

SILOXANES AND SILICONES

SILOXANES are compounds, which consist of units in the form R_2SiO , where R is Hydrogen or Hydrocarbon. The simplest one is Disiloxane $(H_3Si)_2O$. Siloxanes can be produced by water abstraction and dimerisation from silanols (e.g. H_3SiOH). Disiloxane is a colorless gas, higher siloxanes (e.g. H_2SiO)_n or $(HSiO_{1.5})_n$ with $n > 4$ are solids.

Polymerised Siloxanes with organic side chains are Silicones or Polysiloxanes. Their structure can be made out of branched or unbranched back bone chains which are composed of alternative silicon and oxygen bonds and attached side chains R.

e.g. $[SiO(CH_3)_2]_n$ Polydimethylsiloxane, $[SiO(C_6H_5)_2]_n$ Polydiphenylsiloxane.

NOMENCLATURE: *M-Units:* $(CH_3)_3SiO_{1/2}$, *D-Units:* $(CH_3)_2SiO$, *T-Units:* $(CH_3)SiO_2$

SYNTHESIS OF SILICONES:

Educts: R_3SiCl , R_2SiCl_2 and $RSiCl_3$

Hydrolysis to: R_3SiOH , $R_2Si(OH)_2$ and $RSi(OH)_3$

Condensation to linear, cyclic, cage-like or net-like Polysiloxanes $(R_2SiO)_n$

APPLICATIONS OF SILICONES: These are commonly used in cosmetics such as deodorants, sunblocks, hairsprays and skincare (emollient). Volatile methyl Siloxanes (VMS) are a class of chemicals with an increasing range of applications. These are widely used in personal care products such as tooth pastes, and as carriers in anti-perspirants. They are also used as effective industrial cleaning agents and in dry cleaning industry.

PROPERTIES: Depending on the degree of polymerisation silicones can be oils, elastomers or resins. In general their properties are good electric insulation, low chemical reactivity, low toxicity, high gas permeability, excellent resistance to oxygen, ozone and U.V. light.

USES: Silicones are used in bandages and dressings. These are used for bicycle. Silicone is becoming an important product in the cook ware industry and kitchen utensils. Silicone greases is used as lubricant for brake. Silicone is used to manufacture gaskets used in automotive engines.

TASKS:

1: Discuss in detail about siloxanes and briefly explain their synthesis and applications?

2: Name the best compound used as good elastomers and write down its synthesis and applications?