

MAKADITA MARKING GUIDE, CHEMISTRY

PAPER 2, 545/2, 2023.

In CORRECT ANSWERS/MARKS ALLOWED SCORE.

1, (a) 21% ✓ $\frac{1}{2}$

(b) - It has a variable composition.
- Its components can be separated by physical means.
(OR EQUIVALENT)

(c) (i) $S(s) + O_2(g) \rightarrow SO_2(g)$ ✓ $\frac{1}{2}$

(ii) Sulphur burnt with a blue flame. A colourless gas with a pungent (chocking) smell was given off. $\frac{1}{2}$

TOTAL $5\frac{1}{2}$

2, (a) They are different forms in which an element can exist, without change of state. $1\frac{1}{2}$

(b) 2.8.7 ✓ $\frac{1}{2}$

(c) Group VII ✓ $1\frac{1}{2}$

(d) (i) Y^- ✓ $1\frac{1}{2}$

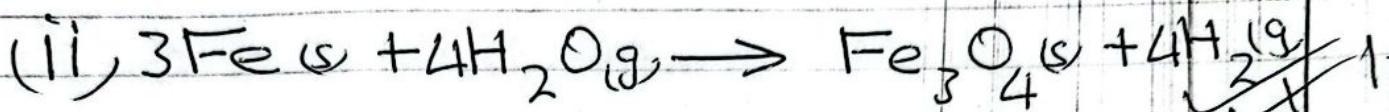
(ii) Y_2O ✓ $1\frac{1}{2}$

TOTAL $4\frac{1}{2}$

(3)(a) Heat ✓



(b) i) A blue-black solid was formed. ✓



(iii) No observable change. ✓

TOTAL

14. (a) i) There was no reading in the ammeter OR no deflection in the ammeter. ✓

ii) There was a reading in the ammeter OR There was a deflection in the ammeter. ✓

(b) The ions in the crystals were held by strong electrostatic forces of attraction. Therefore they were not free and mobile. ✓



(d) They don't react with chlorine. ✓

TOTAL

CORRECT ANSWERS / MARKS ALLOWED

SCORE

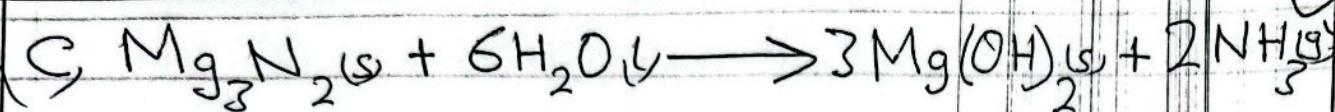
- 5, (a) The white solid changed to a solid that was yellow when hot and then back to white on cooling. 1½
- (b) $\text{ZnO(s)} + \text{H}_2\text{SO}_4\text{(aq)} \rightarrow \text{ZnSO}_4\text{(aq)} + \text{H}_2\text{O(l)}$ 1½
- (c) A white precipitate, soluble in excess to form a colourless solution. 1½

TOTAL

4½

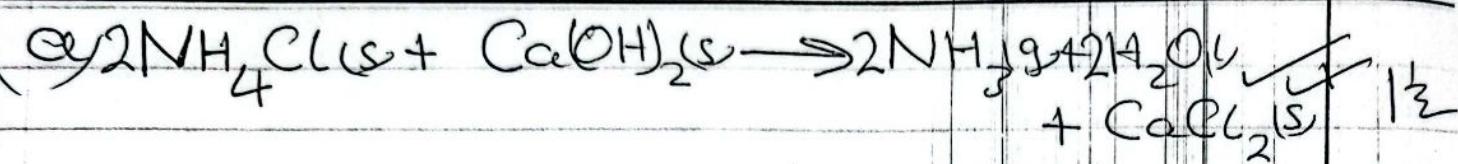
- 6, (a) The nitrogen molecule has a strong triple bond. A lot of energy is required to break the bond and release single unstable atoms which can react. 1
- (b) Burning magnesium releases a lot of energy. The energy released breaks the triple bond in the nitrogen molecules. This results in release of single unstable nitrogen atoms which can react with magnesium. 1½
- $\text{3Mg(s)} + \text{N}_2\text{(g)} \rightarrow \text{Mg}_3\text{N}_2\text{(s)}$ 1½
- P.T.O.

1 CORRECT ANSWERS/MARKS ALLOWED SC



TOTAL

5½



1½

b) Moles of NH_3 produced = $\frac{560}{22400}$ ✓
= 0.025

1 mole of NH_3 is produced by 1 mole of NH_4Cl .

Moles of NH_4Cl = 0.025 ✓

1 mole of NH_4Cl weighs $14 + 4 + 35.5$
= 53.5 ✓

Mass of NH_4Cl = $0.025 \times 53.5 = 1.337$
= $\frac{1.1337}{2.3} \times 100$ ✓
= 58% ✓

2½

By Sublimation. ✓

½

TOTAL

4½

~~CORRECT ANSWERS/MARKS ALLOWED~~

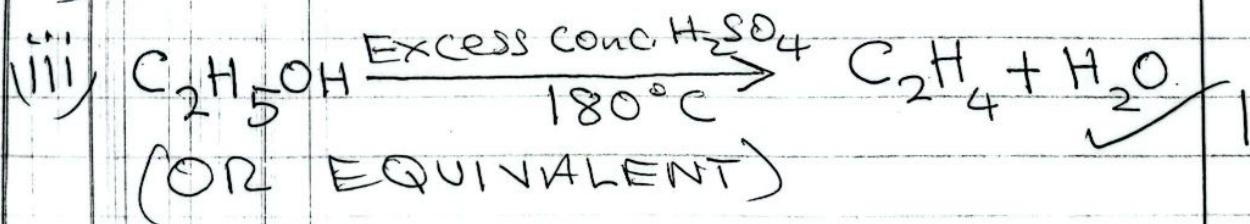
Score

8. (a) i) Cl^- or chloride ion. ✓ $\frac{1}{2}$
- i) Hydrogen chloride. ✓ $\frac{1}{2}$
- (b) $\text{H}^{(\text{aq})} + \text{Cl}^{(\text{aq})} \rightarrow \text{HCl}^{(\text{aq})}$ ✓ $\frac{1}{2}$
- (c) i) A white precipitate. ✓ 1
- (ii) $\text{Pb}(\text{NO}_3)_2^{(\text{aq})} + 2\text{HCl}^{(\text{aq})} \xrightarrow{\text{or } (\text{aq})} \text{PbCl}_2^{(\text{s})} + 2\text{HNO}_3^{(\text{aq})}$ ✓ $\frac{1}{2}$
- OR $\text{Pb}^{2+}_{(\text{aq})} + 2\text{Cl}^-_{(\text{aq})} \rightarrow \text{PbCl}_2^{(\text{s})}$

TOTAL 5

9. (a) It is the decomposition of glucose in presence of the yeast enzyme, zymase to produce ethanol and carbon dioxide. ✓ 1

- ii) Fractional distillation. ✓ 1



(b) 1 mole of ethanol weighs $12 \times 2 + 6 + 16$ ✓
 $= 46$ g

Heat produced = Heat gained by water

Heat given off by 4.5 g of ethanol = $MC\Delta Q$

4.5 g of $\text{C}_2\text{H}_5\text{OH}$ produce $100 \times 4.2 \times 25.5$ J ✓ 2

46 g of $\text{C}_2\text{H}_5\text{OH}$ produce $100 \times 4.2 \times 25.5 \times 46$ J ✓

$$\text{Heat of combustion} = \frac{4.5}{46} = \frac{109484}{109484} \text{ J mol}^{-1}$$

Qn CORRECT ANSWERS / MARKS ALLOWED



(b) Sulphurdioxide is bubbled through acidified potassium dichromate (VI) solution. The solution changes from orange to green. ✓ $\frac{1}{2}$

(c) i) Platinum. ✓ $\frac{1}{2}$



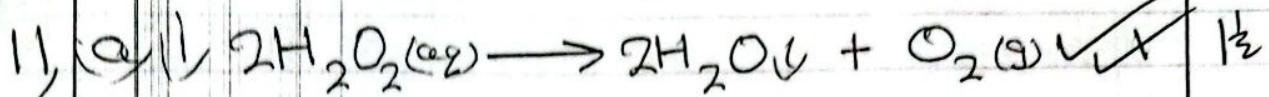
TOTAL

5

in

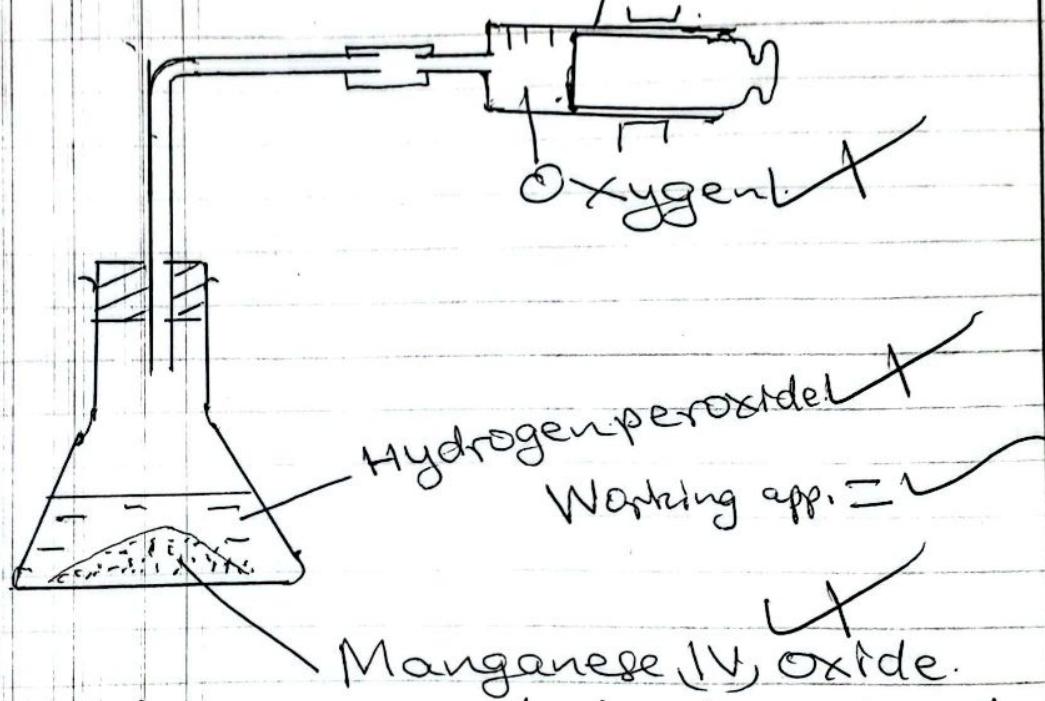
CORRECT ANSWERS/MARKS ALLOWED

Score:



- (ii) To speed up the reaction/
To catalyse the reaction. ✓ 1

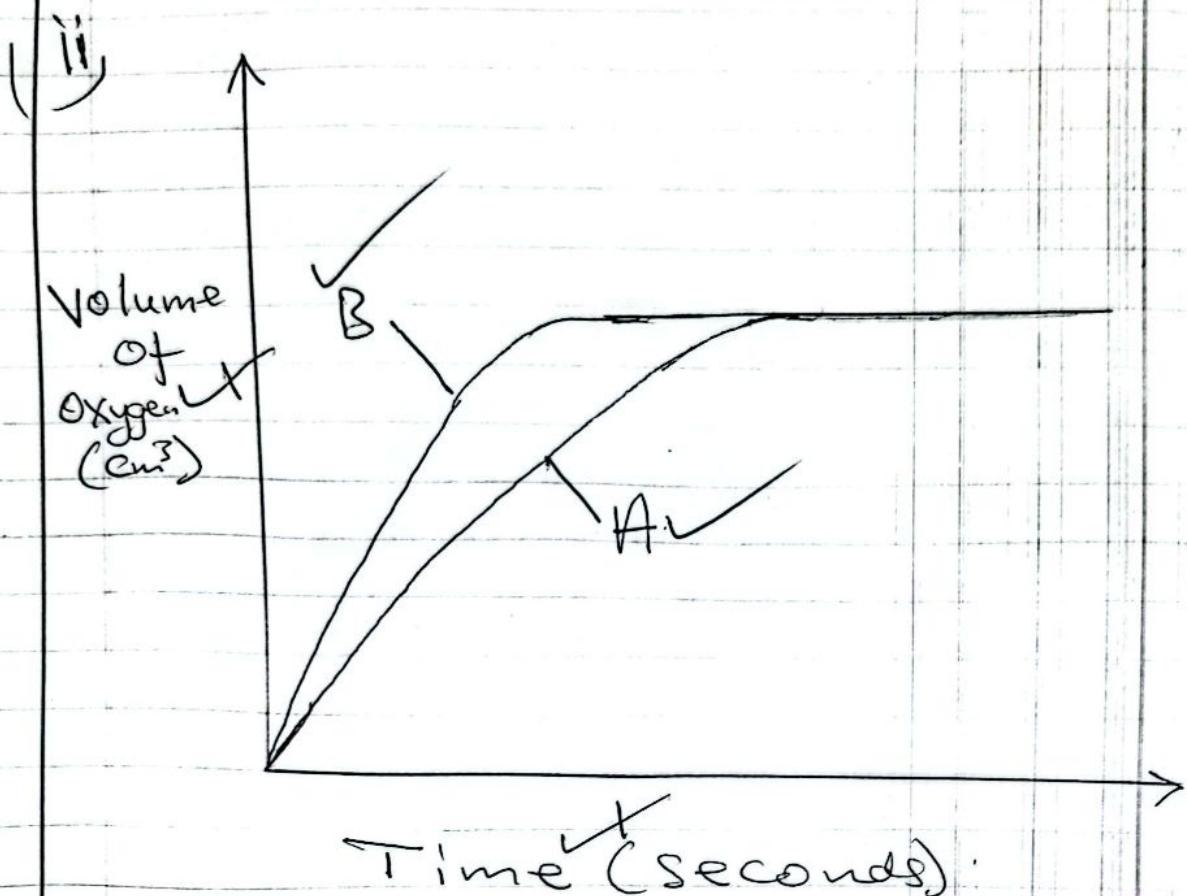
b) The apparatus is set up as shown below: gas syringe



Hydrogen peroxide is transferred into a conical flask. Some manganese(IV) oxide is added. ✓

A cork connected to a gas syringe is immediately inserted in the mouth of the flask and a stop clock is started at the same time. The volume of gas evolved is recorded at a fixed time interval and it is used to determine the rate of reaction. ✓ 6½

Qn CORRECT ANSWERS/MARKS ALLOWED



1000 cm³ of hydrogen peroxide contain 0.2 moles

50 cm³ of hydrogen peroxide solution will contain $\frac{0.2 \times 50}{1000}$ moles
= 0.01 moles ✓

Volume of oxygen given off = 0.01 × 22.4
= 0.224 dm³ ✓

TOTAL

3) Dilute hydrochloric acid is added to zinc granules in a flat bottomed flask, using a thistle funnel (or dropping funnel). The reaction takes place at room temperature.



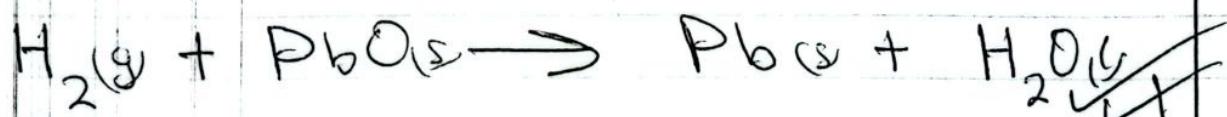
The gas produced passes through a delivery tube and is bubbled through concentrated Sulphuric acid to dry it.

It is then collected by upward delivery because it is less dense than air.

4

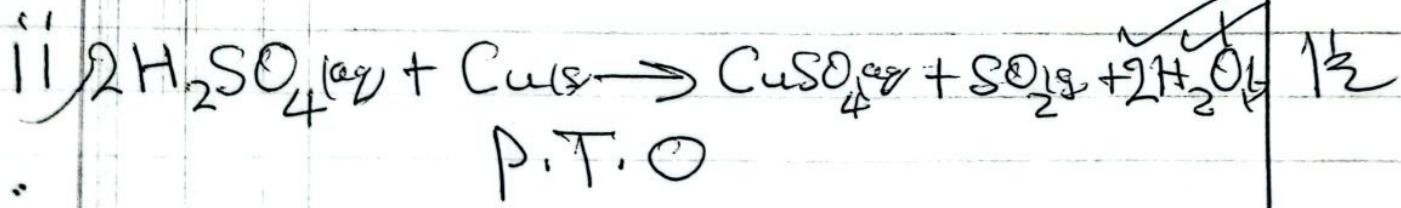
Hydrogen reduces heated lead(II) oxide to lead metal. Hydrogen is itself oxidised to water.

3



i) Sulphuric acid should be hot and concentrated

1

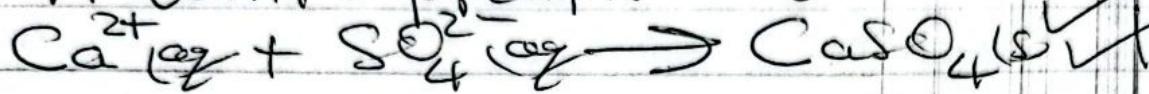


1½

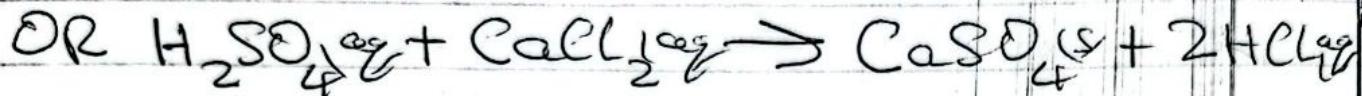
CORRECT ANSWERS/MARCS ALLOWED

SCORING

(d) A white precipitate ✓

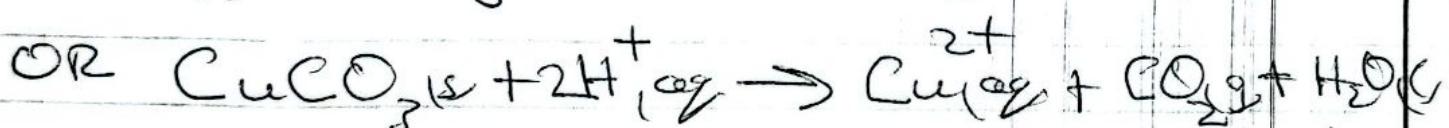


2½



(ii) The green powder dissolves
to form a blue solution.
Effervescence of a
colourless gas.

3



TOTAL

15

CORRECT ANSWERS/MARKS ALLOWED

SCORE

(a) Fats are solids at room temperature while vegetable oils are liquids. 1

(i) Cotton, Sunflower, Oil palms, Sunflower, Ground nuts etc
(Any correct one) 1

(b) It is a sodium salt or potassium salt of a long chain carboxylic acid. 1

(ii) Add sodium hydroxide solution to a vegetable oil. Boil and stir the mixture. Continue boiling and stirring the mixture until frothing stops (or all the oil dissolved). 5

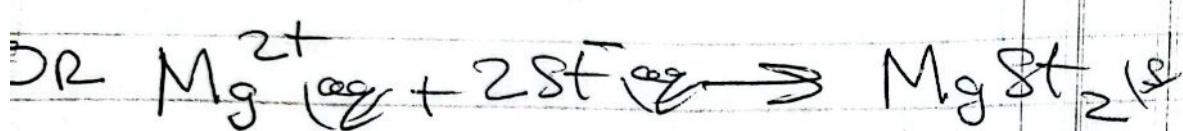
Add sodium chloride solution, boil it and stir the mixture. Allow the mixture to cool. Sodium chloride enables soap to be precipitated out of the mixture as it cools.

Filter to obtain the soap.

(c) Ca^{2+} and Mg^{2+} 2

(ii) Addition of washing soda (sodium carbonate) / Use of permelit (An ion exchange resin) / Addition of lime etc (Any one correct). 2

(d) It is a white precipitate of insoluble Calcium stearate or magnesium stearate formed when soap reacts with Calcium ions or magnesium ions in hardwater.)



i) - It leads to wastage of soap.

- The scum formed stains clothes.

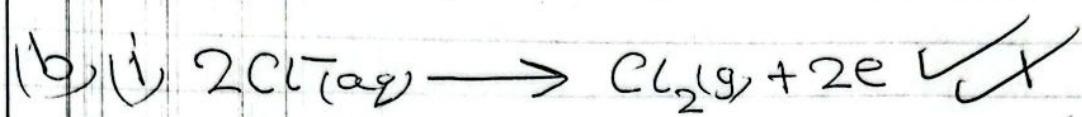
TOTAL

15

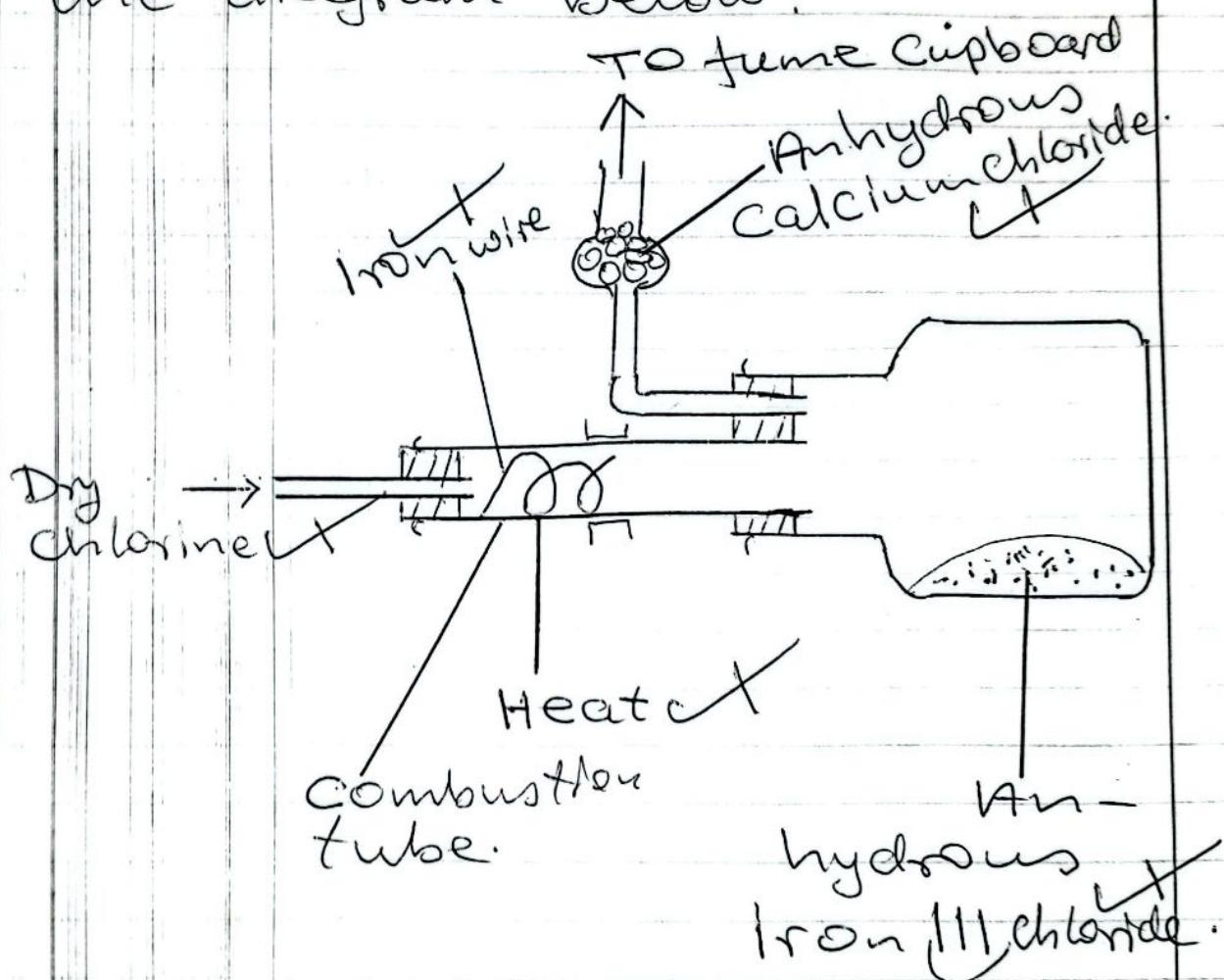
CORRECT ANSWERS/MARKS ALLOWED

Score

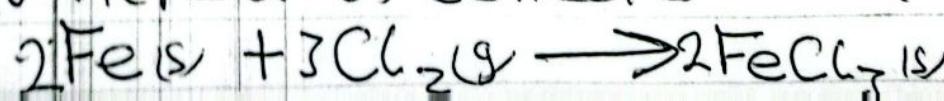
14(a) Carbon / Graphite ✓ | 1



(c) i) It is prepared as shown in the diagram below:



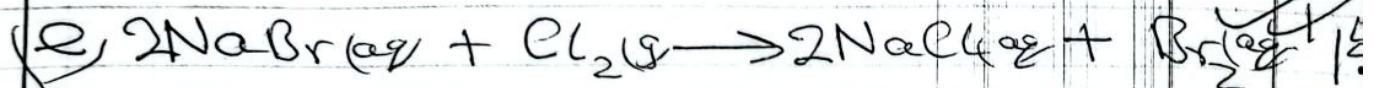
Dry chlorine is passed over a heated iron wire. The chlorine reacts with iron to form anhydrous iron(III) chloride which sublimes into the bottle where it is collected. : :



5½

Qn CORRECT ANSWERS/MARKS ALLOWED : Score

- (ii) Add dilute nitric acid followed by silver nitrate solution. A white precipitate is formed confirming presence of Cl^- ions.
- (iii) The solution changes from colourless to reddish-brown.
- (iv) A red flash and a black cloud of solid particles.
- (v) The solution changes from green to yellow/brown.



TOTAL 15

N.B.-The paper is marked out of 80 marks.

-Allow ionic equations wherever they apply.