

KANGLU KUMHAR GOVT. COLLEGE DURGUKONDAL

DIST:- U.B. KANKER



DEPARTMENT OF CHEMISTRY

**TOPIC:- Synthesis, Structure Aspect and
Application of Silicone**

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B.S.c III YEAR (2025-26)**



**What is
silicon**

**General
formula**

Preparation

**Types of
silicon**

Synopsis

**Properties
& uses of
silicon**

Synthesis

Structure

Application



SILICONE

- Synthesis compounds containing **Si-O-Si** linkage are called silicones

These are **orange** silicon polymer containing **R_2SiO** -repeating unit.

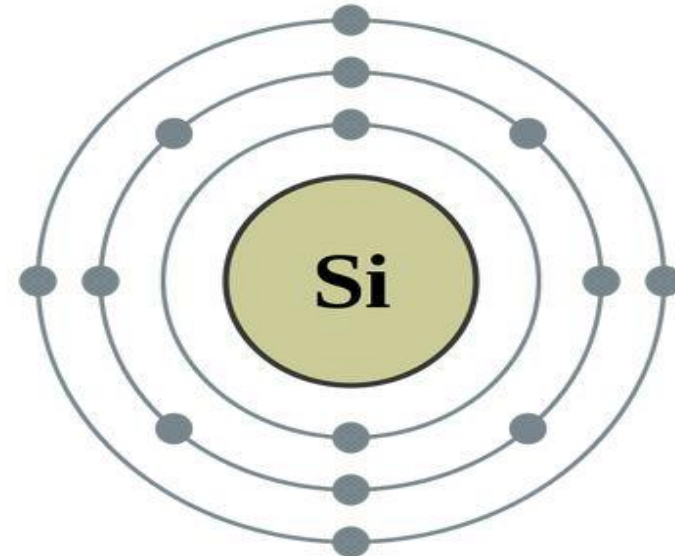
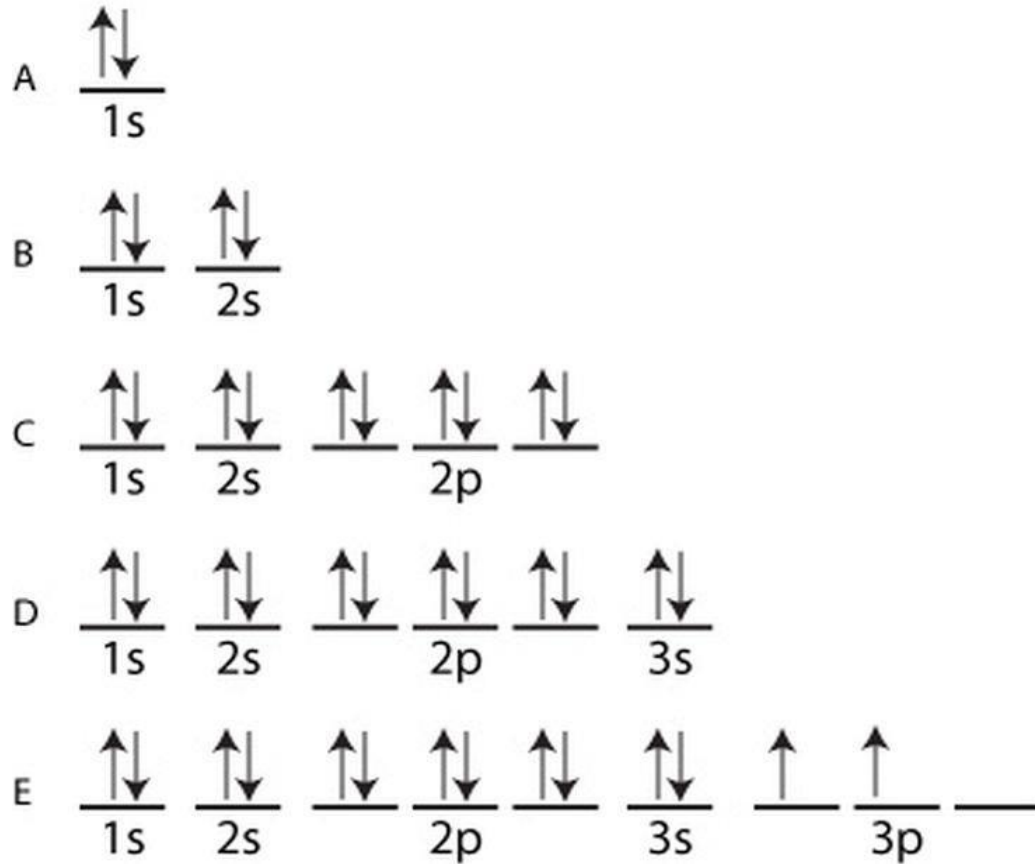
- The starting materials for the manufacturer of silicones are Alkyl or Aryl substituted silicon chloride R_nSiCl



14: Silicon

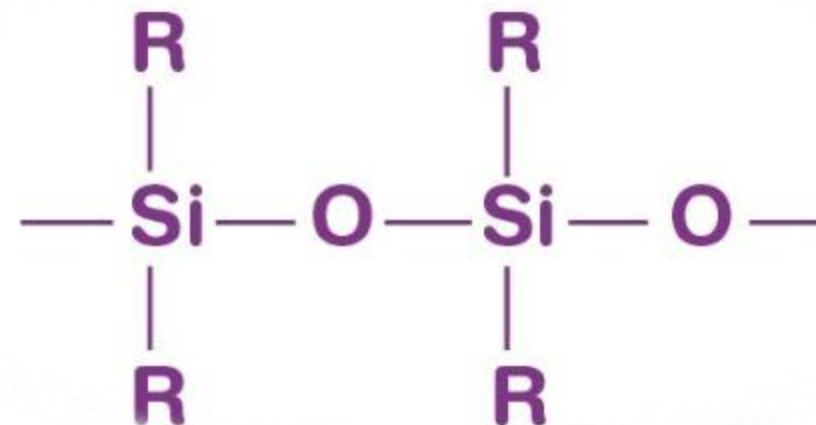
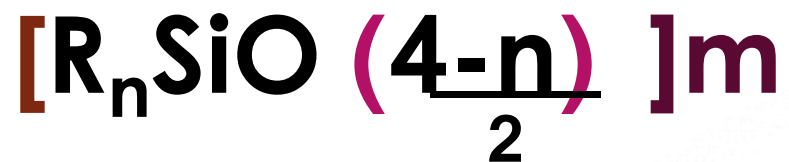
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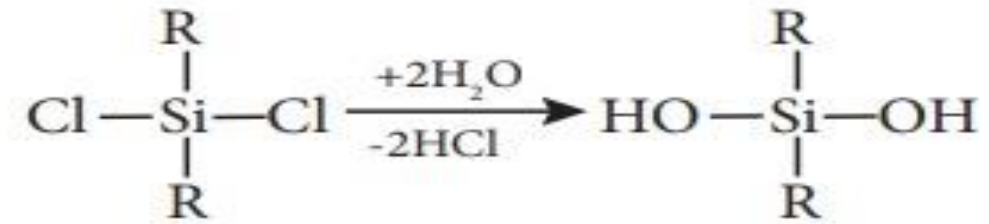
Silicon Electron Configuration





General formula







• TYPES OF SILICONES :-

1. Crystalline silicon (c-si)

- Has a regular crystal structure
- Used in electronics and solar cell.

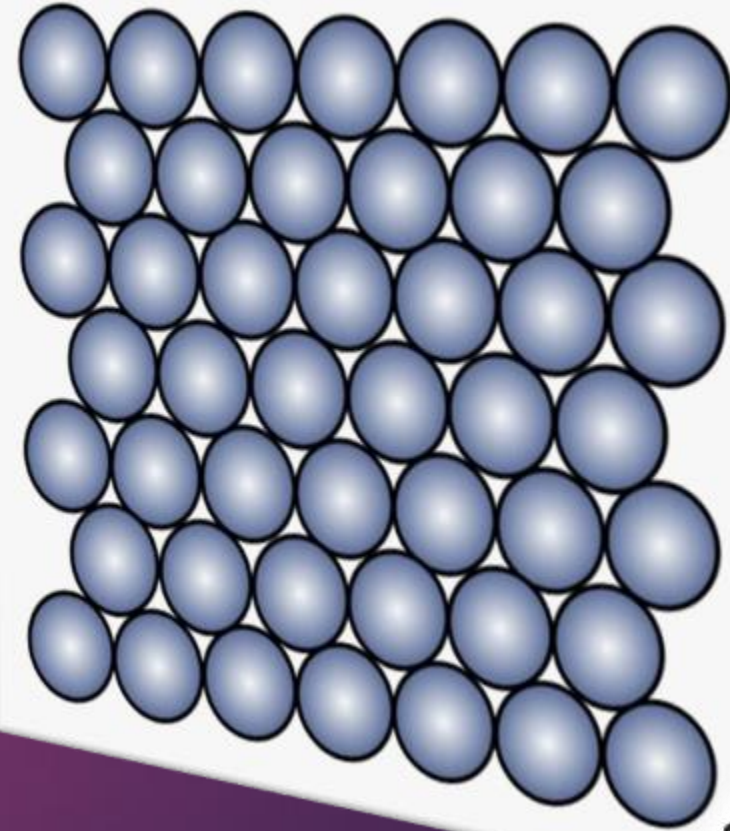




1. Monocrystalline silicon:-

Single continuous crystal very pure used in semiconductors and high efficiency solar panels.

Monocrystalline

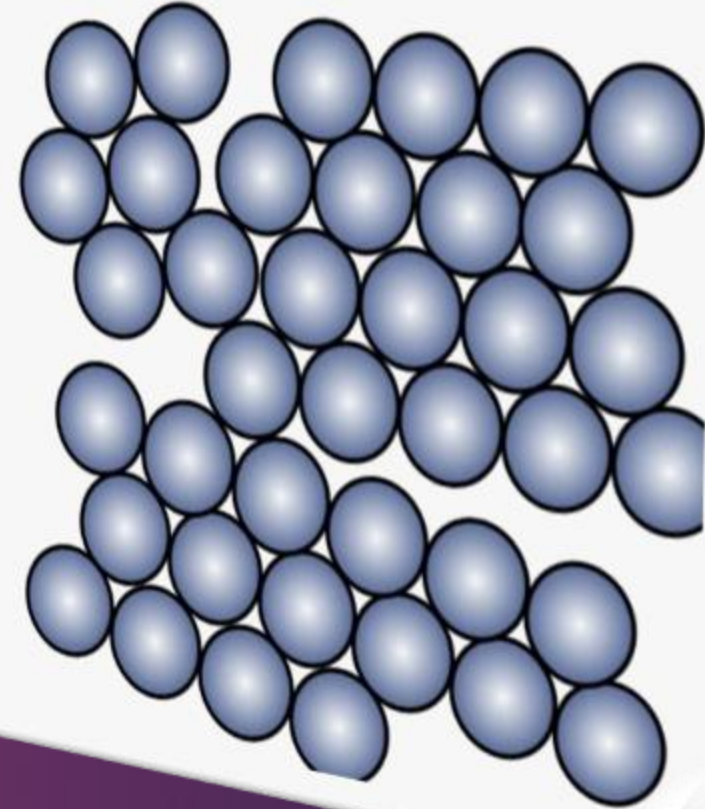




2. Polycrystalline silicon :-

2. Made of many small crystals ,less pure , cheaper, used in most solar panels.

Polycrystalline



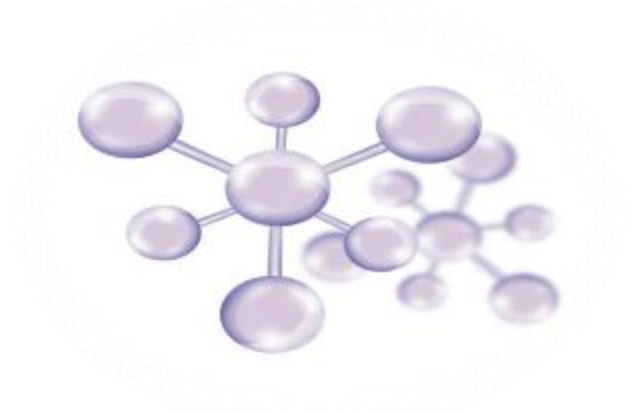


2. AMORPHOUS SILICON (c-si)

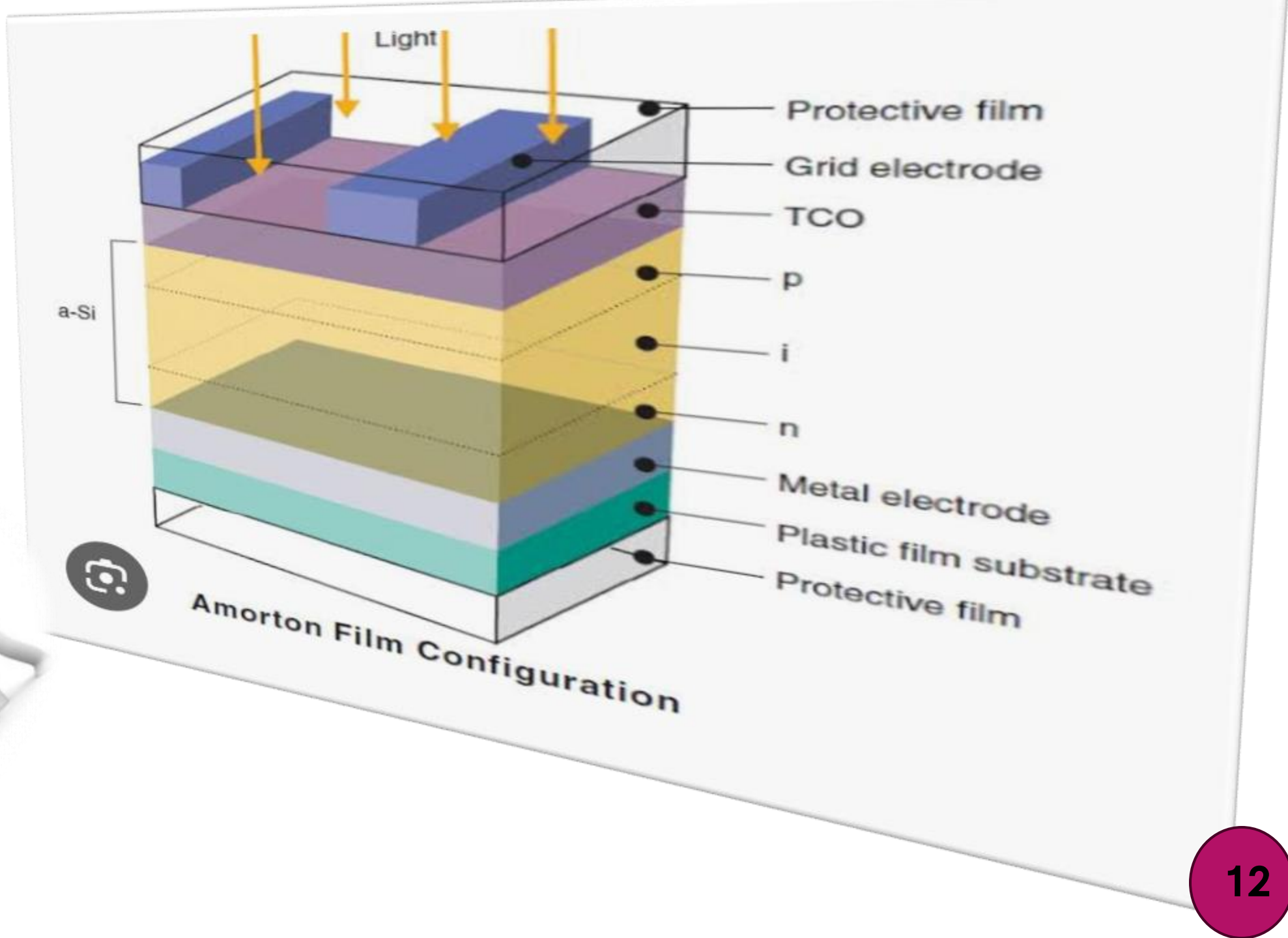


- **Non-crystalline form**

(No long – range order)



- Thin film material used in solar cells. Displays and coating





PROPERTIES OF SILICONE

1. Physical properties:-

• **Appearance -**

Hard, brittle solid, with a gray or bluish metallic shine

• **Atomic Number -**

14

• **Atomic Mass -**

28.094

• **Density -**

2.33g/cm

• **Melting point -**

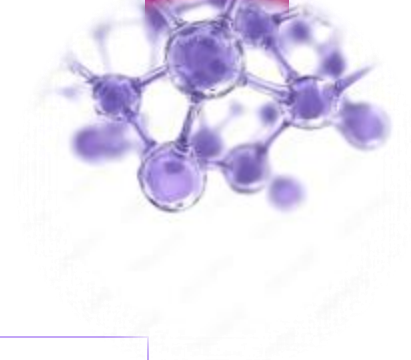
Very high, around 1414°C

• **Boiling point -**

About 3265°C

• **Conduction -**

Semiconductor



2. Chemical properties:-

• Reactivity -

Less reactive at room temperature. But reacts at high temperature.

• With oxygen -

Forms silicon dioxide (SiO_2)

• With acid -

Resistant to most acid but dissolves in hydrofluoric acid.

• With Bases-

Reacts with strong alkalis (like NaOH , KOH) to form silicate.

• Allotropes -

Exists in crystalline and amorphous form.





SYNTHESIS OF SILICONE:-



Silicon is usually obtained from silicon dioxide. (SiO_2) (quartz, sand) By reducing with carbon in an electric furnace.

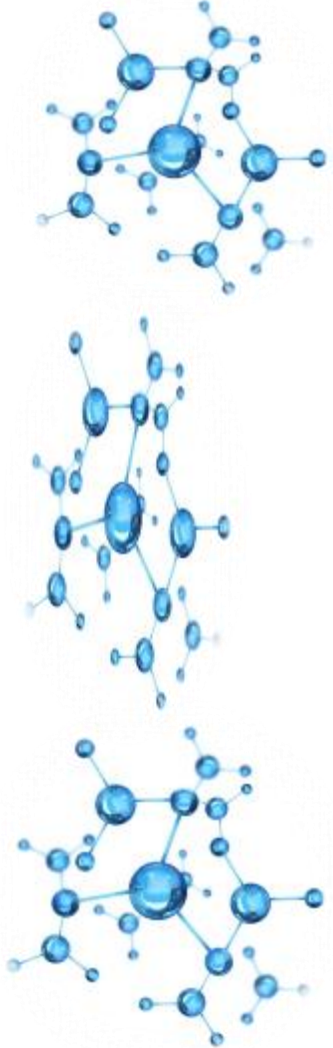




1

From silica (SiO_2)

- The most common method to obtain element silicon is by **Reduction of silica (Sand, quartz)** with a reducing agent.





Reaction



2000°C



- The product is called metallurgical grade silicon (= 98-99% pure)





2

Purification (for electronic use)

Since
semiconductors
require ultra pure
silicon. Further
purification is done.





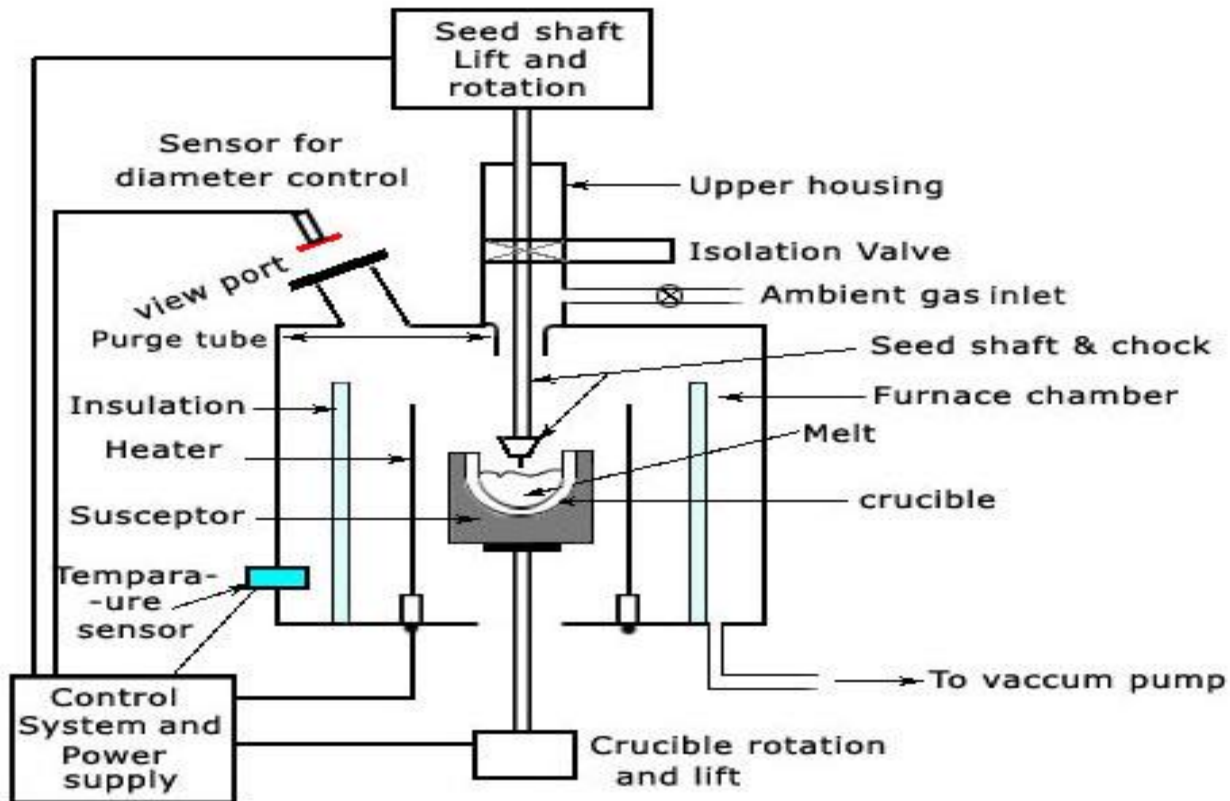
1. Siemens process



2. Czochralski Process

- Used to grow single crystals of silicon

- A seed crystal is dipped into molten silicon and slowly pulled out while rotating forming a large cylindrical silicon ingot

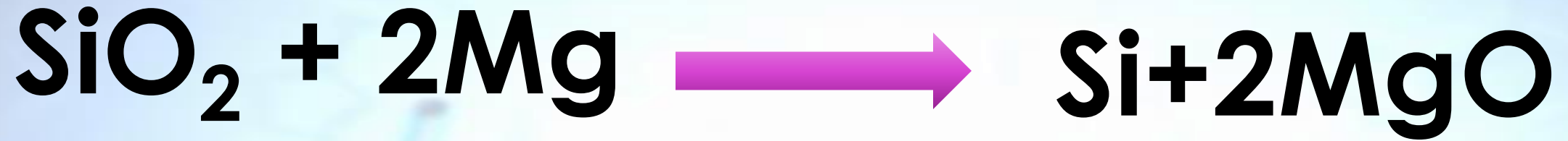




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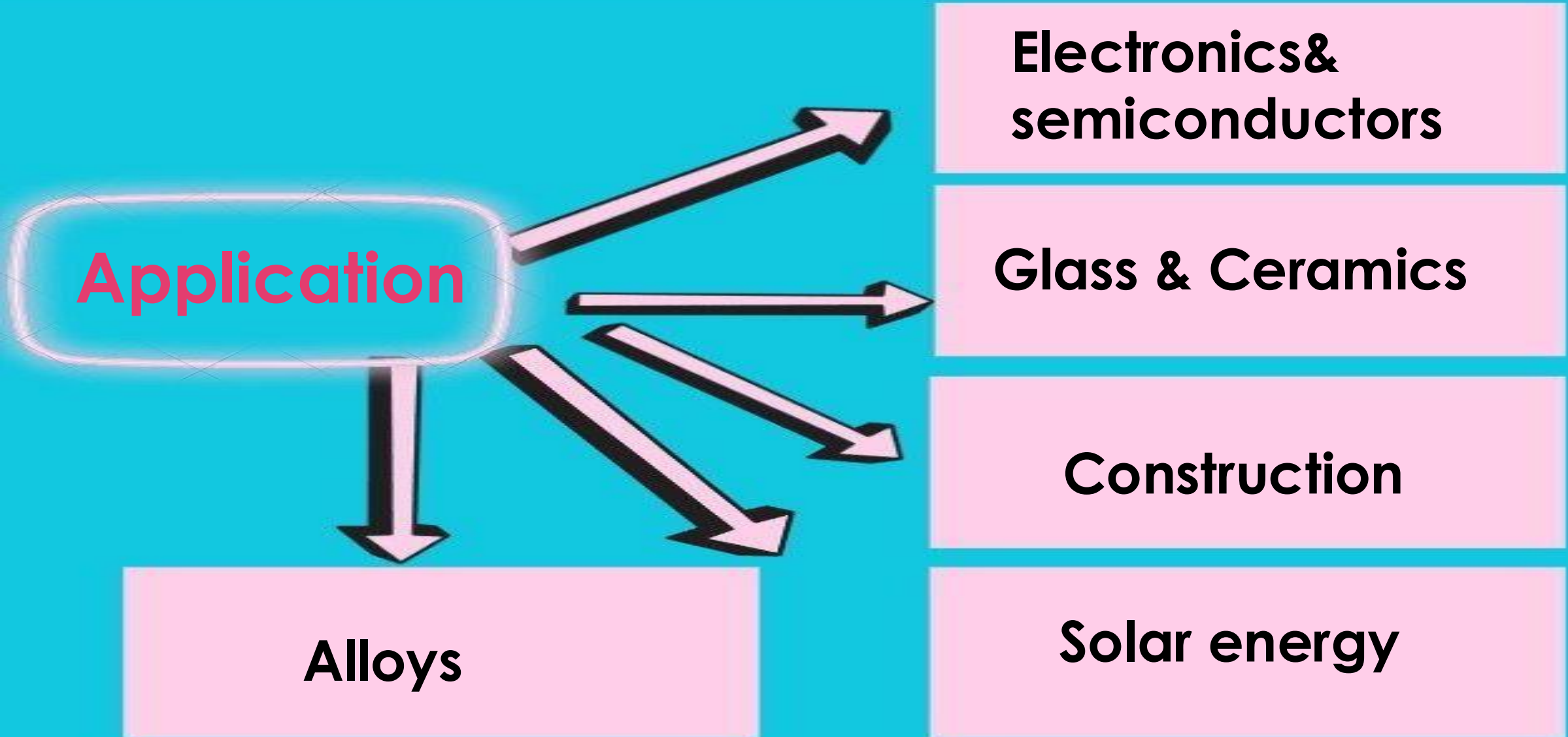
Alternative method

Magnesium Reduction:-



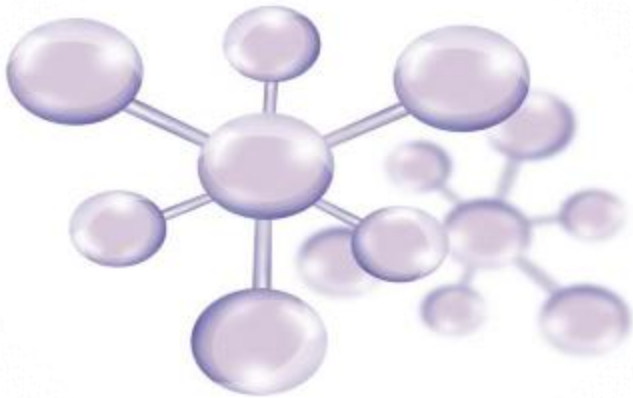
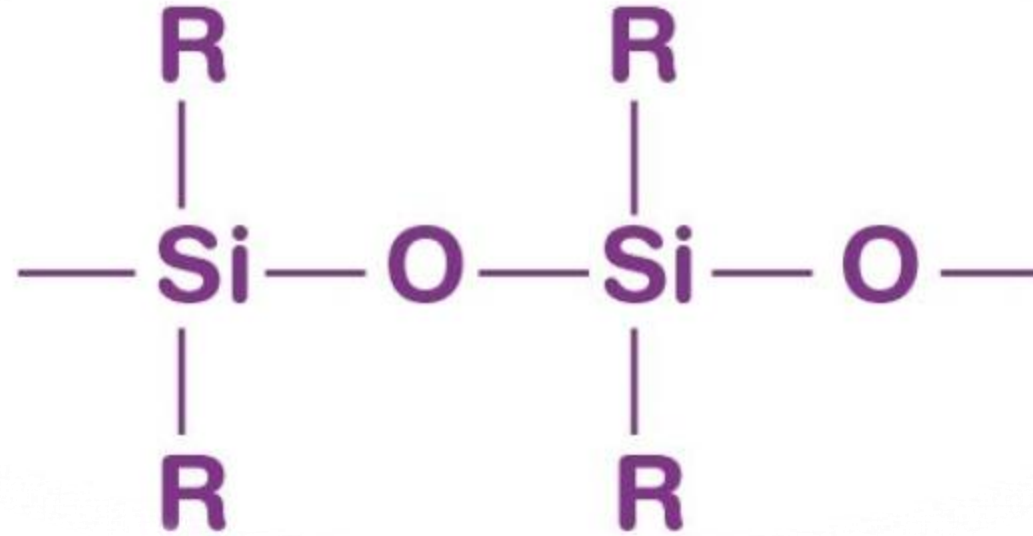
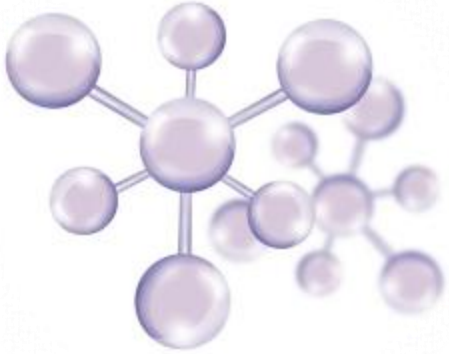


Application of silicon





Structure of silicon

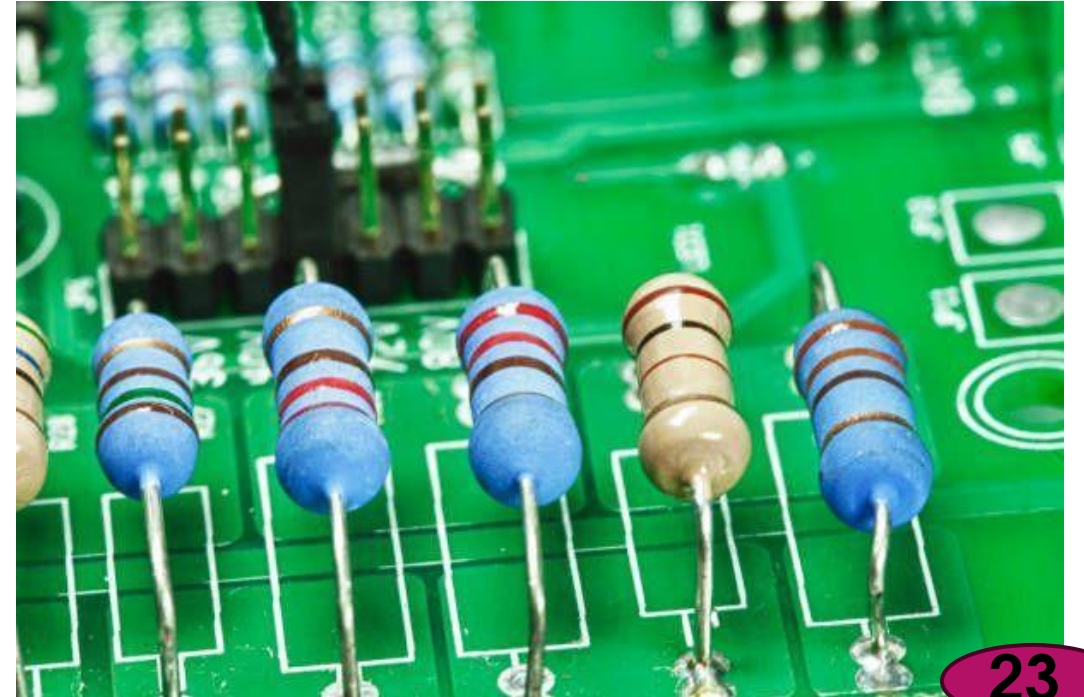




Electronics and semiconductors



**Used to make
transistor, diodes, microchips & solar cells
because it is a
semiconductors.**





Glass & Ceramics

Silica (SiO_2) is the main component of glass, ceramics and quartz.





Construction



Used in
making
cement,
concrete,
and
bricks (as
silica or
silicates)



Solar energy

Crystalline silicon is widely used in photovoltaic solar panels.





Alloys

Added to aluminium, steel and other metals to improve Strength hardness, and corrosion resistance.

Types of Metals



Steel



Iron



Bronze



Brass



Aluminum



Copper



Chromium



Gold



Lead



Silver



Magnesium



Tin



Nickel



Titanium



Zinc



Medical use

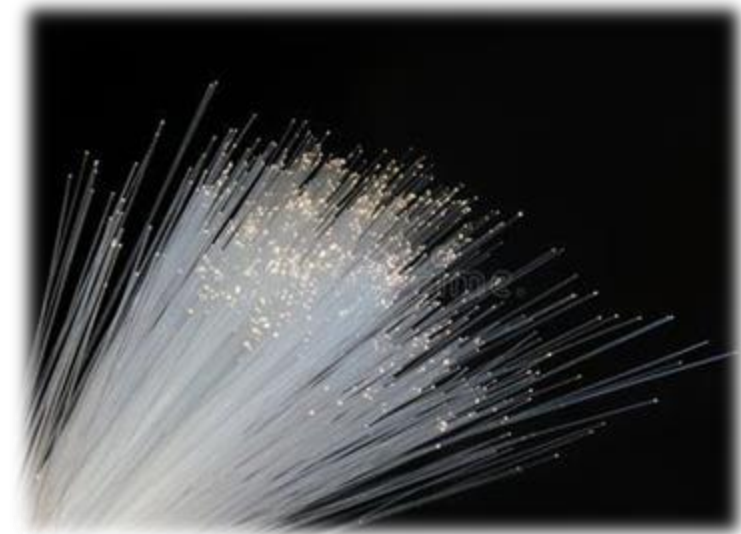


**Biocompatible
silicones are used
in implants
catheters , and
medical tubing.**



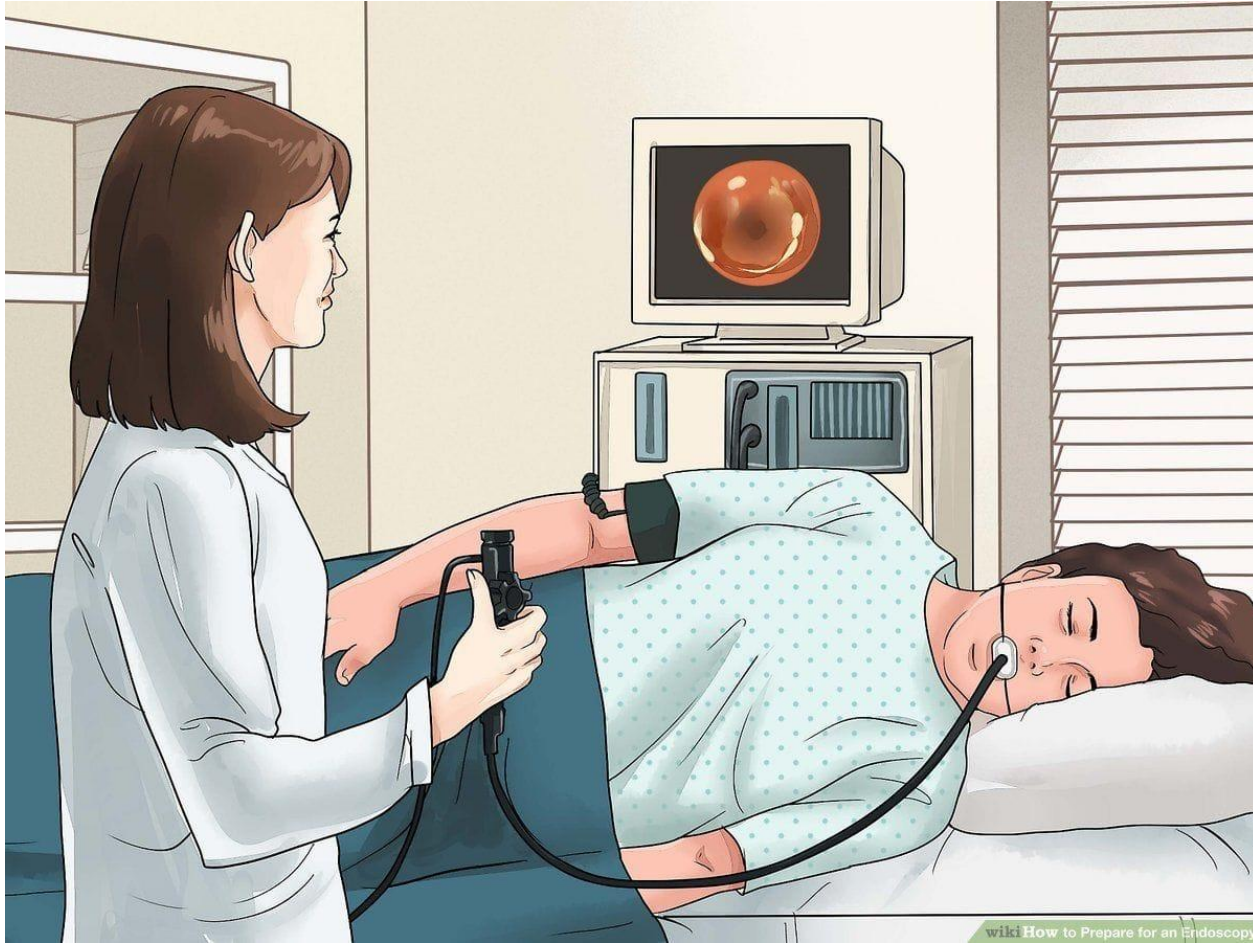
Glass fibres and optical fibres

For communication system and insulation.



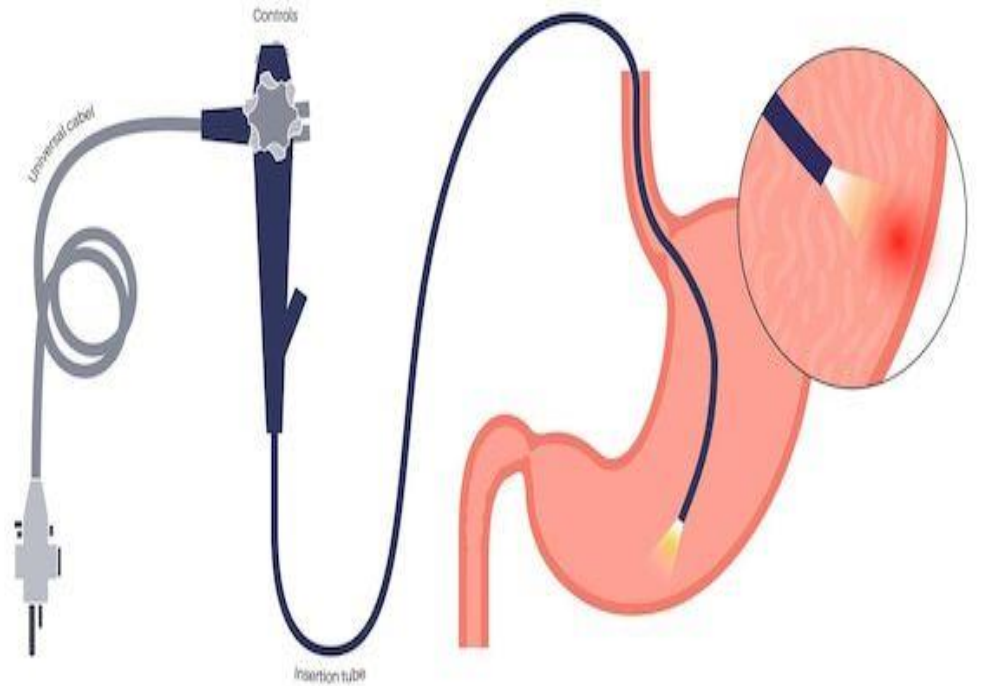


Endoscop



wiki How to Prepare for an Endoscopy

ENDOSCOPY





Chemical industries

Used as a reducing agent and in the production of silanes and other silicon components.





Thank You

