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Soapstone ($Mg_3[(OH)_2(Si_4O_{10})]$)...

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CAS-Reg. No. 14807-96-6

Characteristics / Function:

Soapstone and talc are two different mineralic appearances of the chemically identical composition of **magnesium silicate hydrate** $Mg_3[(OH)_2(Si_4O_{10})]$.

Structure:

There is a distinction between the **coarse crystalline**, **flake like talc's** and the **fine crystalline**, **grainy soapstone's**, depending on the **size of the crystals and particle orientation**. A strict separation does not exist. Fine crystalline, but texturated samples can have the same technical behavior as talc's.

Chemical analysis:

Demands according to E. Alber-Schönberg:

MgO	30.00 %
SiO_2	60.00 % - 61.00 %
Al_2O_3	1.50 %
Fe_2O_3	1.50 %
CaO	as low as possible
Loss at red heat	5.00 %

Mg0, $Si0_2$ and **loss at red heat** are the proof for the nearness of the **actual sample** and the **demanded theoretic composition of the talc**.

A stronger **discrepancy** between the loss at red heat and evaporated water during the heating, hints at **carbonates** in the materials. The exact value can be determined by a chemical analysis (**calcite, dolomite, magnesite**). Carbonates are mainly distributed **inhomogeneous** in their natural stocks; this causes a rather uneven quality.

The technology does rarely distinguish between **talc, soapstone and steatite**. The last name is often employed for fire products of soapstone gained by milling, forming with fluxes and plastifiers and burning at 1,400 °C. The name soapstone is derived from the greasy and soapy surface.

There also exist several **mineral phases** of soapstone, partly polluted with: **chlorite, carbonate, quartz and amphiboles**.

The four mentioned, main **alien elements**, disturb because they change the **chemical compounds** and therefore the **sintering behavior of the material**. Yet this is only interesting to the ceramics industry.

Application in the ceramics industry:

The minerals **talc and soapstone** serve as raw **material** for the production of **steatite**, which shows a high **mechanical strength** and **low dielectric losses**. Therefore it is an important substance in several branches of the **electrotechnology** for insulations and for **condensers**.

The high demands of **high voltage and high frequency technology** imply a **careful selection** of the raw materials. Whereas the chemical industry can produce **synthetic substances**, the ceramics industry relies on the **natural qualities**, although the **structure**, **mineral percentage** and **purity** differ from finding place to finding place. Even in the same mine there are **some differences**, depending on the amount of alien substances. Therefore, it is necessary to know the occurring accompanying materials for an **even** fabrication.

More applications:

Because of the **technical qualities**, caused by the chemical structure and the shape of the particles, micronised soapstone / talc is an **important filling**, especially for the **varnish-, cellulose- and paper industry**, for **casting auxiliary substances** and for the **rubber- and plastics industry**.

It is mainly a combination of several mineral powders, each having a special function depending on its **specific qualities**. Often,

however, micronised talc is applied as a **single extender**, for instance as a **metal-primer**, based on polyvinyl butyral or in various **thermoplastics**.

Bibliography:

- Römpps Chemie-Lexikon
- H. Kittel; Lehrbuch der Lacke und Beschichtungen
- Geächter/Müller: Kunststoffadditive/3. Ausgabe

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