

Properties of calcium sulphate dihydrate

1. Chemical properties

Calcium sulphate dihydrate is the calcium salt of sulphuric acid. Below 40 °C it crystallizes from solution as the thermodynamically stable dihydrate $\text{CaSO}_4 \cdot 2 \text{H}_2\text{O}$. BK Giulini's calcium sulphate dihydrate Luxopharm[®] is an especially pure product and, hence, possesses all the properties of this compound, which are described in reference books (e.g. Gmelin). Calcium sulphate dihydrate is water soluble. Ca. 2 g CaSO_4 , dissolve in 1 litre of H_2O at 20 °C. The solubility is almost independent of temperature. The solubility increases in the presence of salts and sulphuric acid as a consequence of the formation of dissolved calcium complexes. Calcium sulphate dihydrate is stable at 1 atmosphere up to 40 °C, above this temperature increasing loss of the water of crystallization occurs. Depending on the reaction conditions either CaSO_4 , or $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ are formed.

The following table indicates the equilibrium water vapour pressure over calcium sulphate dihydrate as a function of temperature:

T (°C)	10	20	30	40	50	60	70	80
P H_2O (Torr)	2.78	6.24	12.7	26.3	50	91.4	160.7	272.4

In practice loss of water is not observed below 70 °C, since the vapour pressure of water in the surrounding air usually lies above the dehydration pressure and the loss of water of crystallization occurs extraordinarily slowly. This applies, for example, during the drying of granulated material. At higher temperatures care must be taken to keep the residence time of the calcium sulphate dihydrate low in order to avoid loss of water of crystallization.

2. Crystallography and physical properties

Calcium sulphate dihydrate crystallizes in a layer lattice. The crystal structure is monoclinic.

Calcium sulphate dihydrate Luxopharm[®] is manufactured by BK Giulini in the form of platelets or short rods by an optimized crystallization. The following enlargements made with a scanning electron microscope illustrate the crystalline form. The uniform crystal size is another characteristic of BK Giulini's calcium sulphate dihydrate Luxopharm[®].

Carefully controlled growth allows BK Giulini to produce single calcium sulphate dihydrate crystals with only a few twinned crystals. Medium crystal size is about 30 μm .