

# Chemistry: Bonding and Properties

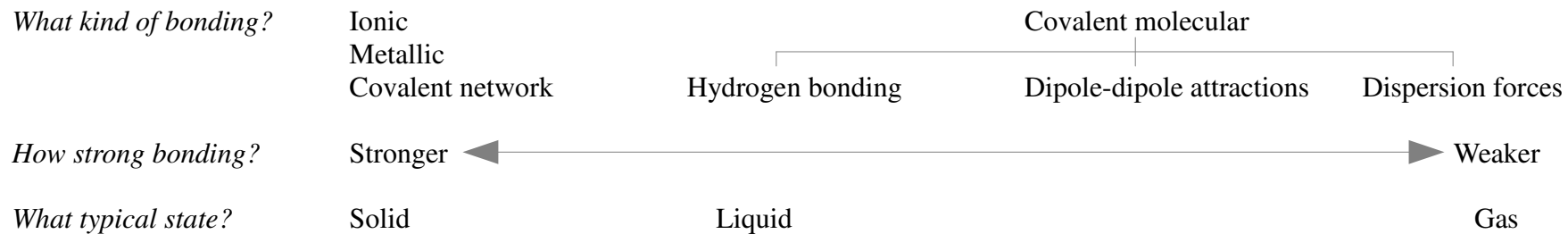
From bonding to properties:

Type of primary bonding	Primary bonding is between	Structure	Type of secondary (intermolecular) forces	Melting and boiling points	Typical state at room temperature	Other typical physical properties
Ionic	Metal and nonmetal	Lattice of ions (continuous)		High	Solid	Hard, brittle, conducts electricity when molten or dissolved but does not conduct in solid form
Covalent	Nonmetal and nonmetal	Covalent network (continuous)		High	Solid	Does not conduct electricity
		Molecular	Dispersion forces	Very low	Gas	
			Dipole-dipole attraction	Low	Gas or liquid	
Hydrogen bonding	Low to moderate	Liquid				
Metallic	Metal and metal	Positive ions and delocalised electrons (continuous)		High	Solid	Malleable, metallic lustre, conducts electricity in all forms

From properties to bonding:

If substance has property:	Then substance is:
High melting/boiling point (solid at room temperature)	Ionic, covalent network, or metallic
Moderate or low melting/boiling point (liquid or gas at room temperature)	Covalent molecular
Hard or brittle	Ionic or covalent network
Malleable	Metallic
Conducts electricity when molten or dissolved but not otherwise	Ionic
Always conducts electricity	Metallic
Never conducts electricity	Covalent network or covalent molecular
Lustrous	Metallic

## Trend of properties:



## Meanings of terms:

*Brittle*: likely to shatter rather than bend

*Malleable*: likely to bend rather than shatter

*Metallic lustre*: shiny and reflective in the typical metallic way

*Molten*: liquid form