SOLIDS Key idea → nature of attractive force

general → closest "packing" of particles of all 3 states
→ high density, rigid, incompressible
→ the stronger the attractive force the higher the mp

SOLIDS → AMORPHOUS ⇒ no regular repeating pattern
→ IMF's
plastics, waxes, asphalt, glass
tangled hydrocarbons

SOLIDS ↓ CRYSTALLINE
⇓
3-D repeating pattern
↳ crystal lattice
lattice points ⇒ ions, molecules, atoms

4 types
1. MOLECULAR
2. IONIC
3. METALLIC
4. COVALENT (NETWORK)

MOLECULAR SOLIDS
→ molecules at lattice points
→ molecules held together by IMF's
STRONG forces WITHIN the molecules
~ WEAK forces between them
– low mp, soft, crumbly

ice, iodine (I_2), sulfur (S_8), phosphorus (P_4)

dry ice CO_2

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(2) IONIC SOLIDS

→ ions at lattice points

→ held together by ionic bonds $F = \frac{kQ_1Q_2}{r^2}$

- ROCKS
- high mp, brittle
- nonconducting solids

  but → conduct as liquids or aqueous sol'n

  electrolytes

(3) METALLIC SOLIDS

→ metal atoms (ions) at lattice points

- shiny
- malleable, ductile, high mp
- conductors
- METALLIC BONDING
  - strong, nondirectional

"SEA of ELECTRONS"

→ delocalized valence e^- surrounding (+) ion cores

Why are metals good conductors?

BAND THEORY

- when atoms come together and bond, AO's combine to form Molecular Orbitals (MO)
- MO's will have different E's based on which/how many AO's were combined

"band" of allowable E's

valence band ⇒ e^-'s involved in bonding

conduction band ⇒ e^-'s @ ↑E than valence band <u>but</u> not <u>LOST</u>

<u>band gap</u> is very small in metals