

Section A (45 marks)

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

- 1 The apparatus shown in Fig 1.1 can be used to separate a mixture of 3 liquids, **A**, **B** and water.

A has a boiling point of 50 °C while **B** has a boiling point of 78 °C.

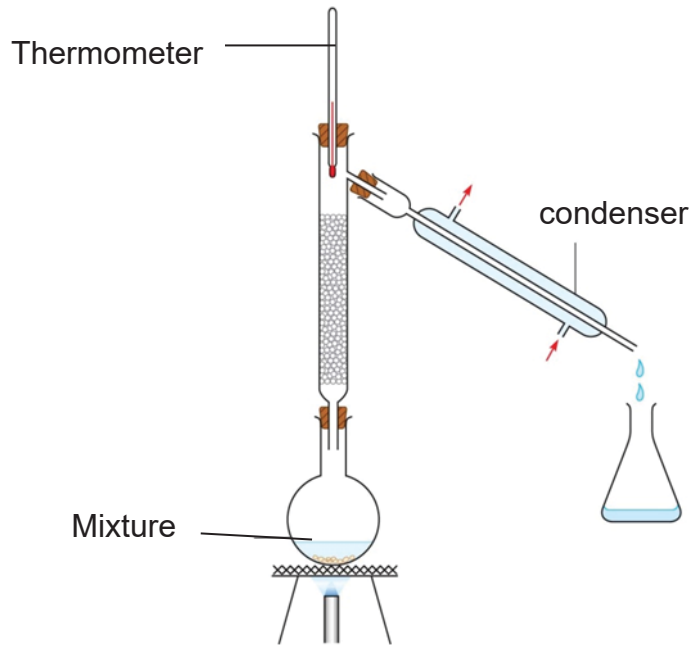


Fig. 1.1

- (a) State the name of this method of separation.

.....[1]

- (b) What is the purpose of the water in the condenser?

.....[1]

- (c) Predict the temperature of the thermometer when the first distillate appears in the beaker.

Explain why.

.....

[2]

2 Table 2.1 shows the number of protons, electrons and neutrons of five particles **Q** to **V**.

Table 2.1

Particle	Number of protons	Number of neutrons	Number of electrons
Q	5	5	4
R	7	7	10
S	8	8	8
T	9	11	9
U	10	10	10
V	16	16	16

Which of the particles, **Q** to **V** in Table 2.1, fit each of the following descriptions?

- (a) (i) an atom with mass number of 16
- (ii) a positive ion
- (iii) an atom that has 8 valence electrons
- (iv) two atoms in the same group and [4]
- (b) Particle **T** is an isotope of an element found in the Periodic Table.

Name the element and explain why **T** is an isotope of that element.

.....

.....

.....

.....[2]

3 Fig. 3.1 shows the extraction of iron from iron ore.

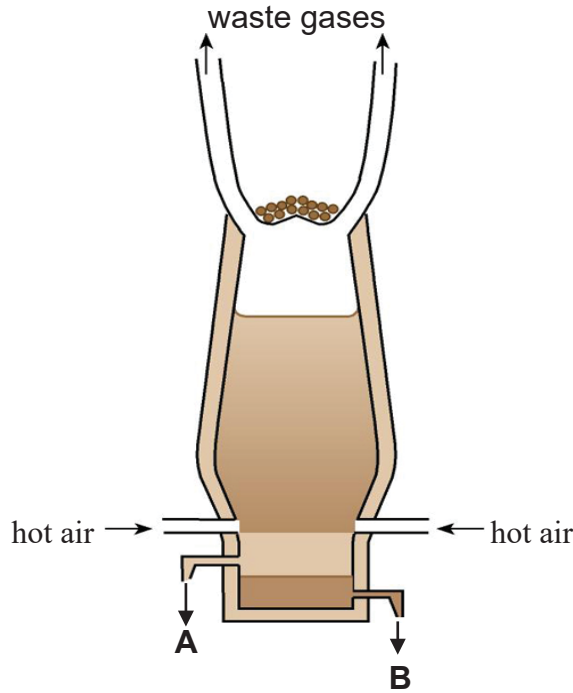


Fig. 3.1

(a) Haematite is the source of iron produced in the Blast Furnace.

(i) Name the reducing agent for the reduction of haematite.

.....[1]

(ii) With the aid of a chemical equation, describe how your answer in 3(a)(i) reduces haematite to molten iron.

.....

.....

.....

.....[3]

(iii) Besides haematite, name the other 2 raw materials that are added to the Blast Furnace.

.....[2]

(b) Name product A and state its usefulness as a substance floating above product B.

.....

.....[2]

- (c) Iron can be used to make stainless steel.

Stainless steel can be made by adding elements such as chromium and nickel to iron to improve its strength.

- (i) What is the name given to mixtures such as stainless steel?

.....[1]

- (ii) Explain, in terms of the arrangement of atoms, why stainless steel is harder than pure iron.

.....

.....

.....

.....[2]

- 4 A student titrates 25.0 cm³ an alkali of metal X, XOH, with sulfuric acid.

He realizes that 20.0 cm³ of 0.2 mol/dm³ of sulfuric acid is required to neutralize the acid fully.

The chemical equation for the reaction is shown below:



- (a) Name an indicator that can determine the endpoint of the reaction and describe the colour change seen.

.....

.....[2]

- (b) (i) Calculate the number of moles present in 20.0 cm³ of the sulfuric acid used.

..... mol [1]

(ii) Determine the concentration, in mol/dm³, of XOH used.

..... mol/dm³ [2]

(iii) If the concentration of XOH used is 12.8 g/dm³, calculate the relative mass of XOH and, hence, determine the identity of X.

Relative mass of XOH: Identity of X: [2]

(c) When XOH is added to ammonium chloride, a gas is formed.

Name the gas formed and describe how to test for its identity.

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

5 Hydrogen can form compounds with both metals and non-metals.

For example, it can form lithium hydride with lithium and also ammonia with nitrogen.

(a) What is the bonding found in lithium hydride?

.....[1]

(b) (i) Draw the dot-and-cross diagram to show the arrangement of valence electrons found in lithium hydride and ammonia in the space below.

Lithium hydride:

[2]

Ammonia:

[2]

(ii) Explain, in terms of bonding, why lithium hydride exist as a solid while ammonia exist as a gas at room temperature.

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

6 Fig. 6.1 describes the reactions of metal **A**.

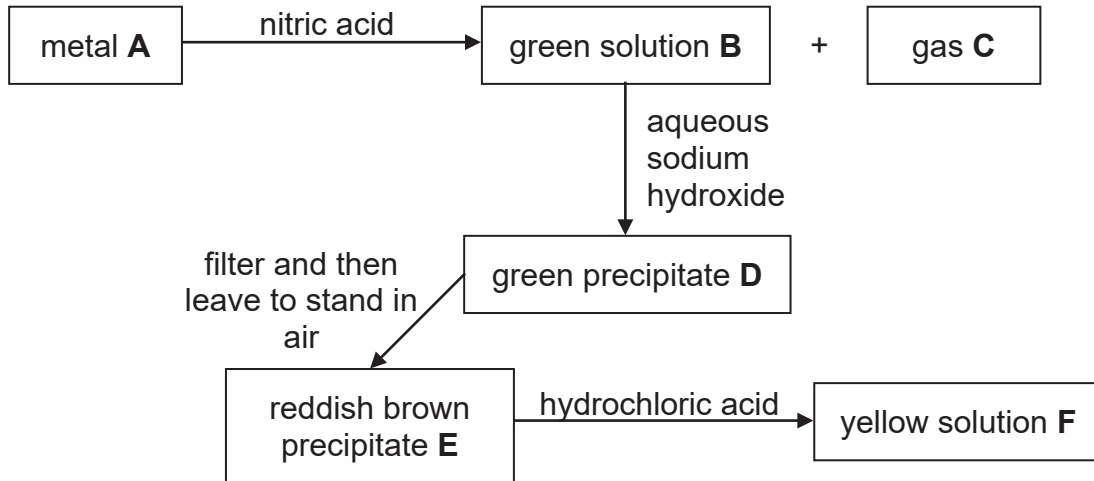


Fig 6.1

(a) Identify the following substances.

A

B

C

D

E

F

[6]

(b) Describe how to test for gas **C** that is formed in the above reactions.

.....

.....[1]

-- End of paper 3 section A --