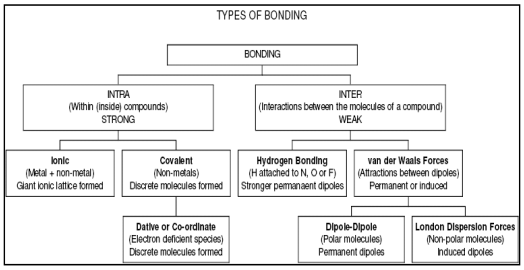
Forces

Types of Bonds



Intramolecular Bonding

- Intra Molecular – Bonding _____
  - _____ - metal + non metal
  - _____ - non metal + non metal
  - _____ - metal + metal

Intermolecular

- Intermolecular bonds – Bonding _____
  - Network Covalent bonding
  - Ionic bonding
  - Metallic bonding
  - Hydrogen bonding
  - Dipole – Dipole bonding
  - London Dispersion forces

Network Covalent

- Continuous network of covalent bonds
- Examples: quarts, diamond, graphite, SiO_2
- Extremely _____ melting points
- Generally _____ in all solvents
- _____ conductors of electricity

Ionic

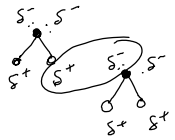
- Strong bonds due to _____ forces
- _____ melting points
- Good conductors of electricity when _____ or in _____
- Usually soluble in _____ or _____ solvents

Metallic

- _____ of valence electrons
- _____ melting points
- Electrons free to move around
- _____ conductor of electricity

Hydrogen bonding

- Occurs when H is bonded to _____, _____, or _____
- They are VERY strong leading to
  - High boiling points
  - Viscous



Polarity

- In order for a substance to be polar, the bonds within the molecule must carry different charges and cannot cancel out due to symmetry

Polar or non polar

- CHF_3
- CO_2
- BCl_3
- CH_4
- H_2O

Rule for solubility

- _____ dissolves _____
- Polar will dissolve in polar
- Non polar will dissolve in non polar

Van der Waals Forces

- Dipole – Dipole
  - Dipole - partial _____ & a partial _____ charges at one end
  - The partial positive and partial negative will _____
  - These attractions are called dipole - dipole attractions
  - These come from polar molecules ONLY!!!

London Dispersion forces

- Small electrostatic forces caused by the _____ of the electron in molecules
- In all molecules
- More electrons → stronger LDF because more polarizable

What type of intermolecular forces are present?

- Ar
- HCl
- HF
- $CaCl_2$
- CH_4
- CO
- $NaNO_3$

Which will have the …

- Highest boiling point… HBr, Kr, Cl_2
- Highest freezing point…H_2O, NaCl, HF
- Lowest freezing point…N_2, CO, CO_2
- Lowest boiling point…CH_4, CH_3CH_3, $CH_3CH_2CH_3$
- Highest boiling point…HF, HCl, HBr

More examples

- At 25°C ONF is a gas where H_2O is a liquid. Why?
- At 25°C Br_2 is a liquid when Cl_2 is a liquid. Why?