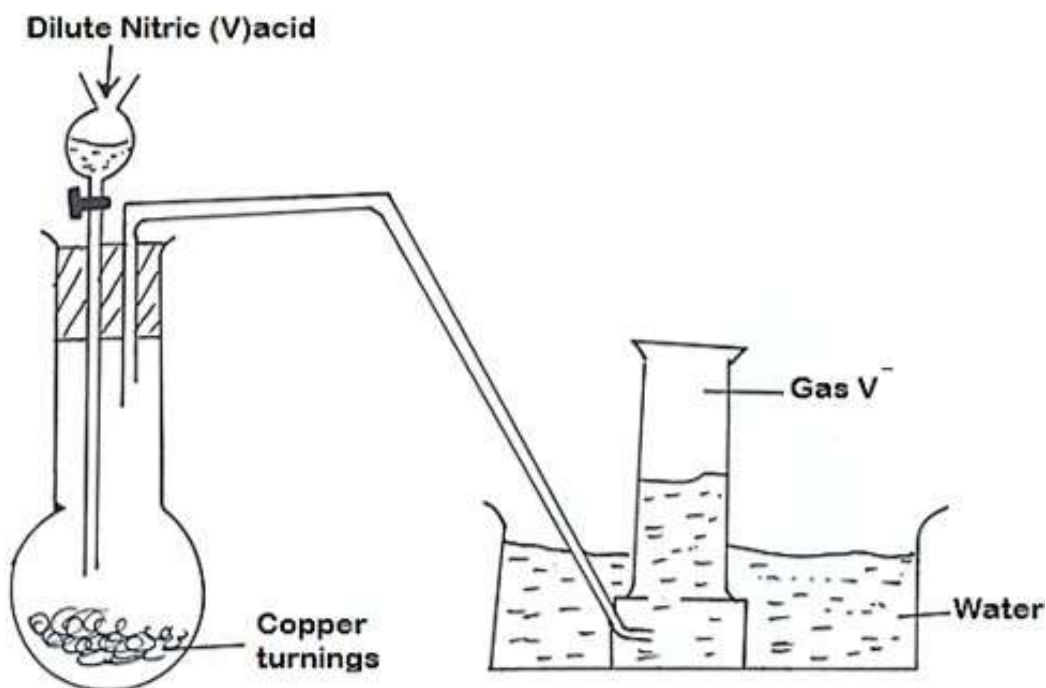


FORM FOUR CLUSTER KCSE MODEL1

PHYSICS PAPER 2 QUESTIONS

1. (a) In an attempt to prepare nitrogen (IV) oxide a student set –up the apparatus shown below. She realized that a colourless gas was collected instead.



- i) Identify: I. One mistake in the set up.

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II. GasV

- ii) State and explain the observation made when gas V was bubbled through a solution of Iron (II) sulphate.

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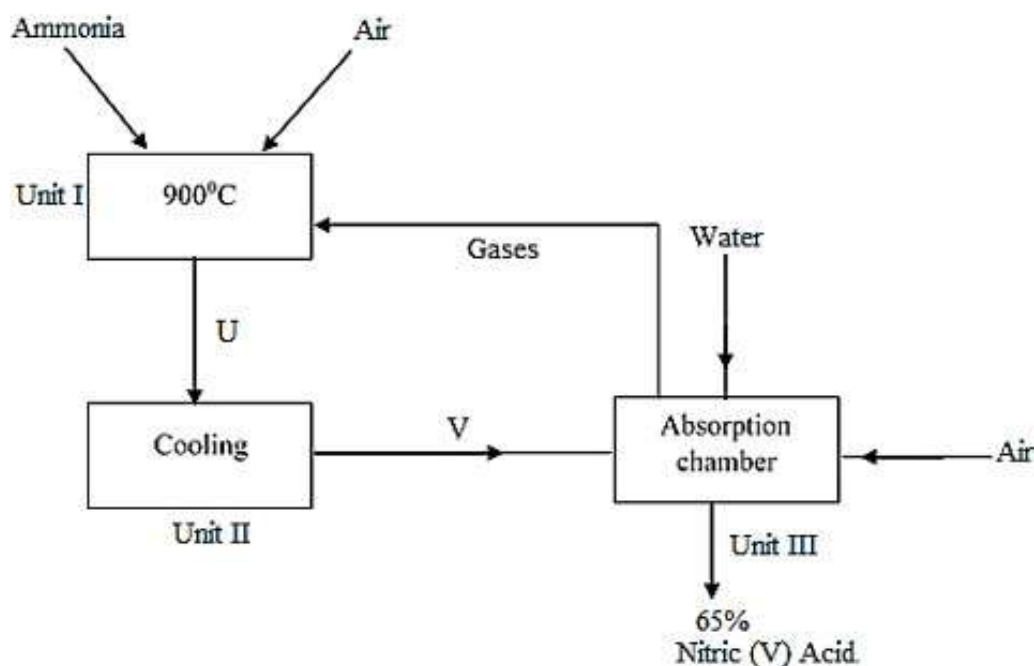
- iii) A gas jar full gas V was opened in air. Explain the observation made by use of an equation.

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- b) The flow chart below represents manufacture of Nitric (V) acid.



i) Identify substances U and V.

U.....

V.....

ii) Name a suitable catalyst for this process and identify the unit where it is used.
Catalyst.....

Unit.....

iii) Give a reason why nitric (V) acid is stored in dark brown bottles.

.....
.....

iv) Ammonia is reacted with sulphuric (VI) acid in the manufacture of a fertilizer. Calculate the volume of ammonia required at r.t.p to produce 330kg of the fertilizer (MGV= 24.0dm³ N=14, H=1 S=32, O=16).

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2. a) Give the names of the compounds:

i) HCCCH₂CHCH₃CH₃

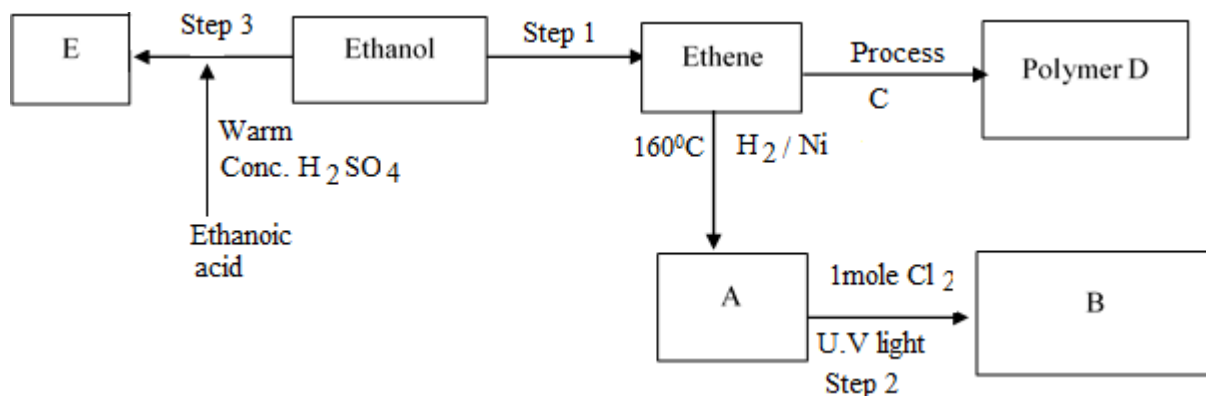
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ii) CH₃CH₂COOCH₂CH₂CH₃

.....

b) Describe a chemical test that can be used to distinguish between but-1-ene and propane.

c) Study the flow chart below and answer the questions that follow.



i) Name the compounds:

E.....

A.....

ii) Give the reagent and condition used in step I.

.....

iii) State the type of reaction which takes place in

(I) step 2.....

II) Step 3.....

iv) Draw the structural formula of compound B.

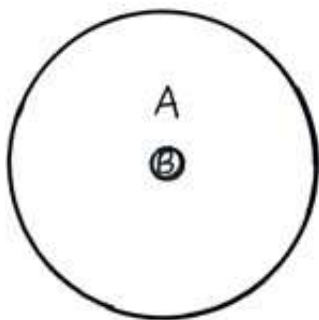
v) I) Give the structure of polymer D showing two repeat units.

.....

II) Explain the effect of continued use of polymer D.

.....

3. a) The diagram below represents an atom.



State one similarity and one difference between the particles found in region B.

.....

.....

b) The table below gives the number of sub –atomic particles in the atoms of M, N, P, Q, R, S, T, and U.

U.

Atom	Electrons	Protons	Neutrons
M	10	8	8
N	10	13	14
P	17	17	18
Q	10	12	12
R	10	10	12
S	6	6	8
T	6	6	6
U	18	19	20

i) What is the mass number of N?

.....

.....

ii) Which particle is likely to be

I) A noble gas?.....

II) A halogen?.....

iii) Name the type of bond formed between M and Q.

.....

.....

iv) Write the formula of the compound formed when N and P combine. (1mark)

.....

v) Using a dot (•) and cross (X) diagram, show bonding in the compound formed between S and P.

.....

.....

vi) Which of the particles are likely to represent isotopes? Give a reason

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.....
.....
.....

vii) How does the atomic radii of N and Q compare? Explain.

.....
.....
.....
.....

viii) To what group and period does element U belong?

Group

4. a) What is meant by latent heat of fusion?

.....
.....

b) Below are standard enthalpies of combustion of hydrogen, graphite and enthalpy of combustion of propane.

$$\Delta H_c^\ominus(\text{graphite}) = -393 \text{ kJ mol}^{-1}$$

$$\Delta H_c^\ominus(\text{H}_{2(\text{g})}) = -286 \text{ kJ mol}^{-1}$$

$$\Delta H_c^\ominus(\text{C}_3\text{H}_{8(\text{g})}) = -2184 \text{ kJ mol}^{-1}$$

i) Write the equation for the formation of propane

.....
.....

ii) Draw an energy cycle diagram that links the heat of formation of propane with its heat of combustion and heats of combustion of graphite and hydrogen.

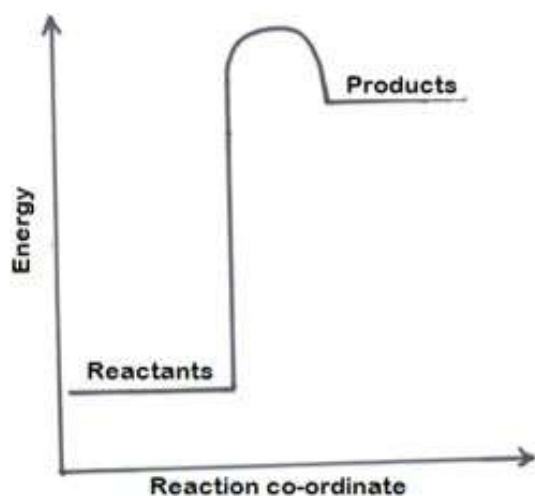
iii) Using Hess' Law determine the standard heat of formation of propane.

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c) The enthalpy change obtained when 1 mole of dilute nitric (V) acid and 1 mole of dilute hydrochloric acid are neutralized was found to be -57.2 kJ, while that of ethanoic acid is -55.2 kJ. Explain the difference

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.....
.....

d) In the diagram below, show the activation energy (E_a) and the heat of reaction (ΔH_r)



e) Some bond energies are shown below

Bond Type Average bond Energy

Br – Br 192

H - Br 368

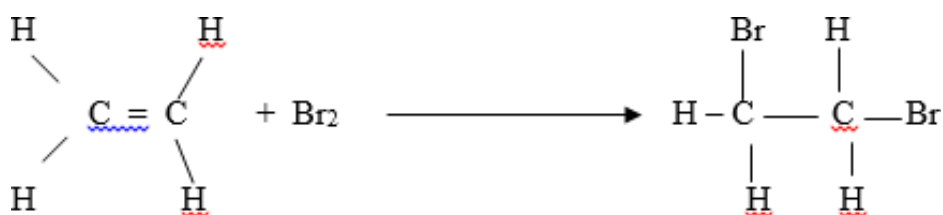
C - C 347

C = C

C - H 413

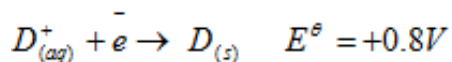
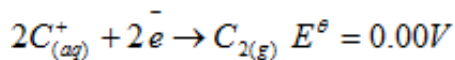
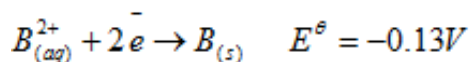
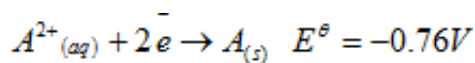
C- Br 288

Use the bond energies to determine the enthalpy change for reaction:



.....

5. a) Use the following standard electrode potentials to answer the equations that follow.



i) Which half-cell is likely to be hydrogen? Give a reason.

.....

ii) The standard $E^{\ominus}$ value for copper is +0.34V.

Explain what would happen if solution of copper (II) sulphate was stored in a container made of metal A.

.....

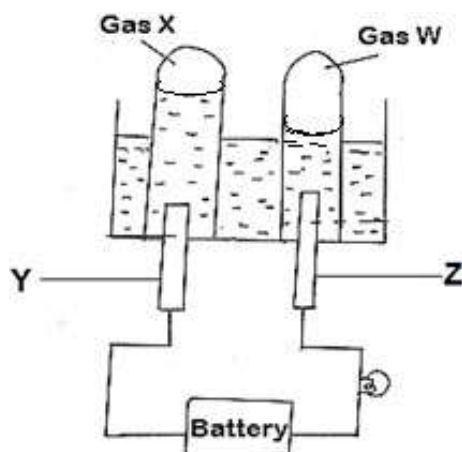
iii) Calculate the e.m.f of a cell formed between Half –cell B and D

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iv) Write the cell representation of the cell in (iii) above.

.....

b) The set-up below was used during electrolysis of dilute sulphuric acid solution.



Gas X was found to relight a glowing splint.

i) Identify gas W.....

ii) Name electrodes

Y.....

Z.....

iii) A current of 0.5A was passed through the solution for 72 minutes.

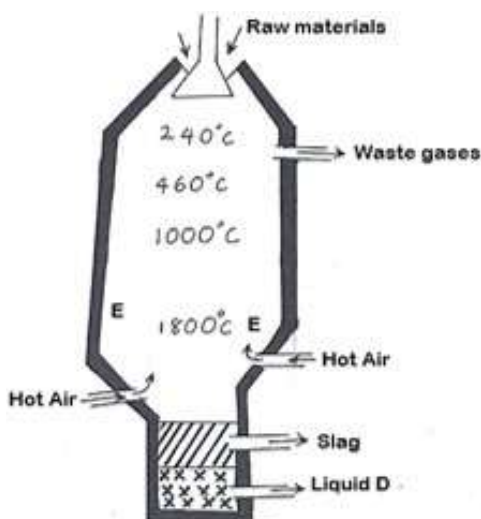
Calculate the volume of gas X produced at r.t.p. (M.G.V = 24000cm³, IF =96500c).

.....

iv) State two applications of electrolysis.

.....

6. The diagram below represents a blast furnace used in extraction of iron.



a) Name the main ore from which iron is extracted.....

b) Other than the iron ore, and hot air name two other raw materials introduced in the blast furnace and state the role of each in the process.

i) Name

Function.....

ii) Name.....

Function.....

c) The temperature in the region E is higher than any other region. Explain:

.....

d) Write an equation in which the iron ore is reduced to iron metal.

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.....
.....

e) State two physical properties of molten slag that allow it to be separated from molten iron.

.....
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f) i) One of the components of waste gases is nitrogen (IV) oxide. What effect does the gas have on the environment.

.....

ii) Iron produces from the blast furnace is brittle and less hard due to presence of carbon and other impurities.

Describe how the impurities can be reduced.

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ii) Give two ways by which rusting of iron can be controlled.

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7. a) i) What is meant by hardwater.

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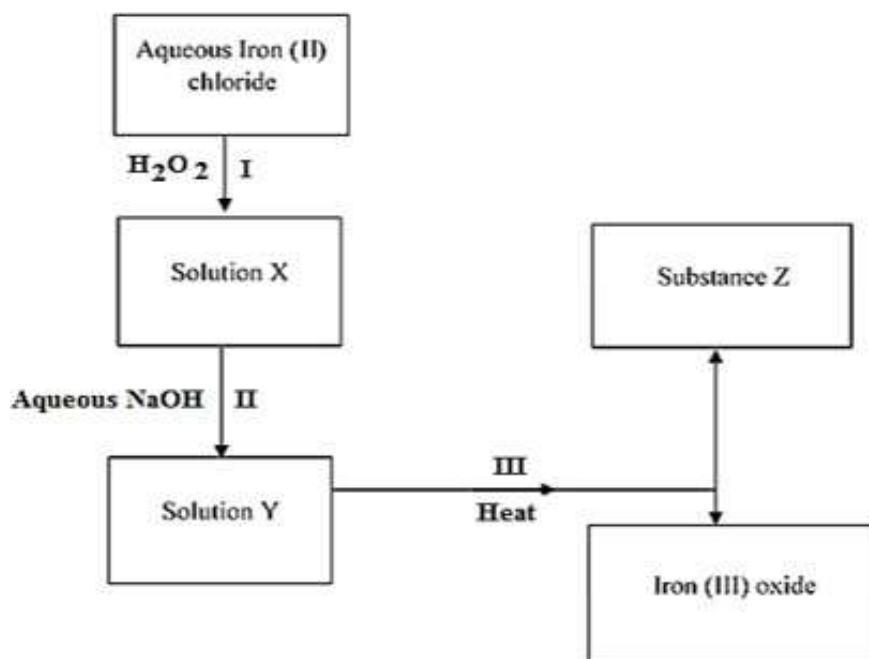
ii) Describe how temporary hardness is removed by boiling

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b) During the lab. Preparation of soap, sodium chloride is added. Explain the function of sodium chloride in the process. (1mark)

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c) Study the flow diagram below and answer the question that follow.



i) Give the name of substance Z.

.....

ii) What observations would be made in step I

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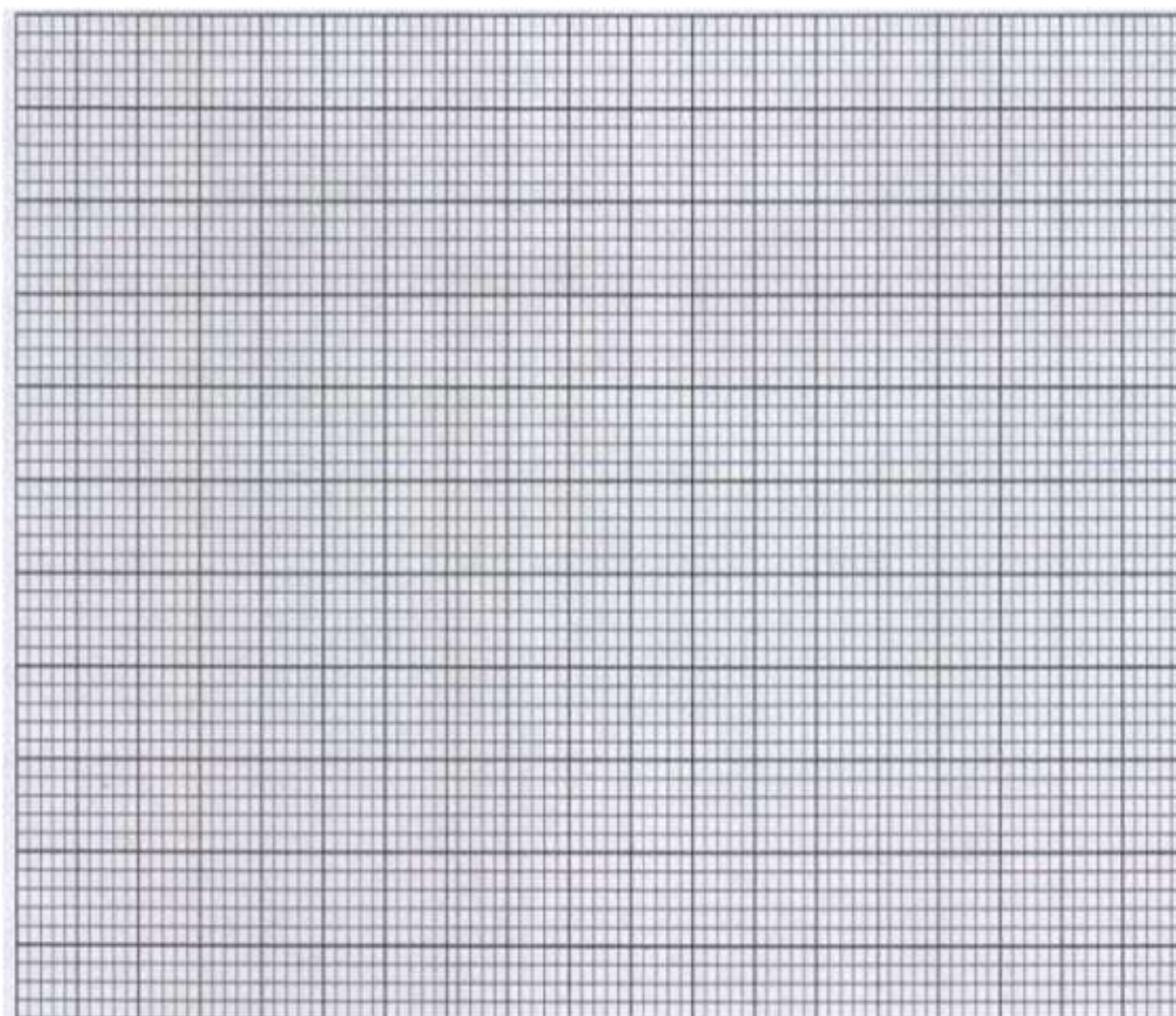
iii) Name other reagent that could be used in step II.

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d) The table below gives the solubilities of solids P and Q at different temperatures.

Temperature	0	10	20	30	40	50
Solubility of P g/100g water	8	13	24	38	61	98
Solubility of Q g/100 water	31	32	35	38	44	48

i) On the grid provided below, plot the graphs of solubility of P and Q against temperature on the same axis.



ii) If a solution of P containing 50 g in a 100g of water was cooled from 40°C;
I. The temperature at which crystals will first form.

.....

II. The mass of crystals formed if the solution is cooled to 10°C.

.....

iii) How much of solid Q could dissolve in 60g of water at 50°C.

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