1. Lithium is an element in Group 1 of the Periodic Table. Lithium reacts with fluorine gas to form lithium fluoride.

(i) Complete the word and symbol equation for the reaction.

lithium + fluorine → .....

2..... + F_2 → 2LiF

[2]

(ii) Draw straight lines to join each **substance** to its correct **description**.

Substance	Description
lithium	non-metal
fluorine	compound
lithium fluoride	metal

[2]

2. The Haber process uses nitrogen and hydrogen to make ammonia for fertilisers.

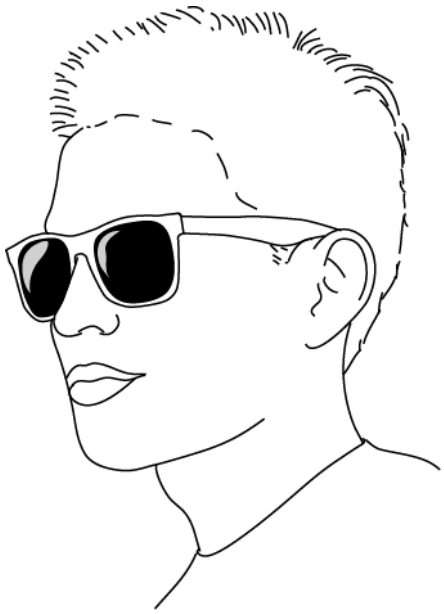
The reaction between nitrogen and hydrogen is reversible.

Complete the equation for the process by drawing the symbol for a reversible reaction in the box.

$N_2 + 3H_2$ ☐ $2NH_3$

[1]

3. Silver chloride is a salt that is used to make lenses that darken in bright light.



Terry uses silver nitrate to make some silver chloride in a precipitation reaction.

This is the symbol equation for the reaction.

$$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$$

Use these words to write a word equation for this reaction.

sodium chloride
silver chloride
sodium nitrate
silver nitrate

[2]

4. Sam works for a company that makes chemicals to kill fungi on plants.

One of the chemicals the company makes is copper sulfate.

Sam makes some copper sulfate from copper oxide.

Complete the **word** and **symbol** equation for the reaction.

copper oxide + [ ] → copper sulfate + water

CuO + H_2SO_4 → $CuSO_4$ + [ ]

[2]

5. Write a word equation to show how sodium reacts to make sodium chloride.

[1]

6. Millions of tonnes of hydrogen are made every year.

The hydrogen is usually made from methane.

The process starts with methane and steam, and makes hydrogen and carbon dioxide.

Write a word equation for this process.

[2]

7. Amir reacts some chlorine solution with a solution of potassium bromide.

The solution turns brown.

(i) Complete **word** and **chemical** equations for the reaction that happens.

chlorine + potassium bromide → _ _ _ _ _ _ _ _ _ _ _ _ _ _ + bromine

Cl_2 + 2 _ _ _ _ _ _ _ _ → 2KC*l* + Br_2

[3]

(ii) Use the equations in **(i)** to explain why the solution turns brown.

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[1]

END OF QUESTION PAPER

Question			Answer/Indicative content	Marks	Guidance
1		i	lithium + fluorine → lithium fluoride ✓ 2Li ✓ + F_2 → 2LiF	2	
		ii	✓ lithium → metal ✓ fluorine → non-metal ✓ lithium fluoride → ionic compound	2	All three correct = (2) One or two correct = (1)
			Total	**4**	
2			? ; (1)	1	Do not accept ? or ? **Examiner's Comments** Over half the candidates knew the correct symbol for a reversible reaction. Two complete arrows facing in opposite directions was the most common incorrect response.
			Total	**1**	
3			silver nitrate + sodium chloride → silver chloride + sodium nitrate Fully correct (2) silver nitrate on LHS and silver chloride on RHS; (1)	2	allow (1) for correct names written under formulae with no '+' **or** '→' Examiner's Comments Most candidates could write a correct word equation from the formula equation given, although some omitted signs and arrows and others confused silver with sodium and got it the wrong way round. A significant number did not respond at all.
			Total	**2**	

Question			Answer/Indicative content	Marks	Guidance
4			sulfuric acid; (1) H_2O; (1)	2	Accept hydrogen sulfate Examiner's Comments Most candidates gave a correct formula for water in this question, with many also giving a suitable name for the reactant, with the systematic name, hydrogen sulfate, appearing more frequently than sulphuric acid. Some lost a mark by clumsy representations of the formula for water e.g. H2O.
			Total	2	
5			sodium + chlorine ? sodium chloride	1	ALLOW sodium + hydrochloric acid ? sodium chloride + hydrogen REJECT chloride for chlorine ACCEPT correctly balanced symbol equation IGNORE incorrect symbols if word equation present Examiner's Comments Many candidates correctly wrote the word equation for the reaction between sodium and chlorine to produce sodium chloride. Others incorrectly wrote chloride instead of chlorine or included other substances, such as water.
			Total	1	
6			methane + steam ? hydrogen + carbon dioxide	1	reactants in either order Allow water products in either order Allow correctly balanced symbol equation Examiner's Comments Generally answered well by the majority of candidates. Where mistakes were made, it was usually because extra products had been added into the equation.
			Total	1	

Question			Answer/Indicative content	Marks	Guidance
7		i	potassium chloride ✓ KBr ✓	2 (AO 2.2 × 2)	Symbol for Br must be correct Examiner's Comments This part was well answered. The most common mistakes were to write potassium chlor*ine* instead of potassium chloride and, less frequently, to write the formula of potassium bromide as KBr2.
		ii	(because) bromine is formed / bromine is red-brown ✓	1 (AO 2.1)	DO NOT ALLOW 'bromide' references Examiner's Comments This part was well answered.
			Total	3	