1. a Using graphs and table 2 marks

b. (i) gloves, goggles ,lab coat 2. Marks

(ii) wash the affected part with saop and running water (plenty water)

(2 marks)

c. -recycling, icineration, use of normal and special controlled bins, use of fume chamber, reusing, land filling(burying) (2 marks)

2. a. $Ca_3(PO_4)_{2\,(s)} + 3H_2SO_{4\,(l)} \longrightarrow 2H_3PO_{4\,(aq)} + 3CaSO_{4\,(s)}$

(2 marks)

b. RMM for H_3PO_4 = 3 + 31 + 64 = 98 g

for . $Ca_3(PO_4)_2$ = 120 + 62 + 128 = 310g

if 310 g $Ca_3(PO_4)_2$ produces 196 g H_3PO_4

155000 $Ca_3(PO_4)_2$ will produce xg of H_3PO_4

$$x = \frac{155000g\ x\ 196g}{310g} = 98000g = 98\ kg$$

(4 marks)

3. a. proton donor (H^+) (1 mark)

b. bitter taste, change red litmus paper to blue, react with acids to form salt and water, pH of greater than 7, changes phenolphthalein to pink.

(2 marks)

c. i $NH_4^+ + HSO_4^-$

ii. $H_3O^+ + NO_3^-$ (4 marks)

d. It determines strength(pH) of acid/base (1 mark)

4. a. i. 14 (1 mark)

ii. 4 (1 mark)

b. i. 4 (1mark)

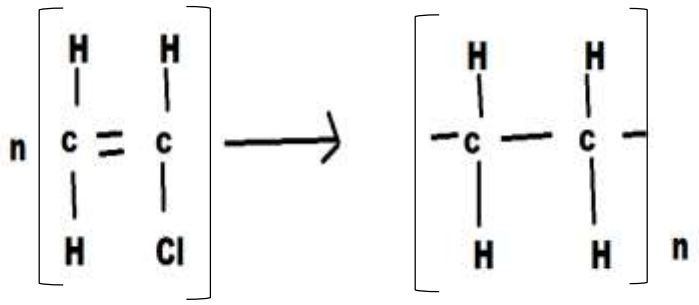
ii. it has four electrons in the outermost energy level.

5. a. Refers to the existence of organic compounds with the same molecular formula but different structural formula. (1 mark)

b. i. hex – 3 – ene (1 mark)

ii. 2,2 dimethylbutanoic acid (1 mark)

c. i



(3 marks)

ii. Synthetic polymer (1 mark)

6. a. is the existence of different forms of the same element without changing physical state. (1 mark)

b. graphite conducts electricity because every carbon atom in graphite has three electrons that take part in the covalent bonding therefore the other electron is free to move(delocalized). (2marks)

c. making jewery/reason shiny or sparkles

cutting materials/drilling/ reason it is hard (4 marks)

d. -conducts electricity when in molten or aqueous form.

-they have high melting and boiling point. (2 marks)

7. a. It absorbs UV lays from the sun (1 mark)

b. melting of ice carps in polar regions /submerging of island/expansion of deserts, formations of hurricanes and typhoons. (2 marks)

c. It is a process whereby permutit releases sodium ions which exchange with calcium and magnesium ions (cations) in hard water. (2 marks)

8. a. i. $Fe(s) \rightarrow Fe^{2+}(aq) + 2e^-$ (1mark)

ii. $Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$ (1 mark)

iii $Fe(s) + Cu^{2+}(aq) \rightarrow Fe^{2+}(aq) + Cu(s)$ (1 mark)

b. i. EMF = 0.34 V + 0.44

= 0.78 V (1 marks)

ii. Yes/because the EMF is positive

9. a. concentration in moles/dm^3 **(1 mark)**

b. -is the ratio of distance travelled by the spot of the substance to the distance travelled by the solvent. (1 mark)

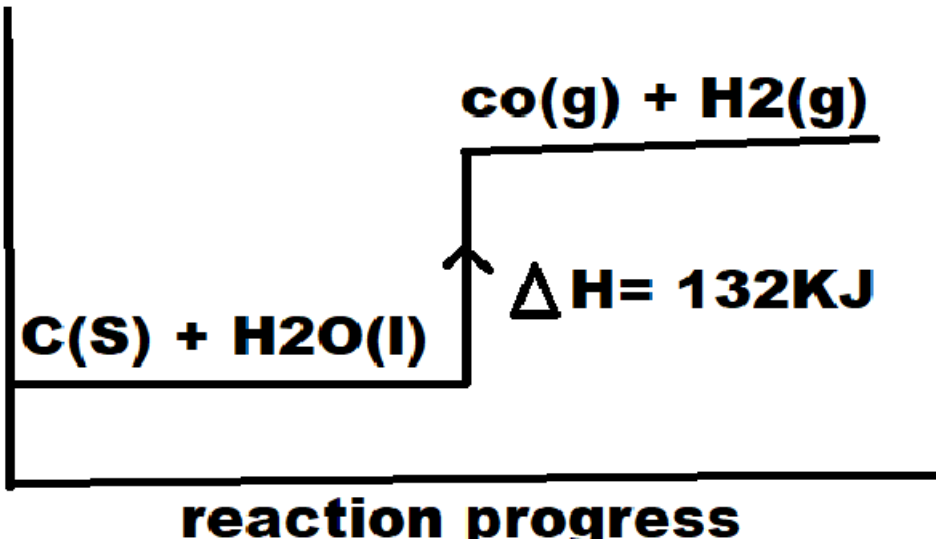
ii. changes anhydrous chloride from blue to pink when water is added

(3 marks)

10. a. the bigger the surface area the higher the rate of reaction.

(2 marks)

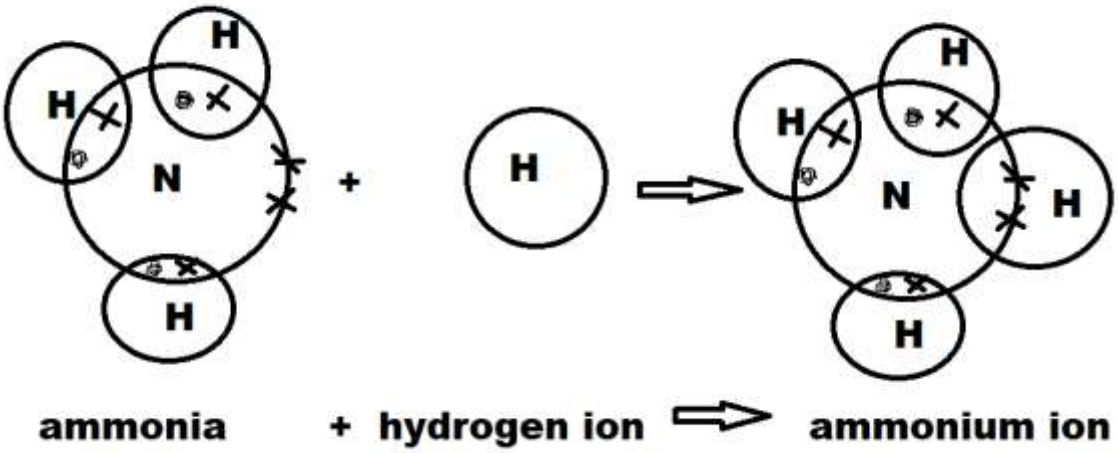
b.



b. endothermic (1 marks)

SECTION B

11 a



(3 marks)

b. No of mole of NaOH in 2M solution

= 2M X 0.1 dm3

= 0.2 moles

Mass of 0.2 moles of NaOH

= 40 x 0.2

= 8 g

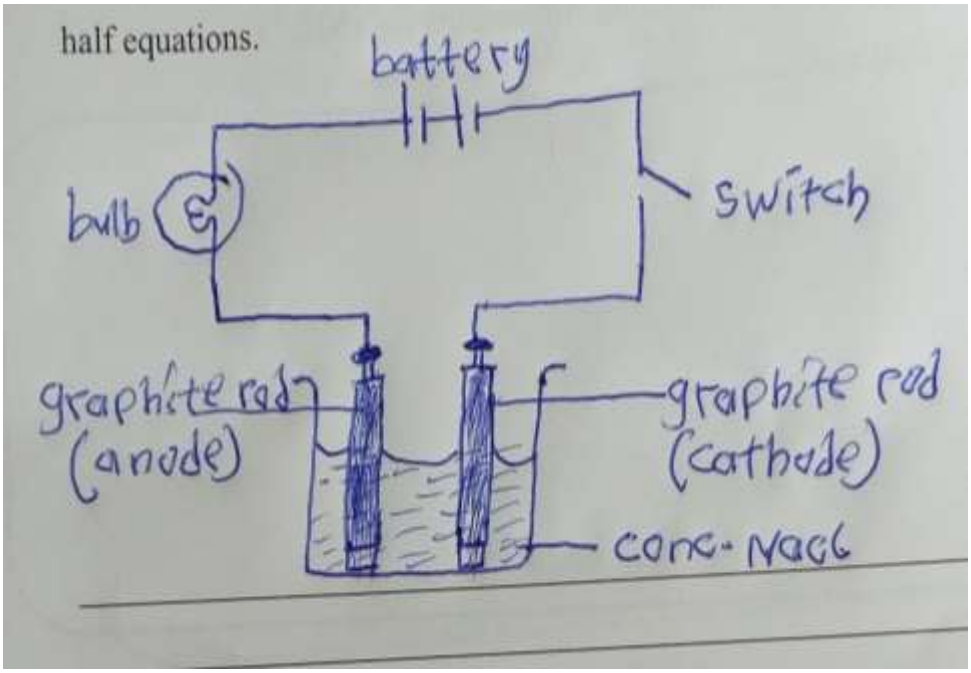
Total mass of NaOH = 8 g + 20 g

= 28 g

Resultant concentration = $\frac{mass}{Volume\ x\ Molar\ Mass}$ = $\frac{28g}{40\ g/mole\ X\ 0.5dm^3}$ = 1.4 M

(7 marks)

12.



The ions present in solution are $Na^{+}cl^{-}$ from salt and H^{+} and OH^{-} from the water.

When the switch is closed, the electrons move from negative terminal of the battery to the cathode.

At the cathode, the H^{+} accepts electrons since hydrogen is less reactive than sodium. The equation for the reaction is

$2H^{+}_{(aq)} + 2e^{-} \longrightarrow H_{2(g)}$ .This is reduction.

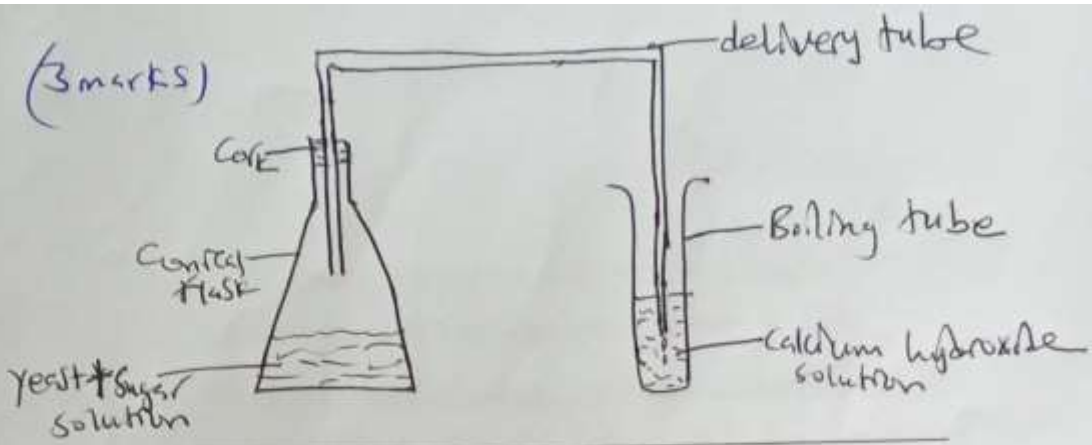
The hydrogen gas bubbles off.

At the anode, the cl^{-} ions give up electrons more readily than the OH^{-} ions do. According to the following equation.

$2cl^{-}_{(aq)} - 2e^{-} \longrightarrow cl_{2(g).}$ This is oxidation. The chlorine gas bubbles off.

13

(3marks)



(4 marks) Ethanol is prepared in the laboratory by fermentation of glucose or any sugar solution using yeast. The sugar solution mixed with yeast is placed in a conical flask. Connect a delivery tube with a tight fitting cork onto the conical flask and boiling tube containing Calcium hydroxide solution. Then the mixture is kept in an undisturbed place for 3-4 days. After 4 days, pure ethanol is obtained by fractional distillation of the mixture formed.

(7 marks)

b) Write the chemical equation for the reaction above. (3marks)

$C_6H_{12}O_{6(aq)} \xrightarrow{yeast} 2C_2H_5OH_{(g)} + 2CO_{2(g)}$

Glucose — Ethanol — Carbon dioxide