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liquid-crystal transitions

Also contains definitions of: cholesteric phase, nematic phase

A liquid crystal is a molecular crystal with properties that are both solid- and liquid-like. Liquid crystals are composed predominantly of rod-like or disc-like molecules, that can exhibit one or more different, ordered fluid phases as well as the isotropic fluid; the translational order is wholly or partially destroyed but a considerable degree of orientational order is retained on passing from the crystalline to the liquid phase in a mesomorphic transition.

1. Transition to a nematic phase.
   A mesomorphic transition that occurs when a molecular crystal is heated to form a nematic phase in which the mean direction of the molecules is parallel or antiparallel to an axis known as the director.
2. Transition to a cholesteric phase.
   A mesomorphic transition that occurs when a molecular crystal is heated to form a cholesteric phase in which there is simply a spiralling of the local orientational order perpendicular to the long axes of the molecules.
3. Transition to a smectic state.
   A mesomorphic transition that occurs when a molecular crystal is heated to yield a smectic state in which there is a one-dimensional density wave which produces very soft/disordered layers.

Source:
PAC, 1994, *66*, 577 *(Definitions of terms relating to phase transitions of the solid state (IUPAC Recommendations 1994))* on page 584

