Chemical Bonding Part 2



We Believe You Can Fly

The Chemistry Specialist

Chemical Bonding

Structure	Giant metallic lattice structure e.g. Na, Mg, Al	Giant ionic lattice structure e.g. NaC <i>I</i> , MgO	Giant molecular structure e.g. Diamond, Graphite, Silicon, Silicon dioxide	Simple molecular structure e.g. H ₂ , O ₂ , H ₂ O, CO ₂ , Ne (monoatomic element)
Bonding	(Strong) Electrostatic forces of attraction / metallic bond between cations and sea of delocalised mobile electrons	(Strong) Electrostatic forces of attraction / ionic bond between two oppositely charged ions.	(Strong) Covalent bond between atoms	(Weak) Intermolecular forces of attraction between molecules id - id - non polar polar polar
Factors affecting strength of bonds / IMF	Strength of Metallic Bond 1. Charge Density <u>q</u> + r_+ 2. No. of valence electrons contributed by each atom (strength q_)	Strength of Ionic Bond $\frac{q_+ \times q}{ L.E. } = \frac{q_+ \times q}{r_+ + r}$ *Compare charges first before ionic radii	 Bond Order (Higher → Stronger) Bond Length (Shorter → Stronger) Bond Polarity (Greater Difference in Electronegativity → Stronger) 	Size of Electron Cloud More electrons to be polarised Stronger id - id Shape (Isomers) Linear Molecules Stronger id - id
Properties	 High m.p. and b.p. (large amount of energy required to overcome the metallic bonds) Good conductor of electricity (solid and molten) Good conductor of heat Malleable and ductile 	 High m.p. and b.p. (large amount of energy required to overcome the ionic bonds) Good conductor of electricity (molten and aqueous) Soluble in polar solvent Hard and brittle 	 High m.p. and b.p. (large amount of energy required to break the covalent bonds) Diamond and SiO2 Tetrahedral arrangement Cannot conduct electricity Silicon Tetrahedral arrangement Semi-conductor Graphite Layered structure of hexagonal rings Weak id-id forces between layers Conducts electricity in directions parallel to planes 	 Low m.p. and b.p. Non-polar molecules are soluble in non-polar solvent while polar molecules are soluble in polar solvent (compatibility of IMF type). Non-conductor of electricity
The Chemistry Spee	ialist Dream		Conducts electricity in directions parallel to planes	© Achievers Dream