GRAND A'LEVEL CHEMISTRY SEMINAR AT ST. JOSEPH'S S.S.S NAGGALAMA

28TH SEPTEMBER 2024

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1. Explain briefly each of the following observations, illustrating your answers with equations where applicable.

(a) The acid strength of the following hydrogen halides are in the order; HI > HBr > HCl

(b) Ethylamine is a stronger base than 1-amino-2-bromoethane

(c) Melting points of the following bromides are in the order; $SrBr_2 < CaBr_2 < MgBr_2$

(d) Aluminium bromide is used as a halogen carrier in the preparation of bromobenzene

(e) When potassium peroxosulphate(VI) solution was added to potassium iodide solution, the colourless solution turned to brown.

(f) To a hot solution of chromium(III) ions containing excess sodium hydroxide solution was added hydrogen peroxide solution , a green solution turned to yellow solution.

(g) Solubility of the hydroxides of group(II) elements increases down the group while the solubility of the sulphates of group(II) elements decreases down the group.

2. a) i) Define the term distribution coefficient

ii) Describe how the distribution coefficient of ammonia between water and trichloromethane can be determined.

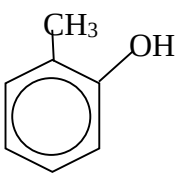
b) 50 cm^3 of 1.5M ammonia solution was shaken with 50 cm^3 of trichloromethane in a separating funnel. After the layers had separated, 20 cm^3 of the trichloromethane layer required 23.10 cm^3 of 0.05M hydrochloric acid for complete reaction. Calculate the distribution coefficient of ammonia between water and trichloromethane

c) A copper ore was dissolved in excess concentrated ammonia and the solution made up to 1 dm^3. The resultant solution was shaken with trichloromethane and left to settle. 50 cm^3 of the organic layer required 12.5 cm^3 of 0.1M hydrochloric acid for neutralization. 25 cm^3 of aqueous layer required 20 cm^3 of 1M hydrochloric acid. Calculate the concentration of copper(II) ions in $moldm^{-3}$.
(The distribution coefficient of ammonia between trichloromethane and water is 0.04)

d) A crude sample of lead contained 2% of silver by mass. Calculate the percentage of silver left in 150 kg of the crude sample of lead if it was thoroughly mixed with 10 kg of zinc at 800°C. The solubility of silver in a given mass of zinc is 300 times its solubility in an equal mass of lead at 800°C.

3. Name the reagents that are used to distinguish between the following pair of compounds. In each case, state the observations made then write equations for the reactions for the stated observable changes

a) $BaCO_3$ and $CaCO_3$

b) 

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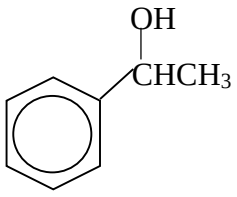
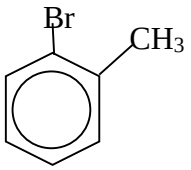
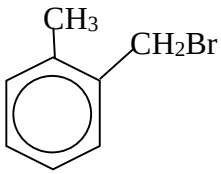


c) $CH_3(CH_2)_2CHO$ and $CH_3CO(CH_2)_2CH_3$

d)  and 

e) HCOOH and HOOCCOOH

4. a) Draw and name the shapes of the following ions

i) NO_3^- ii) NO_2^-

b) Compare the bond angle of the above given ions. Explain your answer.

c) One of the ions in (a) above decolorizes iodine solution

(i) Identify the ion (ii) Explain your answer.

5. The following half-cell reactions are given together with their corresponding standard electrode potential values.

$Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6e \longrightarrow 2Cr^{3+}(aq) + 7H_2O(aq)$ +1.33V

$Cl_2(g) + 2e \longrightarrow 2Cl^-(aq)$ +1.36V

$V^{3+}(aq) + e \longrightarrow V^{2+}(aq)$ -0.27V

$PbO_2(s) + 4H^+(aq) + 2e \longrightarrow Pb^{2+}(aq) + 2H_2O(l)$ +1.46V

$MnO_4^-(aq) + 8H^+(aq) + 5e \longrightarrow Mn^{2+}(aq) + 4H_2O(l)$ +1.52V

a) Name the most;

i) Oxidizing species ii) Reducing species

b) i) Write the cell notation for the cell made by combining the two half-cell reactions for the above mentioned two species in (a) above

ii) Write the equations for the half cell reactions that occur at positive and negative terminals

iii) Calculate the amount of free energy produced by the cell.
[1 Faraday of electricity = 96500C]

c) i) Write the cell convention for the cell made up of two half-cells consisting of acidified lead(IV) oxide and chloride ions.

ii) State whether the cell will produce electric current or not. Explain your answer

d) Using the above given information, explain why potassium dichromate can be acidified using hydrochloric acid whereas potassium permanganate cannot.

6. Nylon-6,6 and Perspex are examples of artificial polymers formed through condensation and addition polymerization processes, respectively

a) Distinguish between the terms addition and condensation polymerisation

b) Name the monomer(s) used in formation of

i) Nylon-6,6 ii) Perspex

c) Write equations leading towards formation of each of the above named polymers

d) State the differences between the structural features of each of the;

i) Monomers used in the formation of the polymers ii) Polymers formed

e) State one use of each of the above named polymers in (a).

7. (a) Define the following terms

(i) solute (ii) saturated solution

(b) The solubilities of potassium chloride and potassium nitrate at a certain temperature are shown in the table below.

Temperature / ^oC	0	11	15	30	40	50	57
Solubility of potassium chloride / g per 100g of water	27.9	31.0	32.0	36.5	40.0	43.0	45.0
Solubility of potassium nitrate /g per 100g of water	14.0	21.5	25.0	43.0	63.0	84.0	102.0

(i) Plot on the same axes, a graph of solubility against temperature for solubilities of potassium chloride and potassium nitrate.

(ii) State which one of the two salts has a solubility which increases less rapidly with increase in temperature.

(iii) Determine the temperature at which the solubilites of the two salts are equal.

(iv) A saturated solution of potassium nitrate at 30^oC was cooled to 5^oC . Determine the number of moles of potassium nitrate crystals formed.
(K = 39 , N= 14 , O = 16)

(c) 25.2g of a solution saturated with copper(II) sulphate at 35^oC was made up to $200cm^3$ with deionized water. $25.0cm^3$ of the diluted solution reacted with excess potassium iodide solution to liberate iodine which was titrated against $33.5cm^3$ of 0.118M sodium thiosulphate solution.
Calculate the solubility of copper(II) sulphate in grams per 100g of water at 35^oC.

(d) Explain how;

(i) Unsaturated solution of a solute can become saturated without adding any more solute

(ii) A saturated solution can become unsaturated without carrying out any dilution.

(e) (i) Define the term fractional crystallization.

(iii) The solubility of copper(II) sulphate is 75g in 100g of water at 100^{o}C and 25g at 30^{o}C. What mass of the salt would crystalize if 50g of a copper(II) sulphate solution saturated at 100^{o}C were cooled to 30^{o}C.

(iv) Explain how you would grow a large crystal of copper(II) sulphate.

8.a) During manufacture of sulphuric acid, sulphur dioxide is catalytically oxidised in an equilibrium reaction to form sulphur trioxide. The reaction is exothermic.

i) Write equation for the reaction.

ii) State the optimum conditions for the reaction

b) State and explain what would happen to the position of equilibrium in the reaction in a(i) above when;

i) Temperature of the reaction is increased to 800^{o}C.

ii) Acidified potassium permanganate solution is added to the vessel of the reaction mixture.

c) 1.8 moles of sulphur dioxide and 2 moles of oxygen were placed in a 2.0 litre vessel. The reaction mixture was heated and when equilibrium was established, 26% of the initial amount of oxygen had reacted. Determine the equilibrium constant for the reaction.

d) Write equation of reaction of warm concentrated sulphuric acid with;

i) Phosphorous. ii) Hydrogen iii) sulphide iv) Tin

9. a) Explain what is meant by the terms;

i) Transition metal ii) Complex ion

b) Explain why transition metals are able to form complexes.

c) Pink solid Q when heated, formed a green solid R and brown fumes, solid R dissolves in dilute hydrochloric acid forming a pink solution T. solution T forms a blue solution with potassium thiocyanate solution.

i) Write the formula and name of the species in solution T.

ii) Write equation for the reaction leading to the formation of the blue solution.

iii) State what will be observed and write equations for the reaction that takes place if to the aqueous solution of solid Q is added to;

(i) Concentrated hydrochloric acid

(ii) Sodium hydroxide solution drop-wise until in excess.

10.a) i) Define standard electrode potential

ii) Why is it not possible to measure standard electrode potential absolutely?

iii) Discuss the factors which affect the value of standard electrode potential

b) Describe a standard hydrogen half cell

c) Describe how the standard electrode potential of a metal electrode can be measured. E.g. silver electrode

d) $Ca^{2+}(aq) + 2e \longrightarrow Ca(s)$ $E^o = -2.87V$

$Mg^{2+}(aq) + 2e \longrightarrow Mg(s)$ $E^o = -2.37V$

A cell was set up as below, $Mg(s)|\ Mg^{2+}(aq)||\ Ca^{2+}(aq)|Ca(s)$

i) Calculate the E.m.f of the cell

ii) What conclusion can you draw from your E.m.f value in d(i) above.

11. Write equation and suggest a mechanism to show how the following compounds are synthesized.

(a) 2,2-dibromopropane

(b) 1-methylcyclohex-1-ene

(c) 2-methylpropane- 1,2- diol

(d) Benzaldehyde oxime

(e) 2-hydroxy-2-methylbutanonitrile

(f) 2-bromoethanol

(g) Phenylpropanoate.

12. a) Define the term relative atomic mass

b) Describe how the relative atomic mass can be determined by the mass spectrometer

c) The mass spectrum of an element W contained three line at mass/charge of 24, 25 and 26 with relative intensities in the ration of 8:1:1 respectively

i) Explain what the term relative intensity means

ii) Calculate the relative atomic mass of W

iii) State why the mass spectrum shows three lines

d) State two advantages of using a mass spectrometer over the depression of freezing point method of determining relative atomic masses

e) The initial count of a radioactive nucleus was 680 per count. After 350 seconds, the count rate was 125 per second.

Calculate the;

i) Decay constant ii) Half-life of the nucleus.

13. A bromoalkane **S**, C_4H_9Br burns with a non-sooty flame.

(a) Write the structural formulae and IUPAC names of all the possible isomers of **S**

(b) Which of the isomers of S in (a) above has the

(i) The highest boiling point

(ii) The lowest boiling point.

(c) Explain your answer in (b) above.

(d) When **S** was refluxed with aqueous potassium hydroxide, compound **T** was formed. Compound **T** formed two layers in 8 minutes when treated with concentrated hydrochloric acid in the presence of anhydrous zinc chloride. Identify **S** and **T**

(e) Write equation and suggest a mechanism for the reaction between

(i) **S** and ethanolic potassium hydroxide and the mixture refluxed.

(ii**)** **T** and ethanoic acid in the presence of few drops of concentrated sulphuric acid and the mixture heated.

(f) Using equations only show how **T** can be converted to ethanol.

14 .Fluorine, Chlorine, bromine and iodine belong to Group (VII) elements of the Periodic Table.

(a)Write the general outermost electronic configuration of the elements.

(b)Discuss the reaction of fluorine and bromine with

(i) Water (ii) Potassium hydroxide

(c) State what would be observed and write equation for the reaction when:

(i) Chlorine gas was bubbled through Iron(II) chloride solution

(ii) Aqueous sodium sulphite solution was added to iodine solution

(iii) Bromine water was added aqueous hydrogen sulphide.

(iv) Iodine was added to cold dilute sodium hydroxide and the mixture allowed to stand.

15 (a)(i) Distinguish between the terms ionic product and solubility product.

(ii)Explain how the two terms in (i) are affected by temperature.

(b) Describe an experiment to determine the solubility product of lead(II) iodide

(c) When 2.5g of lead(II) iodide was shaken with 1 dm^3 of distilled water at 25^oC , 11.62% of the salt had dissolved. Calculate the solubility product of lead(II) iodide at 25^oC.

(d) State and explain whether the percentage of the lead(II) iodide that dissolved would be higher than, less than or equal to 11.62% when the following were added to its saturated solution at 25^oC

(i) Few drops of ammonium iodide solution.

(ii) Two clean pieces of magnesium ribbon.

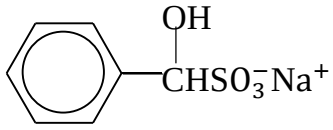
(e) Solution **X** was made by dissolving 0.025 moles of lead(II) ions in 500cm^3 of solution and solution **Y** was made by dissolving 0.01325moles of iodide ions in 500cm^3 of solution.
When the two solution are mixed,

(i) Calculate the ionic product of lead(II) iodide.

(ii) State whether the precipitation of lead(II) iodide will occur or **not**. Give a reason for your answer.

(f) A solution containing silver ions was added to a solution containing 0.005M chromate ions and 0.005M chloride ions. State which of the salts silver chloride or silver chromate will precipitate first? Give a reason for your answer.
(Ksp for Ag_2CrO_4 =1.3x10^{-12}mol^{3}dm^{-9}, Ksp and for AgCl = 1.8 x10^{-10}mol^{2}dm^{-6})

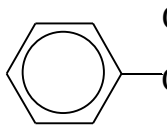
16. Using equations only show how the following conversions can be effected.

(a) 

from phenol

(b) $CH_3CCl_2CH_3$ from propan-1-ol

(c) $CH_3CH_2CH_2\ CH_2\ COOH$ from ethyne

(d) 

from phenol

(e) Ethanol from propanoic acid

(f) 1,3,5-tribromo benzene from nitrobenzene

17. Carbon, silicon, germanium, tin and lead are the elements of **Group(IV)** of the Periodic Table.

(a) (i) State the oxidation states exhibited by the elements.

(ii) Explain how the stability of the oxidation states varies down the group.

(b) Describe the reactions of the elements with

(i) Concentrated nitric acid

(ii) Concentrated sodium hydroxide solution.

(c) Explain the following observations;

(i) When hydrogen peroxide solution is added to lead(II) sulphide, a black solid turned to white solid.

(ii) Lead(IV) chloride exists whereas lead(IV) iodide does not exist.

(iii) Carbon tetrachloride is not hydrolysed by water whereas silicon tetrachloride readily hydrolyses in water.

(iv) When warm concentrated hydrochloric acid was added to lead(IV) oxide, dark brown solid dissolves with effervescence of a greenish yellow gas and white precipitate was formed on cooling.

(v) When dilute nitric acid was added to trileadtetraoxide, red powder turned to dark brown
solid and colourless solution were formed.

18.(a) What is meant by the terms

(i) Order of reaction

(ii) Molecularity of a reaction

(iii) Activation energy of a reaction?

(b) The decomposition of hydrogen peroxide is first order kinetics and proceeds according to the following equation.

$2H_2O_2\ (aq) \longrightarrow 2H_2O\ (l) + O_2(g)$

(i) Write the rate law for the reaction.

(ii) Describe an experiment to show how the order of the above reaction can be determined.

(iii) Explain the effect of temperature on the rate of decomposition of hydrogen peroxide.

(c) The following kinetic data in the table below were obtained for the decomposition of hydrogen peroxide.

Concentration of H_2O_2 ($moldm^{-3}$)	0.0013	0.00076	0.00036	0.00014	0.0001
Time(minutes)	5	12	20	33	40

Plot a graph of $\log_{10}[H_2O_2]$ against time

(d) Using your graph in (c), determine

(i) The initial concentration of hydrogen peroxide

(ii) The half- life of the reaction

19. (a) What is meant by the following terms

(i) Buffer solution. (ii) Salt hydrolysis

(b) A 0.021M propanoic acid solution is 2.5% ionized. Calculate the

(i) pH of the solution

(ii) Acid ionisation constant for the acid.

(c) (i) What mass of potassium propanoate must be added to 1 $dm^3$of 0.021M propanoic acid to increase its pH by 2.34 units

(ii) Why does the pH of propanoic acid increase on addition of the measured mas of

potassium propanoate.

(d) Explain the following observations

(i) When a clean piece of magnesium ribbon was added to an aqueous solution of ammonium nitrate, there was effervescence of a colourless gas.

(ii) Benzoic acid is a stronger acid than propanoic acid.

20. Write equation and suggest a mechanism for the reaction to show how the following conversions can be effected.

(a) 2-hydroxypropanonitrile from ethanal

(b) Diphenylmethanone from benzene

(c) Propanalsemicarbazone from acidified solution semicarbazide. ($NH_2CONHNH_2$)

(d) Propyne from 2,2-dichloropropane.

(e) Phenylethanoate from phenol

21(a)What is meant by the term **steam distillation?**

(b) Explain the principle on which steam distillation is based.

(c) State

(i) the conditions necessary for steam distillation.

(ii) **one** advantage of steam distillation over fractional distillation

(d) The table below shows how the vapour pressure of a mixture of phenyl amine and water varies with temperature.

Temperature (^oC)	40	50	60	70	80	90	100	110	120
Vapour pressure of phenylamine (mmHg)	10	20	25	32	40	50	55	65	80
Vapour pressure of water(mmHg)	629	632	645	655	670	690	710	730	760

(i) On the same axes plot graphs of vapour pressure against temperature for phenylamine , water and the mixture.

(ii) Use the graph to determine the ratio of phenylamine to water and hence the percentage of phenylamine in the distillate. Given that the distillation was carried out at 760mmHg.

(e) The partition coefficient of substance **Q** between ethoxyethane and water is 2.0. A solution containing 10.0g of **Q** in $50cm^3$ of water was extracted with $100cm^3$ of ether. Calculate percentage of **Q** that remained in the aqueous layer.

22. Beryllium, magnesium, calcium, strontium and barium are the elements of group(II) of the Periodic Table.

(a) Describe how the electropositivity of the elements varies down the group.

(b) Discuss the reaction of the elements with

(i) water (ii) dry air (iii) nitric acid

(c) Describe how

(i) Beryllium carbide and calcium carbide can be prepared in the laboratory.

(ii) The carbides in (c)(i) react with dilute hydrochloric acid

(d) Describe how cement is

(i) manufactured (ii) used to make concrete.

23. Sodium hydroxide is used as one of the raw materials in manufacture of soap.

a) Describe briefly how sodium hydroxide can be obtained on a large scale. [No diagram required].

b) i) Name other raw material(s) used together with sodium hydroxide during formation of soap

ii) Briefly describe how a sample of soap can be prepared using the named raw materials

iii) Write equations for the reaction leading towards formation of soap.

c) Explain the cleansing action of soap.

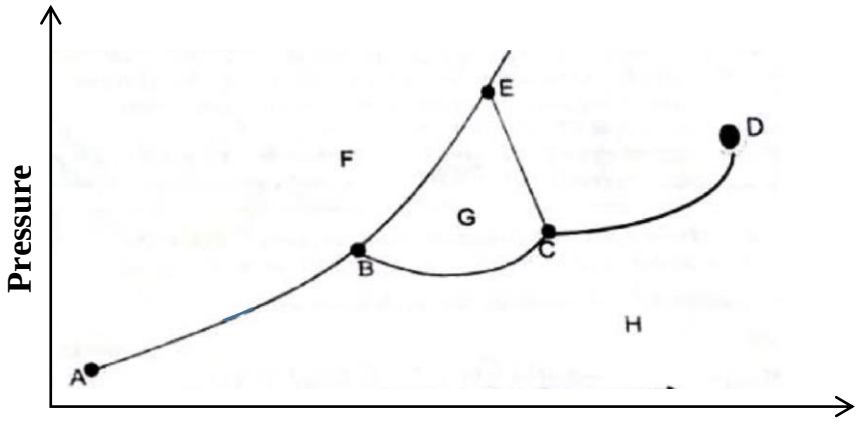
d) i) Write equations to show how a soapless detergent can be prepared starting from an alkylbenzene.

ii) Name some other substances that are added to detergents during their manufacture and state their role.

e) State any two advantages of soapless detergents over soapy detergents.

24. (a) Define the term critical temperature

(b) The phase diagram for a certain substance is shown below



(i) Identify the regions F, G and H

(ii) State what the points B, C and D represent

(c) Describe the changes that took place when pressure was increased at a constant temperature on the phase at H

CHEMISTRY PRACTICAL

QUESTION ONE

You are provided with following;

FA1, which is a solution containing 18.96g of anhydrous sodium thiosulphate in a litre

FA2, which is a solution of manganate (VII) ions of unknown concentration.

SOLID T, which is an iron (II) salt with a formula $\mathbf{Fe_x(C_2O_4)_y.nH_2O}$

10% potassium iodide solution

2.0M sulphuric acid solution

You are required to determine the; (i) Concentration of manganate(VII) ions in FA2 in $moldm^{-3}$

(ii) Valves of **x,y** and **n** in **T**.

Theory

Acidic manganate (VII) ions oxidize iodide ions to iodine according to the following equation.

$2MnO_4^-(aq) + 16H^+(aq) + 10I^-(aq) \longrightarrow 2Mn^{2+}(aq) + 5I_2(aq) + 8H_2O(l)$

The liberated iodine reacts with thiosulphate ions according to the following equation

$I_2(aq) + 2S_2O_3^{2-}(aq) \longrightarrow S_4O_6^{2-}(aq) + 2I^-(aq)$

Acidic manganate (VII) oxidizes both iron (II) ions and ethanedioate ions in solid T according to the following equations.

$MnO_4^-(aq) + 5Fe^{2+}(aq) + 8H^+(aq) \longrightarrow Mn^{2+}(aq) + 5Fe^{3+}(aq) + 4H_2O(l)$

$2MnO_4^-(aq) + 5C_2O_4^{2-}(aq) + 16H^+(aq) \longrightarrow 2Mn^{2+}(aq) + 10CO_2(g) + 8H_2O(l)$

PART I

Procedure:

Using a measuring cylinder transfer $65cm^3$ of FA2 into a clean $250cm^3$ glass beaker, followed by $35cm^3$ distilled water label the resultant solution **FA3**

Pipette $25.0cm^3$ (or $20.0cm^3$) of **FA3** into a conical flask. Add $15cm^3$ of 2M sulphuric acid followed by $15cm^3$ of 10% potassium iodide solution shake the mixture for 1 minute.

Titrate the iodine liberated with **FA1** from the burette until the solution is pale-yellow. Add 4 – 5 drops of starch indictor and continue the titration until the end point. Repeat the titration until you obtain consistent results. Record your results in table I below.

Results

Volume of pipette used = ……(mark)

Final burette reading (cm^3)				
Initial burette reading (cm^3)				
Volume of FA1 used (cm^3)				

(a)(i)State the volumes of **FA1**used for calculating average. ($\frac{1}{2}$ mark)

(ii)Calculate the average volume of **FA1** ($2\frac{1}{2}$ marks)

Questions

(b)Calculate the number of moles of;

(i) Iodine that reacted with thiosulphate ions in FA1 (2½ marks)

(Na = 23, S = 32, O = 16)

(ii) Manganate (VII) ions in 65cm^3 of FA2 (2½ marks)

(b)Determine the concentration of manganate (VII) ions in FA2 in moldm^{-3} (2½ marks)

PART II

Procedure

Weigh accurately **1.5g** of **T** into a clean beaker. Add about 120cm^3 of 2M sulphuric acid and stir to dissolve. Transfer the contents to a 250cm^3 volumetric flask and add distilled water to make it up to the mark. Label the solution **FA4 Results**

Mass of weighing beaker +**T** = …….....g(½ mark)

Mass of weighing beaker alone = …….....g (½ mark)

Mass of **T** used = …….....g(½ mark)

PART III

Procedure

Pipette 25.0cm^3 (or 20.0cm^3) of **FA4** into a conical flask. Heat the mixture to about 60^{0}C and titrate the hot mixture with **FA2** from the burette until the end point. Repeat the titration until you obtain consistent results. Record your results in table II below.

Results

Volume of pipette used = …….....cm^3 ($\frac{1}{2}$ mark)

Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of **FA2** used (cm^3)			

(4½marks) (a)(i)State the volumes of **FA2** used for calculating average.

(½ marks)

(ii) Calculate the average volume of **FA2** (2½ marks)

(b) Calculate the number of moles of;

(i) Manganate (VII) ions that reacted with both iron (II) ions and ethanedioate ions in FA4

(ii) Iron(II) ions in FA4 that reacted manganate(VII).

(1mark)

(iii) Ethanedioate ions in FA4 that reacted with manganate (VII). (1mark)

(b)Determine the

(1mark)

i) Values x and y in solid T

ii) The formula mass of $Fe_x(C_2O_4)_y.nH_2O$ and hence the number of moles of water of crystallization, n (Fe = 56, C = 12, O = 16, H = 1)
(2marks)

Question two

You are provided with substance, **L**, which contains **two** cations and **two** anions. You are required to carry out the following tests on **L** to identify the cations and anions in it. Identify any gas (es) evolved.

Record your observations and deductions in the table below. (**30 marks**)

TESTS	**OBSERVATIONS**	**DEDUCTIONS**
(a)Heat **two** spatula end-ful of **L** in a dry test tube strongly until no further change.		
(b)To **two** spatula end-ful of **L** in a test tube add about $10cm^3$ of distilled water shake strongly. Filter, keep both the filtrate add the residue. Divide the filtrate into **four** portions.	.	
(i) . To the first portion of the filtrate, add 2-3 drops of Barium nitrate solution followed by dilute nitric acid.		
(b)(ii) . To the second portion of the filtrate, add 2-3 drops of lead (II) nitrate solution followed by dilute nitric acid.		
(b)(iii) To the third portion of the filtrate, add 1-2 drops of silver nitrate solution followed by dilute ammonia solution.		

(b)(iii)Use the fourth portion of the filtrate to carry out your own test to confirm the anion in the filtrate **Test**		
(c)Dissolve then residue in dilute nitric acid.(**warm to dissolve**) To the resultant solution add dilute sodium hydroxide solution drop- wise until in excess. Filter and keep both the filtrate and residue.		
(d). To the filtrate from part (c) add dilute nitric acid drop wise until the solution is just acidic. Divide the resultants into **three** parts.		
(d)(i)To the first portion of acidified filtrate, add dilute sodium hydroxide solution dropwise until in excess.		
(d)(ii)To the second part of acidified filtrate add dilute ammonia solution drop-wise until in excess.		
(d)(iii). Use the third part of acidified filtrate to carry out a test of your own choice to confirm one of the cation in the filtrate **Test**		
(e). Dissolve the residue from part (c) in minimum amount of nitric acid. Divide the resultant solution into three parts.		
(i) To the first part add 2-3 drops dilute sulphuric acid		

(ii). To the second part, add dilute ammonia solution drop wise until in excess.		
(iv) Use the third part of to carry out a test of your own choice to confirm the second cations in L **Test**		

(f) identify the (i) Cations in L …….. (ii) anions in L ……..

QUESTION THREE

You are provided with an organic substance, **R**. You are required to determine the nature of **R**. Carry out the following tests on **R** and record your observation and deductions in table below. (**20marks**)

TESTS	**OBSERVATIONS**	**DEDUCTIONS**
(a)Burn a small amount of **R** on a spatula end		
(b)To about 1 spatula end-ful of **R** in a test – tube, add about 10 cm^3 of distilled water. Shake strongly and test the mixture with litmus paper. Heat the mixture and Divide the resultant solution into **7** parts.		
(i)To the **first** part of the solution, add 2 – 3 drops of acidified potassium dichromate (VI) and **warm**		

(ii)To the **second** part of the solution add 2-3 drops of 2,4-dinitrophenylhydrazine solution		
iii)To the **third** part of the solution add 2 – 3 drops of iron (III) chloride solution		
(iv)To the **fourth** part of the solution add 1cm^3 of ethanoic acid followed by 3drops of concentrated sulphuric acid and heat to boiling		
(v)To the **fifth** part of the solution add little solid magnesium powder		
(vi)To the **six** part add 2-3 drops acidified potassium manganate(VII)		
(vii)To the **seventh** part add 2-3 drops of bromine water and shake strongly		
(c)Dissolve one spatula end-ful of R in about 3cm^3 of ethanol, add 3 drops of concentrated sulphuric acid and heat, pour the resultant solution on a petridish containing some water		

(e)Comment on the nature of **R**. ……

END