III. Group: Halide

They have:

- Big negative charged halogen ions:
 - e.g. Cl, Br, and J
- relative big low valence cations
- A perfect cleavage according to the cube size
- They crystallize normally cubic.

Rock salt and sylvite are

- most colorless
- easily soluble in water
- hardness: 2
- density: ~2 g/cm³
- occasionally in liquid inclusion metamorphic and magmatic rocks

Halite (Rock salt)

- NaCl
- colorless, transparent, white, reddish (finest inclusions of hematite), rarely blue
- from fossil sediments as well as by evaporation of seawater

Red rock salt with stripes of anhydrite from Bismarckshall, South Harz





Blue rock salt from the Cavern Marie, Morsleben, Helmstedt

Rock salt structure Na⁺ CL

Sylvite (potassium salt)

- KCI
- cubic
- colorless, transparent or white, but too reddish or yellowish (inclusions of hematite)
- It is also called bitter salt

Fluorite

- CaF₂
- cubic, coarse-grained
- cubically, but also unfrequent octahedral crystals
- hardness 4
- density 3.2 g/cm³
- frequently greenish, yellow, cyan, violet, but as well colorless, white, rose, brownish





Fluorite with chalcopyrite from Rottleberode, Harz

Fluoritkristalle







IV. Group: Oxides and Hydroxides

FeOOH

trigonal





Oxides are

- oxygen bonded with one, two or more metal cations.
- describable with the model of the ionization.
- distinguishable into several bond types by means of differences in metal-oxygen-proportion (X:O).
- simple oxides, such as XO, X₂O, XO₂, X₂O₃ and there are described complicated oxidic bonds as spinel-type.

XO_2 – bonds: quarz-rutil-gruppe

Quartz and other SiO₂-modifications SiO₂ TiO₂

SnO₂

 UO_2

MnO₂

- Rutile
- Tinstone (Cassiterite)
- Uraninite
- Pyrolusite

X₂O₃-bonds: corundum-ilmentite-group



 (Fe_2O_3)

- Corundum (Al_2O_3)
- Hematite (specular iron)

Hematite-Fe₂O₃-Quartz

Ilmenite (titanic iron ore) (FeTiO₃)

Corundum

- AI_2O_3
- trigonal
- hardness 9
- density 4.0 g cm³
 - formation predominantly metamorphic
- it can to be accumulated also in placers
- often stengele crystals with hexagonal cross section
- significant as grinding and polishing material
- red variety: ruby, blue variety Sapphire

Crystals of corundum in gemstone quality from gemstone placer of southwest Africa



Hematite

- Fe₂O₃
- hardness 6¹/₂
- density 5.3 g cm³

Hematite as fibrous red iron ore

- diverse varieties: leaved crystals, sometimes fibrous
- variety: fibrous red iron ore (wood hematite)
- hematite occurs in metamorphic and sedimentary rocks
- its cleavage is very good



Hematite • Fe₂O₃

