Liquid crystals

- Introduction
- Classification of liquid crystals
- Classification of thermotropic liquid crystals
- Applications of liquid crystals.

- **Transition point**: A point in which one type of polymorphic state is converted into another form.
- **Liquid crystals**: Ordinarily a solid changes to liquids on heating. But some crystalline solids do not get converted directly into liquid state. An intermediate state structure called liquid crystals appears in them between the crystalline solid state and ordinary liquid state.
- Although these crystals can flow like liquids yet they show the behaviour similar to crystalline solids.

- Cholesteryl benzoate was the first solid discovered to have this property. It fuses sharply at 145 degree celcius to give a turbid liquid and at 178 degree celcius it changes into clear liquid. The above changes are reversed on cooling.
- P- Cholesteryl benzoate ↔ P- Cholesteryl benzoate ↔ P- Cholesteryl benzoate
  (Solid state) (liquid crystal) (liquid state)
- Classification of liquid crystals
  1. Thermotrophic liquid crystal
  2. Lyotrophic liquid crystal

- **Thermotrophic liquid crystal**: Crystals with decrease in temperature the matter gains ordered state with discrete symmetries whereas at higher temperature the state becomes disordered with continuous symmetries i,e, the matter undergoes thermotrophic changes.

- **Classification of Thermotrophic liquid crystal**

  1. nematic phase
  2. smectic phase
  3. cholesteric phase

- **Nematic liquid crystals**:

--- Nematic meaning thread

---- flows in a layers

----- molecules are disordered in all the directions

----- strongly affected by magnetic field

Example: p- azoxy anisole, p- methoxy cinnamic acid ,

p-azoxy phenolate

Smectic liquid crystals:

----- do not flows as a normal liquids.

----- molecules spread over a clean glass suface , they form a series of terraces

----- complex internal structures.

Example: ethyl p- azoxy benzoate,ethyl p- azoxy cinnamate,