

# Chemistry Study Materials for Class 11

(NCERT Based Revision Notes of Chapter- 11)

Ganesh Kumar

Date: -27/02/2021

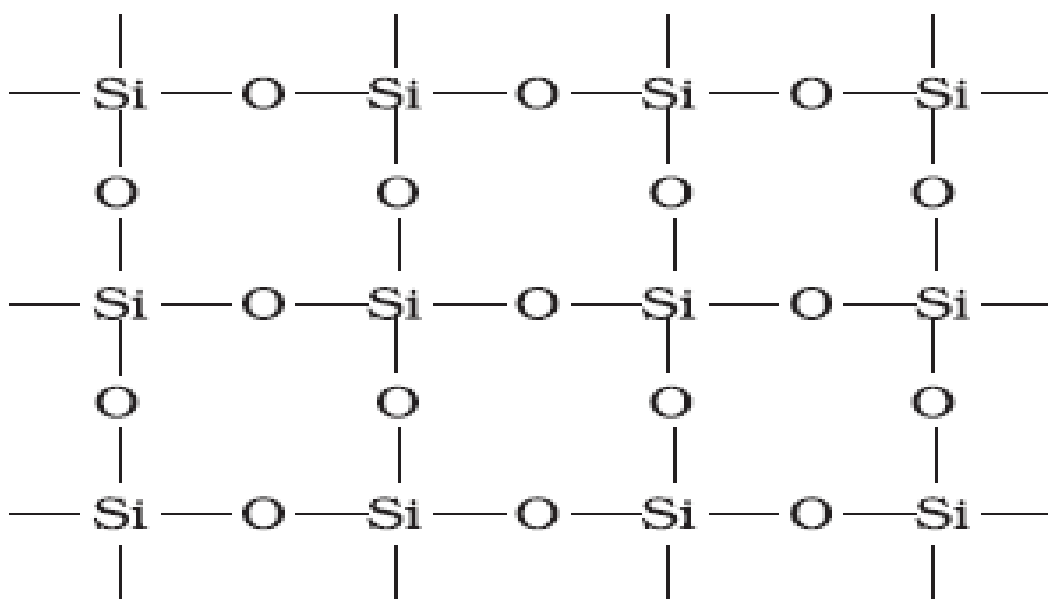
## p- block element

### 1. Silicon Dioxide (SiO<sub>2</sub>)

Silicon dioxide is commonly known as silica. It exists in different crystalline forms like Quartz, Cristobalite, Tridymite etc.

**Structure:** In SiO<sub>2</sub>, each silicon atom undergoes sp<sup>3</sup> hybridisation. Here each Si atom is tetrahedrally surrounded by 4 oxygen atoms. Each oxygen atom is covalently bonded to another silicon atom. So it has a three dimensional network structure and hence it is a solid.

Silica is almost unreactive because of very high Si – O bond enthalpy.



#### Uses:

- Quartz is used as a piezoelectric material. It is used to produce extremely accurate clocks, for radio and television broadcasting and mobile radio communications.
- Silica gel is used as a drying agent, in chromatography and as catalysts.
- Amorphous form of silica (Kieselghur) is used in filtration plants.

## 2. Silicones:

Silicones are a group of organosilicon polymers, which have  $(-R_2SiO-)$  as a repeating unit. (Where R is alkyl or aryl group)

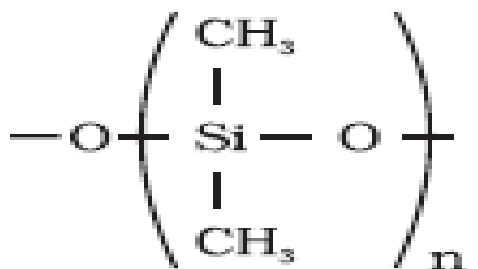
### Manufacture:

When methyl chloride reacts with silicon in the presence of copper as a catalyst at a temperature 573K, dimethyl dichlorosilane  $[(CH_3)_2SiCl_2]$  and other methyl substituted chlorosilanes are formed.

Hydrolysis of dichlorosilane followed by condensation gives straight chain polymers.



$n(CH_3)_2Si(OH)_2$  polymerisation  $\rightarrow$



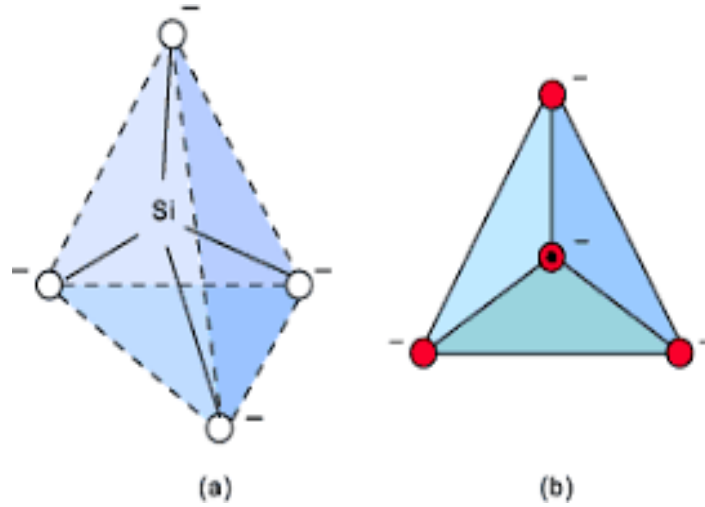
The chain length of the polymer can be controlled by adding  $(CH_3)_3SiCl$  (Trimethyl chlorosilanes).

### Properties:

They are water repelling in nature. They have high thermal stability, high dielectric strength and resistance to oxidation and chemicals. So they are used as sealant, greases, electrical insulators and for water proofing of fabrics. Being biocompatible they are also used in surgical and cosmetic plants.

### 3. Silicates:

These are compounds of Si in which each silicon atom is bonded to four oxygen atoms in tetrahedral manner. In silicates, either the discrete  $\text{SiO}_4^{4-}$  units are present or a number of such units are joined together by sharing oxygen



atoms. When silicate units are linked together, they form chain, ring, sheet or three-dimensional structures. Zeolites, mica, feldspar, asbestos etc. are some examples of silicates.

### 4. Zeolites:

Zeolites are aluminosilicates of metals. These are widely used as a catalyst in petrochemical industries for cracking of hydrocarbons and isomerisation. E.g. the zeolite ZSM-5 is used to convert alcohols directly into gasoline. Hydrated zeolites are used as ion exchangers in softening of hard water.

\*\*\*\*\*