

Bonding Summary

	Ionic Bonds	Polar Covalent Bonds	Nonpolar Covalent Bonds	Metallic Bonds
Type of Elements	metal $\frac{1}{2}$, nonmetal	2 nonmetals	2 nonmetals	metals
Δ EN	≥ 1.8	.4 - 1.7	0 - .3	N/A (0)
Type of Formula Used	Empirical (Ratio)	molecular and structural ←—————→		Element symbol
Example(s)	NaCl	H-O, H-Cl +→ +→	Cl-Cl	$\text{Cu}^+ \text{Cu}^+$ $\text{Cu}^+ \text{Cu}^+$
	Ionic Compounds	Polar Covalent Compounds	Nonpolar Covalent Compounds	Metallic Compounds
Properties	crystalline solids	dissolve in H ₂ O	EVAPORATE EASILY	conduct electricity
Example(s)	NaCl	H ₂ O, C ₁₂ H ₂₂ O ₁₁	H ₂ , O ₂ , Cl ₂ Hexane	Al
Melting Point	highest >1000°C	MEDIUM	Lowest (stearic acid)	High (Al)
State of Matter (common)	SOLID	Liquid or SOLID	Liquid or GAS	
Hardness/Brittleness	hard/brittle	soft	soft	HARD, MALLEABLE, DUCTILE
Conductivity	only in aqueous sol'n	NON	NON	SOLID CONDUCTS
Solubility in H ₂ O	SOLUBLE	SOLUBLE	INSOLUBLE	INSOLUBLE

Solubility Rule of Thumb: Like Dissolves Like*

- POLAR COVALENT SOLVENTS (H₂O) dissolve:

- POLAR COVALENT SOLUTES (SUGAR)

- IONIC SOLUTES (NaCl)

* things with charges dissolve other things with charges.

- NONPOLAR COVALENT SOLVENTS (HEXANE, GASOLINE)

- dissolve nonpolar covalent solutes (stearic acid, WAX, grease)