

1 – States of Matter		
Particle Theory		Models particles as <b>small, solid, inelastic spheres</b> .
Solid	Particles	<b>Regular</b> arrangement, <b>touching</b> each other, <b>strong</b> forces, <b>vibrating</b> in fixed positions.
	Properties	<b>Fixed shaped</b> and <b>volume</b> . <b>Cannot flow</b> or be <b>compressed</b> .
Liquid	Particles	<b>Random</b> arrangement, <b>touching</b> each other, <b>weak</b> forces, <b>moving around</b> each other.
	Properties	<b>No fixed shape</b> but <b>fixed volume</b> . Can <b>flow</b> but <b>cannot</b> be <b>compressed</b> .
Gas	Particles	<b>Random</b> arrangement, <b>not touching</b> each other, <b>no</b> forces, moving <b>randomly</b> in <b>straight lines</b> at a <b>range</b> of speeds.
	Properties	<b>No fixed shape</b> or volume. Can <b>flow</b> and can be <b>compressed</b> .
2 – Changes of State		
Melting (S -> L)		Particles gain <b>energy</b> and move <b>faster</b> -> forces <b>weaken</b> -> particles <b>break free</b> from positions.
Boiling (L -> G)		Particles have <b>enough energy</b> to <b>break</b> the forces between them.
Condensing (G -> L)		Particles <b>no longer</b> have <b>enough energy</b> to <b>overcome</b> forces. Forces <b>re-form</b> .
Freezing (L -> S)		Particles lose <b>energy</b> and move <b>slower</b> -> forces <b>strengthen</b> -> particles <b>held</b> in positions.
Melting Point		Temperature at which a <b>solid melts</b> or a <b>liquid freezes</b> .
Boiling Point		Temperature at which a <b>liquid boils</b> or a <b>gas condenses</b> .
Energy Required		<b>Stronger</b> forces -> <b>more energy</b> required -> <b>higher</b> melting and boiling points.

3 – Formation of Ions	
Ions	<b>Charged particles</b> .
Cations	<b>Positive</b> ions formed when electrons are <b>lost</b> .
Anions	<b>Negative</b> ions formed when electrons are <b>gained</b> .
Group 1 metals	<b>Lose 1</b> electron -> form ions with <b>1+</b> charge.
Group 2 metals	<b>Lose 2</b> electrons -> form ions with <b>2+</b> charge.
Group 6 non-metals	<b>Gain 2</b> electrons -> form ions with <b>2-</b> charge.
Group 7 non-metals	<b>Gain 1</b> electron -> form ions with <b>1-</b> charge.
4 – Ionic Bonding	
Electron Transfer	Electrons transferred from <b>metal</b> to <b>non-metal</b> atoms. Both gain <b>full outer shells</b> .
Ionic Bond	<b>Electrostatic attraction</b> between a <b>positive metal ion</b> and a <b>negative non-metal ion</b> .
Structure of Compound	<b>Lattice</b> of <b>oppositely charged ions</b> held together by <b>strong electrostatic forces</b> in all directions.
Melting & Boiling Points	<b>High</b> -> many <b>strong</b> electrostatic forces -> require a lot of <b>energy</b> to break.
Electrical Conductivity	<b>Solid</b> = does <b>not</b> conduct -> ions <b>not</b> free to move <b>Molten</b> or <b>aqueous</b> = does <b>conduct</b> -> ions <b>free</b> to move.
5 – Explaining Reactivity Trends in Group 1 and 7	
Group 1 Trend	<b>More reactive</b> as you go down the group.
Group 1 Explanation	Down the group: number of <b>shells increases</b> -> outer shell electron <b>further</b> from nucleus -> <b>less attraction</b> -> electron <b>lost more easily</b> .
Group 7 Trend	<b>Less reactive</b> as you go <b>down</b> the group.
Group 7 Explanation	Down the group: number of <b>shells increases</b> -> outer shell electrons <b>further</b> from nucleus -> <b>less attraction</b> -> electron <b>gained less easily</b> .

## GCSE Science

### Chemistry C2 – States of Matter & Ionic Bonding

