

## Section B

Answer **all** the questions in the spaces provided.

- 1 The physical and chemical properties of five unknown oxides are summarised in Table 1.1.

Table 1.1

unknown oxide	state at r.t.p	solubility in water	pH of aqueous solution	reacts with dilute hydrochloric acid?	reacts with dilute sodium hydroxide?
<b>A</b>	solid	soluble	14	yes	no
<b>B</b>	solid	insoluble	-	yes	yes
<b>C</b>	gas	soluble	7	no	no
<b>D</b>	solid	insoluble	-	yes	no
<b>E</b>	gas	soluble	2	no	yes

- (a) Which oxide(s) is/are:

(i) non-metallic?

..... [2]

(ii) able to form an alkali?

..... [1]

(iii) amphoteric?

..... [1]

- (b) Give an example for your answer in (a)(iii).

..... [1]

- (c) Suggest the identity of oxide **A**.

..... [1]

- 2 Phosphorus is an element that does not react with water, but will react readily in air, forming an oxide.

Fig. 2.1 below shows a piece of phosphorus fastened to a copper wire and left for a few days in the set up. The water slowly rises up the tube.

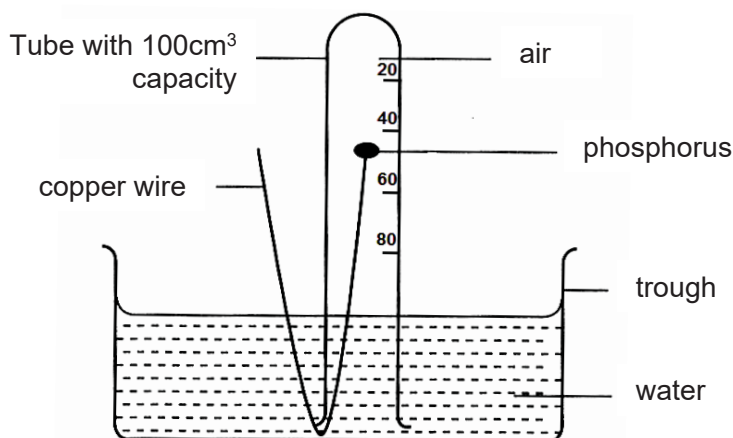


Fig. 2.1

- (a) State the gas in air that phosphorus has reacted with.

..... [1]

- (b) At which mark will the water level approximately be after a few days?

..... [1]

- (c) State two gases that are left in the tube after a few days.

..... [2]

- 3 When a mixture of aluminium powder and zinc oxide is heated, the mixture burns vigorously with a bright flame, and may even explode. The reaction is illustrated by the equation below.



- (a) Is the reaction endothermic or exothermic? Explain your answer.

.....  
 ..... [2]

- (b) State whether zinc oxide is oxidised or reduced. Explain your answer in terms of electron transfer.

.....  
 .....  
 ..... [2]

- 4 A common reaction iron undergoes is rusting. Fig. 3.1 below shows an experiment where some iron nails have been exposed to different conditions in four test tubes **A**, **B**, **C** and **D**.

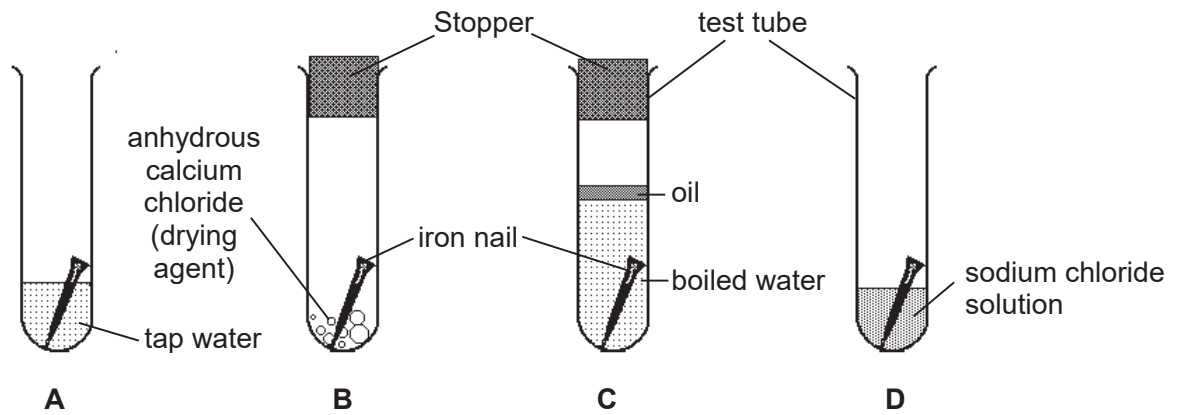


Fig. 3.1

- (a) In which test tube(s) will the iron nail not rust? Explain your answer.

.....

.....

.....

..... [3]

- (b) In which test tube will the iron nail rust the fastest?

..... [1]

- 5 The electronic configurations of lithium, sodium and potassium are shown in Table 5.1.

**Table 5.1**

element	symbol	proton number	electronic configuration
lithium	Li	3	2,1
sodium	Na	11	2,8,1
potassium	K	19	2,8,8,1

- (a) Explain why these three elements are in the same group of the Periodic Table.  
 .....  
 ..... [1]
- (b) For one of the metals in Table 5.1, name the products of its reaction with water.  
 ..... [2]
- (c) Name one other element that is in the same group as the elements in Table 5.1.  
 ..... [1]
- (d) Describe how the reactivity of the element in (c) would differ from the elements in Table 5.1.  
 ..... [1]

6 An unknown metal **M** forms the nitrate **MNO<sub>3</sub>**. The compound is stable, but decomposes upon strong heating.

When a 17.0 g sample of **MNO<sub>3</sub>** was heated, it decomposed completely according to the equation:



At the end of the reaction, 2400 cm<sup>3</sup> oxygen was collected.

(a) Is the above decomposition reaction exothermic or endothermic one? Explain your answer.

.....  
 ..... [2]

(b) Calculate the number of moles of **MNO<sub>3</sub>** that decomposed.

[2]

(c) Calculate the molar mass of **MNO<sub>3</sub>**, and hence determine the identity of **M**.

Identity of **M** : ..... [3]

(d) Describe a test you would perform to confirm the identity of the oxygen produced.

.....  
 ..... [2]

7 Group VII and Group 0 are found at the right side of the Periodic Table.

(a) What are the names given to elements in Group VII and Group 0?

..... [1]

(b) Explain why the elements in Group 0 are unreactive.

.....  
..... [1]

(c) A student is given four substances below.

aqueous bromine	aqueous chlorine
aqueous potassium bromide	aqueous potassium chloride

Describe how she could use **two** of the substances to perform an experiment to show that chlorine is more reactive than bromine. Include the observations you would expect her to make, and construct a balanced chemical equation of the reaction.

.....  
.....  
.....  
.....  
..... [3]

8 Fig. 8.1 describes some of the reactions of two unknown substances **A** and **B**.

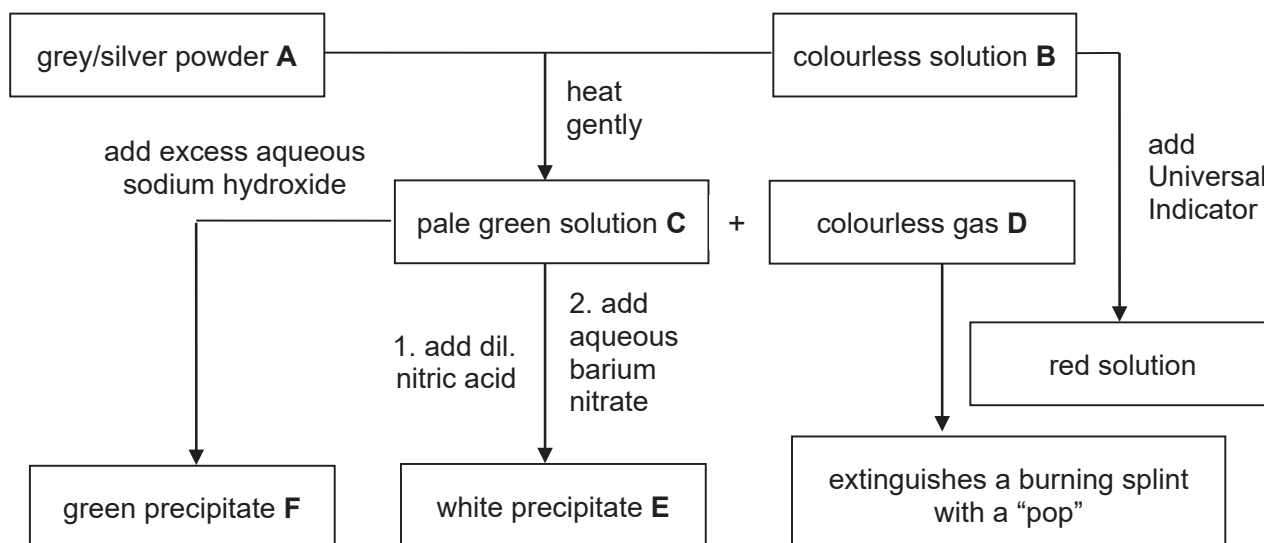


Fig. 8.1

(a) Identify unknown substances **A** – **F**.

**A:** .....

**B:** .....

**C:** .....

**D:** .....

**E:** .....

**F:** .....

[6]

(b) Write a balanced chemical equation for any one of the reactions in Fig. 8.1.

..... [2]