
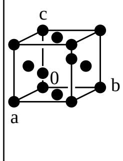
## 10.4. Raumgruppen

**Die 230 Raumgruppen** (mit Kristallsystemen, Punktgruppen, Bravaisgittertypen)

| Kristall-system | Punkt-gruppe | Gitter-konstanten | Bravaisgittertypen P | C | I | F | Blickrichtung 1. | 2. | 3. | Raumgruppen |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | x,y,z | x,y,z<br>$x+\frac{1}{2},y+\frac{1}{2},z$ | x,y,z<br>$x+\frac{1}{2},y+\frac{1}{2},z+\frac{1}{2}$ | x,y,z<br>$x+\frac{1}{2},y+\frac{1}{2},z$<br>$x+\frac{1}{2},y,z+\frac{1}{2}$<br>$x,y+\frac{1}{2},z+\frac{1}{2}$ | | | | |
| **triklin** | $\boxed{1}$ | $a \neq b \neq c$ |  | | | | - | - | - | P1 |
| | $\bar{1}$ | $\alpha \neq \beta \neq \gamma \neq 90$ | | | | | | | | P$\bar{1}$ |
| **mono-klin** | $\boxed{2}$ | $a \neq b \neq c$ |  |  | | | [010] | - | - | P2, $P2_1$, C2 |
| | m | $\alpha = \gamma = 90^o$ | | | | | | | | Pm, Pc, Cm, Cc |
| | 2/m | $\beta \neq 90^o$ | | | | | | | | P2/m, $P2_1/m$, C2/m, P2/c, $P2_1/c$, C2/c |
| **ortho-** | $\boxed{222}$ | $a \neq b \neq c$ | | | | | [100] | [010] | [001] | P222, $P222_1$, $P2_12_12$, $P2_12_12_1$, |
| **rhom-** | mm2 | $\alpha = \beta = \gamma = 90$ |  |  |  |  | | | | $C222_1$, C222, F222, I222, $I2_12_12_1$, Pmm2, $Pmc2_1$, Pcc2, $Pma2_1$, $Pca2_1$, $Pnc2_1$, $Pmn2_1$, Pba2, $Pna2_1$, Pnn2, Cmm2, $Cmc2_1$, Ccc2, Amm2, Abma, Ama2, Aba2, Fmm2, Fdd2, Imm2, Iba2, Ima2 |
| **bisch** | mmm | | | | | | | | | Pmmm, Pnnm, Pccm, Pban, Pmma, Pnna, Pmna, Pcca, Pbam, Pccn, Pbcm, Pnnm, Pmmn, Pbcn, Pbca, Pnma, Cmcm, Cmca, Cmmm, Cccm, Cmma, Ccca, Fmmm, Fddd, Immm, Ibam ,Ibca, Imma |
| **tetra-** | $\boxed{4}$ | $a = b \neq c$ |  | |  | | [001] | [100] | [110] | P4, $P4_1$, $P4_2$, $P4_3$, I4, $I4_1$ |
| **gonal** | 4 | $\alpha = \beta = \gamma = 90$ | | | | | | [010] | [1$\bar{1}$0] | P4, I4 |
| | 4/m | | | | | | | | | P4/m, $P4_2/m$, P4/n, $P4_2/n$, I4/m, $I4_1/a$ |
| | $\boxed{422}$ | | | | | | | | | P422, $P42_12$, $P4_122$, $P4_12_12$, $P4_222$, $P4_22_12$, $P4_322$, $P4_32_12$, I422, $I4_122$ |
| | 4mm | | | | | | | | | P4mm, P4bm, $P4_2cm$, $P4_2nm$, P4cc, P4nc, $P4_2mc$, $P4_2bc$, I4mm, I4cm, $I4_1md$, $I4_1cd$ |
| | 4m | | | | | | | | | P42m, P42c, $P42_1m$, P$\bar{4}2_1$c, P4m2, P$\bar{4}$c2, P$\bar{4}$b2, P$\bar{4}$n2, I4m2, I$\bar{4}$c2, I$\bar{4}$2m, I$\bar{4}$2d |
| | 4/mmm | | | | | | | | | P4/mmm, P4/mcc, P4/nbm, P4/nnc, P4/mbm, P4/mnc, P4/nmm, P4/ncc, $P4_2/mmc$, $P4_2/mcm$, $P4_2/nbc$, $P4_2/nnm$, $P4_2/mbc$, $P4_2/mnm$, $P4_2/nmc$, $P4_2/ncm$, I4/mmm, I4/mcm, $I4_1/amd$, $I4_1/acd$ |
| **tri-** | $\boxed{3}$ | $a = b = c$ | R<br> | | | | [111] | [1$\bar{1}$0] | - | P3, $P3_1$, $P3_2$, R3 |
| **gonal** | 3 | $\alpha = \beta = \gamma \neq 90$ | | | | | | [01$\bar{1}$] | | P3, R3 |
| | $\boxed{32}$ | | | | | | | [$\bar{1}$01] | | P312, P321, $P3_112$, $P3_121$, $P3_212$, $P3_221$, R32 |
| | 3m | | | | | | | | | P3m1, P31m, P3c1, P31c, R3m, R3c |
| | 3m | | | | | | | | | P31m, P31c, P3m1, P$\bar{3}$c1, R$\bar{3}$m, R$\bar{3}$c |
| **hexa-** | $\boxed{6}$ | $a = b \neq c$ | |  | | | [001] | [100] | [1$\bar{1}$0] | P6, $P6_1$, $P6_5$, $P6_3$, $P6_2$, $P6_4$ |
| **gonal** | 6 | $\alpha = \beta = 90$ | | | | | | [010] | [120] | P6 |
| | 6/m | $\gamma = 120$ | | | | | | [$\bar{1}\bar{1}$0] | [$\bar{2}\bar{1}$0] | P6/m, $P6_3/m$ |
| | $\boxed{622}$ | | | | | | | | | P622, $P6_122$, $P6_522$, $P6_222$, $P6_422$, $P6_322$ |
| | 6mm | | | | | | | | | P6mm, P6cc, $P6_3cm$, $P6_3mc$ |
| | 6m | | | | | | | | | P6m2, P6c2, P62m, P$\bar{6}$2c |
| | 6/mmm | | | | | | | | | P6/mmm, P6/mcc, $P6_3/mcm$, $P6_3/mmc$ |
| **kubisch** | $\boxed{23}$ | $a = b = c$ |  | |  |  | [100] | [111] | [110] | P23, F23, I23, $P2_13$, $I2_13$ |
| | m3 | $\alpha = \beta = \gamma = 90$ | | | | | [010] | [1$\bar{1}\bar{1}$] | [01$\bar{1}$] | Pm3, Pn3, Fm3, Fd3, Im$\bar{3}$, Pa$\bar{3}$, Ia$\bar{3}$ |
| | $\boxed{432}$ | | | | | | [001] | [$\bar{1}$1$\bar{1}$] | [$\bar{1}$01] | P432, $P4_232$, F432, $F4_132$, I432, $P4_332$, $P4_132$, $I4_132$ |
| | 43m | | | | | | | [$\bar{1}\bar{1}$1] | [1$\bar{1}$0] | P43m, F43m, I43m, P$\bar{4}$3n, F$\bar{4}$3c, I$\bar{4}$3d |
| | m3m | | | | | | | | [011] | Pm3m, Pn3n, Pm3n, Pn$\bar{3}$m, |
| | | | | | | | | | [101] | Fm3m, Fm3c, Fd3m, Fd$\bar{3}$c, Im$\bar{3}$m, Ia$\bar{3}$d |