Force is proportional to area in contact and velocity gradient, i.e.,

$F \propto A$ (Area) .....(i)

and $F \propto \frac{dv}{dx}$ (velocity gradient) .....(ii)

On combining (i) & (ii) , we get : $F \propto \frac{dv}{dx}$

$\Rightarrow \quad F = \eta A \frac{dv}{dx}$

where η is a constant, called as the coefficient of viscosity and it has the unit of poise, g $cm^{-1}s^{-1}$.

THE SOLID STATE Section - 6

The substance is said to be in solid state if the molecular interaction energy predominates over the disruptive thermal energy.

Covalent Solids

A covalent solid is a giant molecule having a three dimensional network of covalent bonds. Examples are diamond, silicon carbide, silica. These are generally very hard.

Ionic Solids

Ionic solids are three dimensional arrangements of cations and anions bound by coulombic forces .The crystal on the whole are electrically neutral. Such solids are characterized by high melting and boiling points. The ionic solids do not conduct electricity as ions present therein are not free to move. Examples are sodium chloride, barium oxide and calcium fluoride.

Metallic Solids

Metals are orderly collection of positive ions surrounded by and held together by free electrons, each metal atom donating one or more electrons. The bonding is not directional. The metals are good conductors of heat and electricity. They are highly malleable and ductile. These sets of properties can be attributed to this structure of metals. Metals like sodium crystallize- in simple cubic lattice. The presence of a sea of mobile electrons in a metal accounts for its high electrical and thermal conductivity.

Molecular Solids

Many combinations of elements result into covalent molecules. These are discrete units capable of independent existence. Thus we have molecules like di-hydrogen, di-nitrogen, methane etc. which are called covalent compounds. They have weak molecular interaction. Even mono-atomic molecules like the noble gases, form molecular solids. These solids are characterized by low melting points.