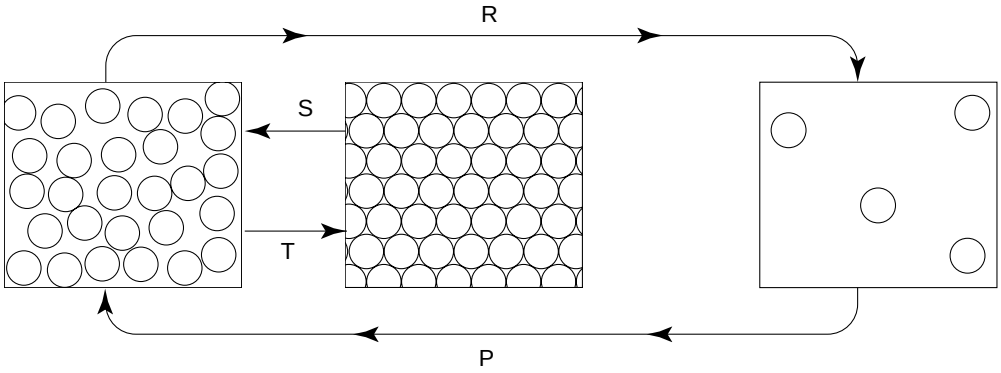
States of matter

1 The diagram below shows particles in a liquid, a solid and a gas. Each arrow, **R**, **S**, **T** and **P** represents a change of state:



Complete the sentences below by filling in the blanks:

i The change of state **R** is called ..... .

ii The change of state **S** is called ..... .

iii The change of state **T** is called ..... .

iv The change of state **P** is called..... .

2 Underline **one** word in the brackets which completes the sentence correctly:

i When a substance is molten, it is in a (gaseous, liquid, solid) state.

ii Particles in a (gas, liquid, solid) move about most quickly.

iii Impurities in a liquid cause it to boil at a (higher, lower) temperature than the pure liquid.

iv A (gas, liquid, solid) is easily compressed.

v Particles in a (gas, liquid, solid) have large spaces between them.

vi A lattice is the structure taken by (gases, liquids, solids).

vii The reverse of freezing is (boiling, melting, condensing).

viii When heated, most liquids (contract, expand, melt).

ix Particles which evaporate from a liquid have (more, less, the same) energy than the particles within the liquid.

3 If you blow on your finger when it has been dipped in water, your finger feels cold. Explain why your finger feels cold, even though your breath is at room temperature.

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Making simple compounds

1a i What are the names and symbols of the **first three** alkali metals?

	Name	**Symbol**
1	.....	.....
2	.....	.....
3	.....	.....

ii In which group of the Periodic Table are these metals?

.....

iii As you go **down** this group of alkali metals in the Periodic Table, do the activities of these metals increase or decrease? Explain your answer.

.....

.....

.....

b i What are the names and symbols of three halogens?

	Name	**Symbol**
1	.....	.....
2	.....	.....
3	.....	.....

ii In which group of the Periodic Table are these halogens found?

.....

iii As you go **down** the group of halogens in the Periodic Table, do the activities of the halogens increase or decrease? Explain your answer.

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iv What is the difference between an atom of chlorine and a molecule of chlorine?

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2 Write down the **nine** formulae and names of the compounds which can be formed by reacting the three alkali metals with the three halogens you answered in Question 1, ai and bi.

Formula	**Name**
.....	.....
.....	.....
.....	.....
.....	.....

Balancing equations

1a Write one word underneath each substance, either reactant or product.

....

b magnesium + hydrochloric acid ⟶ magnesium chloride + hydrogen

.... ⟶ ....

c $CaCO_3$ (s) $\xrightarrow{\text{strong heat}}$ CaO (s) + CO_2 (g)

....

d Ag^+ (aq) + NO_3^- (aq) + Na^+ (aq) + Cl^- (aq) ⟶ AgCl (s) + Na^+ (aq) + NO_3^- (aq)

....

2 Write word equations for:

a the rusting of iron in air

.....

b the burning of butane in air (butane is a hydrocarbon gas)

.....

c the dissolving of table salt in water

.....

3 Use the word equations you have written for question 2 and make them into balanced chemical equations. (The formula for butane is C_4H_{10}.)

a .....

b .....

c Which of the above equations, if any, is not a chemical reaction? Explain why.

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d Which of the above equations, if any, shows an exothermic chemical reaction?

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4 Fill in columns 2, 3 and 4 in the table. When the equation in the first column is not balanced, use the information you have filled in columns 2, 3 and 4 to help you balance the equation correctly. Then write the correctly balanced equation underneath the one originally given in column 1. The first one has been done for you.

Equation	**How many atoms of metal in: reactants?**	**products?**	**How many atoms of non-metal in: reactants?**	**products?**	**Do they balance?**
$Mg + O_2 \longrightarrow 2\ MgO$	(Mg) 1	(Mg) 2	(O) 2	(O) 2	No
$2\ Mg + O_2 \longrightarrow 2\ MgO$	(Mg) 2	2	(O) 2	(O) 2	Yes
$2\ Na + O_2 \longrightarrow 2\ Na_2O$	(Na)	(Na)	(O)	(O)	
$Al + O_2 \longrightarrow Al_2O_3$	(Al)	(Al)	(O)	(O)	
$Na_2CO_3 + HCl \rightarrow NaCl + H_2O + CO_2$	(Na)	(Na)	(C) (O) (H) (Cl)	(C) (O) (H) (Cl)	
$NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O$	(Na)	(Na)	(O) (H) (S)	(O) (H) (S)	
$CaCl_2 + AgNO_3 \longrightarrow Ca(NO_3)_2 + 2\ AgCl$	(Ca) (Ag)	(Ca) (Ag)	(Cl) (N) (O)	(Cl) (N) (O)	