FORM FOUR CLUSTER KCSE MODEL6

CHEMISTRY PAPER 1 QUESTIONS

1.Temporary water hardness can be removed by boiling

a) What is hard water? (1mark

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b)Write a chemical equation to show how temporary hardness is removed by boiling. (1mark)

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c)State one advantage of hard water. (1mark)

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2.a) State Charles' law. (1mark)

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b)One mole of gas at stp was warmed and the temperature rose by 2730 C.Calculate its new volume at the same pressure in cubic centimeters. (MGV=22.4 litres) (2marks)

3.When powdered sodium carbonate is added to a solution of Aluminium chloride, what observation would be made? Explain using an equation.

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4.a) State Graham's law. (1mark)

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b)Calculate the relative molecular mass of a gas x which diffuses 1¾ times slower than methane. (C=12, H=1) (2marks)

5.a) Give the name of the 6th member of the alkyne family. (1mark

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b)Write the name and the structural formular of the compound formed between the fourth member of the organic compound whose general formula is CnH2n+1 OH and propanoic acid in the presence of conc' 4 2SOH (2marks)

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6.The table below show the ionic radii & atomic radii at some elements P, Q, R and S.

Elements.	Atomic radii	Ionic radii.
P	0.064	0.136
Q	0.099	0.181
R	0.114	0.915
S	0.133	0.216

a)(i) Are the elements metals or non-metals? Explain. (1mark)

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(ii) State and explain the most reactive element. (1mark)

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b)Aluminium, sodium and magnesium are all metals. State and explain the metal with the highest melting point. (1mark)

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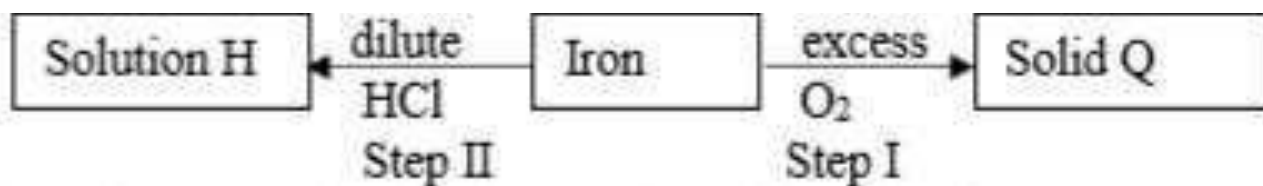………………………………………………………………………………………………

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7.a) Describe precisely how one can chemically distinguish between solid sodium sulphate and solid sodium chloride. (2marks)

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b) How can one chemically distinguish between sodium hydroxide solution and calcium hydroxide   solution?   (1mark)
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8.

a) Write an equation for the reaction taking place in step I. (1mark)

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b) A few drops of 20 volumes of Hydrogen peroxide is added to a solution H. State and explain the observation made. (2marks)

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9. Pentane and Ethanol are miscible. Describe how water can be used to separate a mixture of pentan and ethanol. (...

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10. Explain what will be observed when hydrogen sulphide gas is passed through acidified potassium dichromate solution.)

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11. a) 18.7 cm3 are dibasic acid H2A required 25cm3 of 0.1M sodium hydroxide for complete neutralization. How many moles of sodium hydroxide are contained in 25cm3? (1mark)

b) Calculate the molarity of the dibasic acid. (2marks)

12.a) Chlorofluorocarbons are used in the manufacture of acrosils. State one factor which makes chlorofluorocarbon serious gaseous pollutants. (1mark)

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Sulphur is one of the impurities in petrol. State and explain the environmental effects associated with it? (2marks) ....

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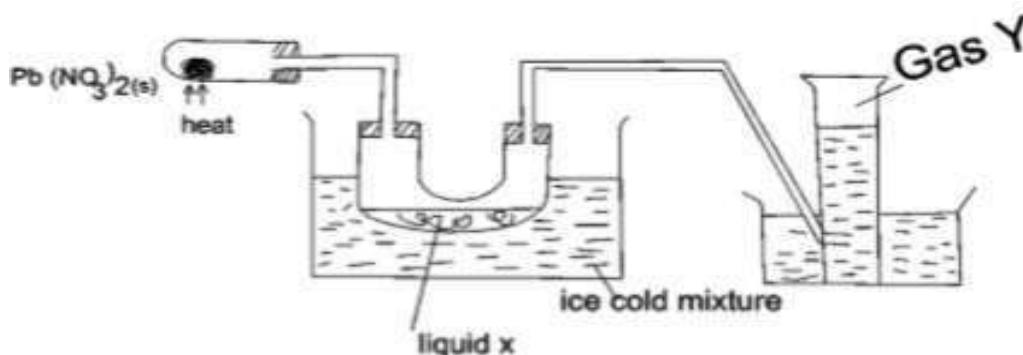
a)Name: (2marks

i) Liquid X ....

ii) Gas Y ....

b)When lead (II) nitrate crystals are heated they undergo a reaction. Name the type of reaction they undergo. (1mark) ....

14.(i)Using dots and crosses to represent valency electrons draw structures to show bonding in products formed:

(i) When carbon is burnt in limited air. (1mark)

(ii)When carbon is burnt in excess air? (1mark)

15.a) Define the solubility? (1mark)

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b) Calculate the mass of the crystals formed if a saturated solution of potassium chlorate in 50g of water at 500 C is cooled to 250 C given that solubility of 3 KNO at 500 C and 250C is 70g/100g water and 38g/100g water respectively. (2marks)

16. What is the difference between a deliquescent and a hygroscopic substance?

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17. The table below shows physical properties of some substances. Use the information to answer the questions that follows:

i)Which of the elements is a liquid at room temperature? Explain. (1mark)

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Substance	Density g/m³	MPC⁰ C	BPC⁰ C	Electrical conductivity	
				Solid	Liquid.
M	3.5	801	1413	Poor	Good
O	0.8	-114	-84.9	Poor	Poor
P	3.8	3550	4827	Poor	Poor
Q	21.4	-39	357	Good	Good
R	1.53	660	2470	Good	Good

i)Which of the elements is a liquid at room temperature? Explain. (1mark)

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ii)Identify the type of structure in P and R. (1mark)

iii) Which element would be the most suitable for use in overhead electric wire transmission? explain. (2marks) ....

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18. i) Give two properties of carbon (IV) oxide that makes it suitable for use in extinguishing fire? (2marks)

a) ....

b) ....

ii) Explain why solid carbon (V) oxide is preferred as a refrigerant than normal ice. (2marks)

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19. (a) Define an acid. (1mark)

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(b) Dilute sulphuric VI acid is a strong acid while 18 M 4 2SOH is a concentrated acid. Distinguish between the terms strong and concentration. (2marks)

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20. Starting with copper metal describe how you can prepare copper (II) sulphate crystals...

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21. Ethanol dissolves in both acetone and water. Explain this using structure and bonding.

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22. The table below shows results obtained from an experiment carried out on a certain salt solution X.

| Experiment	Results
1. A few drops of barium nitrate added to solution M.	No white precipitate.
2. A few drops of lead (II) nitrate added to solution M	White precipitate.
3. Ammonia solution added dropwise until in excess.	White precipitate which dissolves in excess forming a colourless solution.

a) Identify the cation and anion in solution M. (2marks)

Cation...

Anion...

b) Write an ionic equation for the formation of a white precipitate in experiment II. (1mark)

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c) Write the formulae and the name of the ion responsible for the formation of a colourless solution in experiment 3. (1mark)

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23. Dry Ammonia gas was passed over hot copper (II) oxide and iron metal arranged as shown below
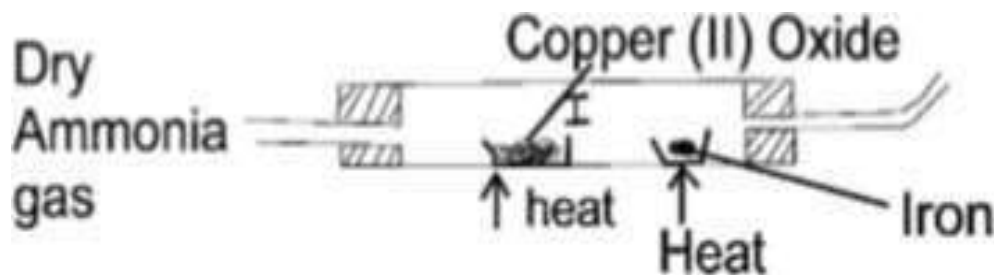
a) State observations made in. (1mark) Boat I

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b)Write a balanced equations for the reaction in boat (II). (1mark)

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c)Explain why the experiment should be done in a fume chamber. (1mark)

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24.. A certain polymer has the following structure.
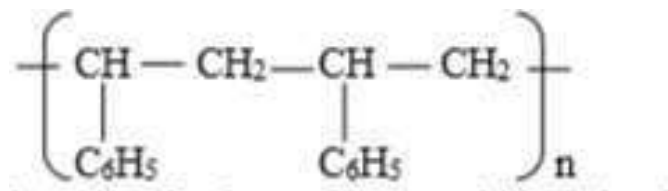
a)Name the type of polymerization exhibited by the above structure. (1mark)

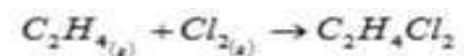……………………………………………………………………………………………….

b)Draw the structure of the monomer. (1mark)

c)If the molecular mass of the polymer is 20,800.What is the value of n(C=12,H=1) (1mark)

25. The following is a list of bond energies.

Bond	Energy
C—C	348 kJ mole^{-1}
C=C	612 kJ mole^{-1}
Cl—Cl	242 kJ mole^{-1}
C—Cl	338 kJ mole^{-1}
C—H	413 kJ mole^{-1}

a)Using this bond energies calculate the enthalpy change for the following reactions.

$$C_2H_{4(g)} + Cl_{2(g)} \rightarrow C_2H_4Cl_2$$

b)What is fuel? (1mark)

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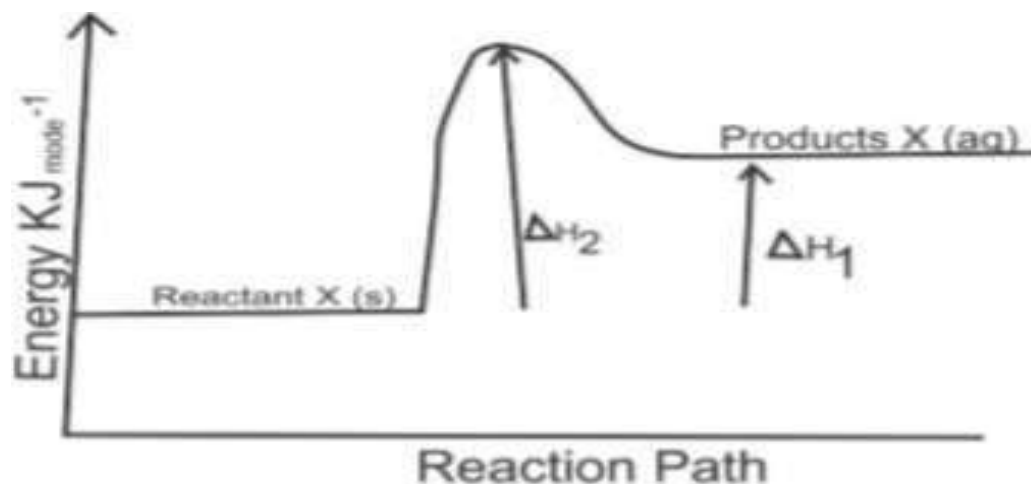
26. In an experiment 6.25 g of calcium carbonate were reacted with 50cm3 of 2M hydrochloric acid. Determine the volume of the carbon (IV) oxide evolved measured at r.t.p. (Ca

=40,C=12,O=16,M.G.V at R.t.p=24dm3)

27. Use the energy level diagram below to answer the questions that follow.

(a) Identify the type of energy (enthalpy) change represented by: (i) H1

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(ii) H2 (1mk)

(b) Name the type of reaction represented by the diagram above. (1mark)