FORM FOUR CLUSTER KCSE MODEL9

CHEMISTRY PAPER 2 ANSWERS

1. a)

F-Alkline –earth metals.√

C-Halogens√

b)

i) Ionic bond/electrovalent bond√

ii) Metallic bond/covalent bond/Dative covalent bond.

c)

i) 3 232 / O AlOD √

ii) Amphoteric oxide √

d)

i) X should be placed in the between next and on the left of E

X	E

ii) 3 5 /xClXCl √

e) 2 periods.

f)

i) Both are conductors of electricity.√ Both have high M.P and B.P due to their giant √ structure.

ii)

-Low melting/boiling points

-Poor conductors of heat and electric

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- Most of them occur in gaseous state

iii) Iodine Sulphur Phosphorous

2.

a) i) Sodium hydroxide √ 1/potassium hydroxide accept also correct formulae.

ii) Air is warmed, boiling, raising temperature above √ 1-196^0 C fractional distillation, nitrogen comes out first (1) as it has a lower boiling point √1

b) i) Hydrogen / H_2 √1

ii) So that all ammonia can be converted into √ gas Q/ stop pollution of air by NH_3 √1or increase NO / Q or completed oxidation of NH_3 /increase yield of NO / Q.

iii) No /nitrogen (II) oxide

iv) $NH_{3(g)} + HNO_{3(aq)} \rightarrow NH_4NO_{(aq)}$

v) -as fertilizer
-manufacture of explosives any one

c) Sulphur dissolves, yellow colour √½ dissolves, Brown gas √½ NO_2 sulphur is oxidized by nitric acid to SO_2 √1

3.

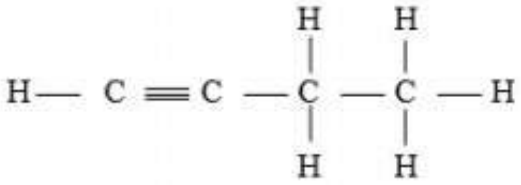
a) i) $C_4H_x \Rightarrow 54 - (12 \times 4)$

$\times \Rightarrow 54 \quad 48 = 6$

C_4H_6 √

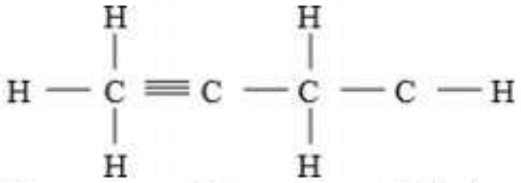
alkyne

ii)



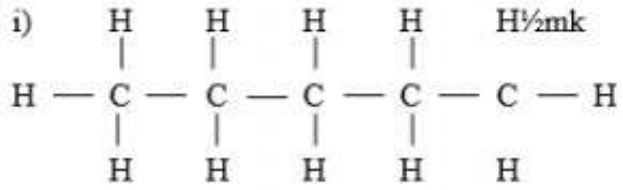
but -1 – yne √½

2marks



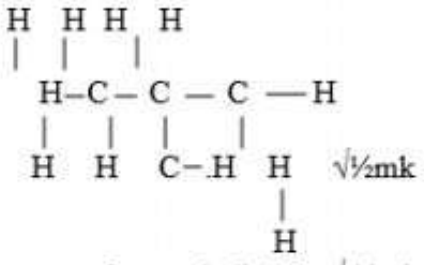
√½ but – 2 – yne √½mark

b) i)



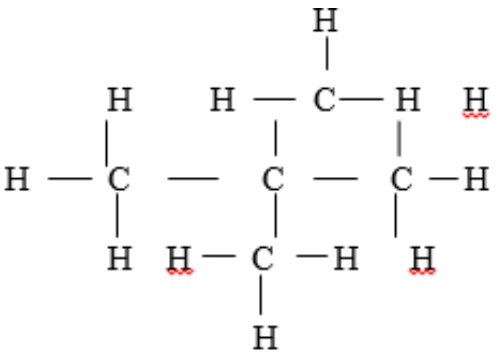
H½mk

Pentane √½mk



√½mk

2 – methylbutane√ ½mk



√½MK 2, 2- dimethylpropane

ii) -Increase in the number of carbon atoms √

-Increase in the intermolecular forces/van der waals√ (2marks)

c) i) Methane and Carbon (IV) oxide √√

ii) Has methane that burned√ (2marks)

4. a)

i) Ammonia √½

ii) Carbon (IV) oxide √½

iii) Carbon/coke/Graphite/Diamond √½

iv) Calcium oxide √½

v) Ammonium chloride √½

vi) Sodium hydrogen carbonate√½

b) i) **Chamber I**

$$CaO_{(s)} + H_2O_{(l)} \rightarrow Ca(OH)_{2(aq)}$$

B.B +S.S- award fully

B.B-S.S- penalize ½mark

S.S-B.B-penalize fully

Chamber II

$$2NH_4Cl_{(aq)} + Ca(OH)_{2(aq)} \rightarrow 2NH_{3(g)} + CaCl_{2(aq)} + 2H_2O_{(l)}$$

(Allow rules of balancing equation)

c) -Used as a drying agent when in anhydrous form gases that do not react with it.
-Used during extraction of sodium chloride to lower the melting point of electrolyte from 800 ^{0}C to 600^0 C.(award 1 mark for any one above)

d) Ammonia.
Carbon (IV) oxide.

e) -Glass making.
-In pulp and paper industry.
-Manufacture of sodium silicate
-Water softening.
-Cattle lick. (Any two above, award 1 mk)

f) i) Excess supply of oxygen/air √1
ii) Limited supply of oxygen/air √1
iii) Bubble each gas separately through calcium hydroxide solution √1 carbon (IV) oxide forms a white precipitate while Carbon (II) oxide does not √1

5.

a) i) Solution A.
Name sodium hydroxide √½
Formula $NaOH$ √½

ii) Zinc hydroxide √½
Formula: $Zn(OH)_2$ √½

b) i) $Zn_{(s)} + H_2SO_{4_{(aq)}} \rightarrow ZnSO_{4_{(aq)}} + H_{2_{(g)}}$

B.B +S.S- award fully
B.B-S.S- penalize ½mark
S.S-B.B-penalize fully

ii) $Zn(OH)_{2_{(s)}} + 2HCl_{(aq)} \rightarrow ZnCl_{2_{(aq)}} + 2H_2O_{(l)}$

c) Introduce a burning splint to the gas √½ It burns with 'pop' sound√½.

d) -Sodium metal darts on the surface of the water.
-A hissing sound is produced√½

e) i) Heat solution E over a water bath to evaporate excess water ; when crystals are almost forming remove from fire and leave it cool slowly√1

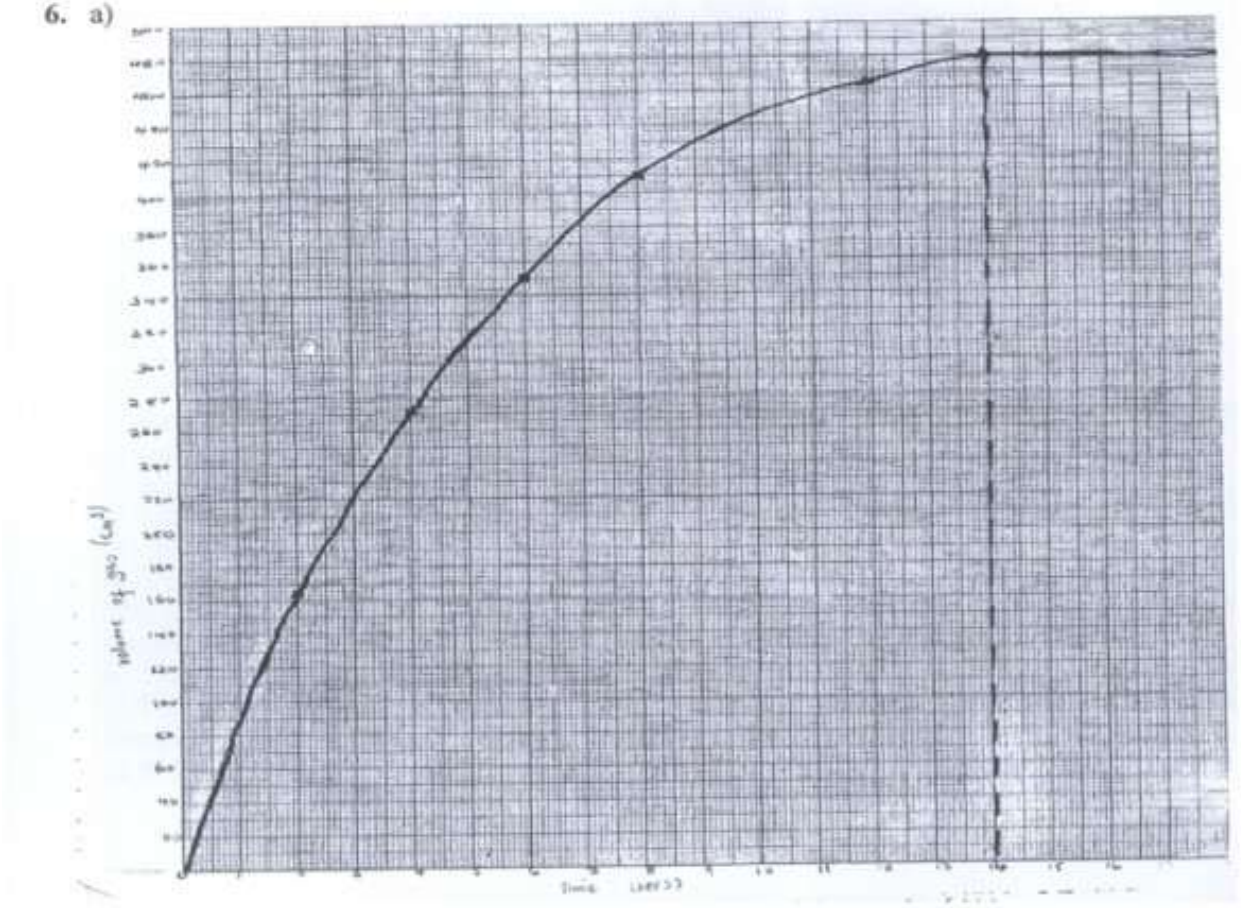
ii) Heat the solution directly until all the water has evaporated to remain with a white powder of Zinc chloride√1

f) $Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2_{(aq)}} + H_{2_{(g)}}$

6.

a)

6. a)



i)14 minutes √½ (showing of the graph √½)

ii) Carbonate was used up/consumed √1

iii) $480cm^3$ √1

b) i) $MCO_{3(s)} + 2HNO_{3(aq)} \rightarrow m(NO_3)_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$

B.B +S.S- award fully

B.B-S.S- penalize ½mark

S.S-B.B-penalize fully

ii) If 480 cm^3 given by 2.5 g√1

24000cm^3 will be given by

$\frac{24000}{480} \times 2.5$ √½

$= 125g$

iii) $MCO_{3(s)} = 125g$

$M + 12 + 48 = 125g$ √½

$M = 125 - 60$ √½

$M = 65$

7. a) i) Sodium burns vigorously in air with a yellow flame forming a pale yellow solid.√1

Equation

$2Na_{(s)} + O_{2(g)} \rightarrow Na_2O_{2(s)}$ 1mark

ii) *Observation*

Effervescence is produced and that relights a glowing splint is produced.
The solution formed turns red litmus paper blue.√1

Equation

$2Na_2O_{(s)} + 2H_2O_{(l)} \rightarrow 4NaOH_{(aq)} + O_{2(g)}$ 1mark

iii) The heated sodium bursts into a bright yellow flame. 1mk

$2Na_{(s)} + Cl_2 \rightarrow 2NaCl_{(s)}$ 1 mk

iv) The sodium darts about on the surface of water, producing effervescence and melts into a ball. (½mark)

$2Na_{(s)} + 2H_2O_{(l)} \rightarrow 2NaOH_{aq} + H_{2(g)}$ ½mk

b) This is the minimum energy required to remove an electron from it in the gaseous state.½mk

c) i) The first electron removed from a sodium must be in its outermost level.√½
This is because the ionization energy is much lower compared to the others which compare more closely√½The electron is furthest from the attraction of the nucleus. √½mk

ii) The first two electrons removed from magnesium atom must be its outermost energy level.√½The ionization energies are relatively lower than the other ionization energies which compare closely.√1mk

iii) $(1500 + 7700 + 10500)kJ = 19,700kJ$