ACIDS, BASES AND SALTS

1.   Aluminium chloride solution changes the blue litimus paper red. Explain this observation
        (2mks)

        ....

        ....

        ....

        ....

2.   Explain why the enthalpy of neutralization of ethanoic acid with sodium hydroxide is
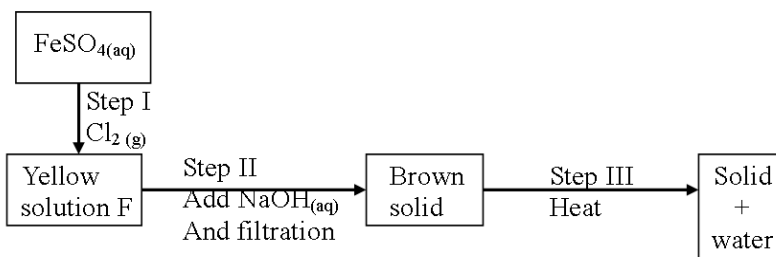   different from that of hydrochloric acid with sodium hydroxide. [2m]

        ....

        ....

        ....

        ....

3.   Study the scheme below and answer the questions that follow

        (a)   Write the formula of the cation present in the yellow solution F   (1mk)

        (b)   What property of chlorine is shown in step I   (1mk)

        ....

        ....

        (c) Write an equation for the reaction in step (III)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

4.   A solution contains 7.5g of solution in 20cm³ of water. When the solution is cooled crystals begin to appear at 10⁰C. Calculate the solubility of the solute at 10⁰C.

<div align="right">(2mks)</div>

5. Explain why the PH of 1.0M Hydrochloric acid is 1.0 while that of 1.0 M ethanoic acid is 5.0.
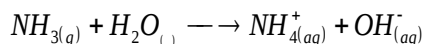
<div align="right">(2marks)</div>

....

....

6. (a) A solution contains 7.5g of solute in 20cm³ of water. When the solution is cooled crystals begin to appear at 10⁰C. **Calculate** the solubility of the solute at 10⁰C.   (2marks)

(a)   **What** causes permanent hardness of water?

(1mark)

....

....

7. Consider the equation:

$$NH_{3(g)} + H_2O_{(\;)} \longrightarrow NH_{4(aq)}^+ + OH_{(aq)}^-$$

(a)   **Identify** the acid and base in the above equation using Bronsted – Lowry theory.

(3 marks)

Acid: ....

Base: ....

Reason: ....

....

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

8. Three samples of water were treated with soap before boiling and after boiling.

Water sample	Amount of soap used in water	
	Before boiling (cm³)	After boiling(cm³)
T	10.0	5.0
W	21.0	20.5
X	5.0	5.0

(a) **Which** sample of water is unlikely to contain dissolved salt? (1mark)

....

(b) **Explain** the effect of boiling water in sample

    (i)   **T**   (1mark)

    ....

    ....

    (ii)   **X**   (1mark)

    ....

    ....

9. a) Write an ionic equation for the reaction between copper II ions in solution and excess ammonia solution. (1mk)

....

....

b) Name the complex ion formed in the reaction in (a) above. (1mk)

....

...

10.   a) A solution of 100cm³ of 0.1M ethanoic acid has a different p.H value from that of 100cm³ of 0.1M hydrochloric acid. Explain the difference. (2mks)

....

....

....

....

a) Predict the p.H value of

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

(i)   ethanoic acid. .... (½ mk)

(ii)   hydrochloric acid .... (½ mk)

11. Name the species acting as the base in the equation below and explain your answer.

$$H_2O_{(aq)} + H_2O_{(l)} \rightleftharpoons H_3O^+_{(aq)} + H_2O_2^-_{(l)}$$
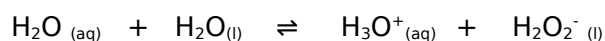
(1mk)

....

....

12. Study the chart below and answer the questions that follow.
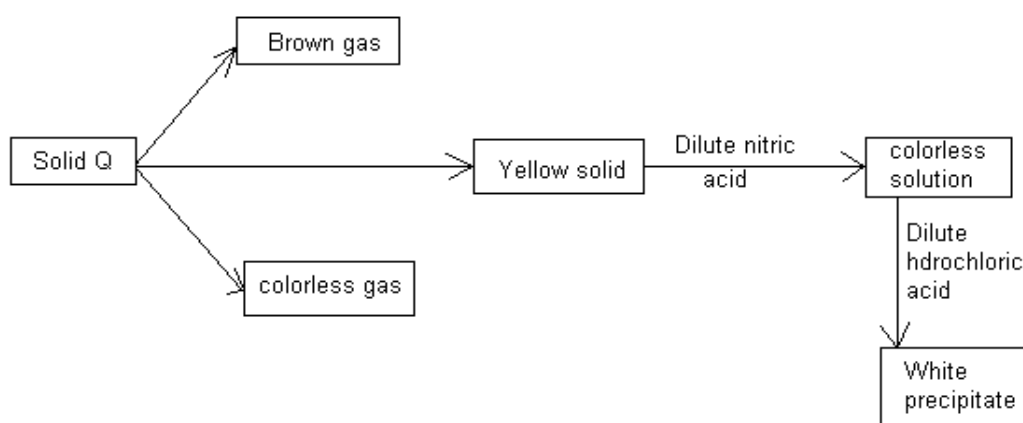
(a) Name:-

(i) Anion in solid Q

(1mk)

....

....

(ii) Cation present in the colourless solution.

(1mk)

....

(b) **Write** an equation for the reaction that occurred between the colourless solution and dilute hydrochloric acid to form the white precipitate.

(1mk)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

....
....

13. In an experiment three separate samples of water were tested using soap solution to find out the volume of soap needed to form a permanent lather with 1000cm^3 of the water sample. Each sample was boiled and again the amount of soap required was determined. The following were obtained.

SAMPLE					
I	II	III			
Volume of soap required before boiling			27	3.0	10.6
Volume of soap required after boiling			27	3.0	3.0

(c) **Explain** the change in the volume of soap solution in sample III (2mks)

....
....

(d) **Write down** the formula of the ions present in sample I (1mk)

....
....

14. The solubility of potassium nitrate in water at 70^{0}C is 155g/100g of water while at 20^{0}C, the solubility is 31g/100g of water. A saturated solution of potassium nitrate in 50grammes of water at 70^{0}C was cooled to 20^{0}C. **Calculate** the mass of the salt deposited.
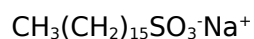
(2mks)

15.   What is the difference between strong acid and concentrated acid?   (2mks)

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

16.   a) Which of the following cleaning agent best in water containing magnesium sulphate? (2mks)

Explain

$CH_3(CH_2)_{16}COO^-Na^+$

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

....

....

$CH_3(CH_2)_{15}SO_3^-Na^+$

....

....
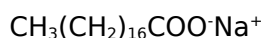
b) Give one advantage of using hard water for domestic use.   (1mk)

....

....

17.   (a)   What is the meaning of PH?   (1mk)

....

....

      (b)   Define the following in terms of PH:

             (i)   An acid   (1mk)

....

....

             (ii)   A base   (1mk)

....

....

18.   An aqueous solution of ammonia was added drop wise to a solution of copper (II) Sulphate
      until in excess.

      (a)   State the observation made when:-

             (i)   A few drops of aqueous ammonia were added.   (1mk)

....

....

             (ii)   Excess aqueous ammonia was added.   (1mk)

....

....

      (b)   Write the formula of the complex ion responsible for the observation made in a(ii)
             above   (1mk)

....

....

19.   (a)   What is hard water?   (1mk)

....

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

....

(b)   Write the formulae of the two cations responsible for water hardness. (1mk)

....

....

(c)   Given that the formula of an ion exchange resin which softens water is Na_2X. Write any one ionic equation to show how the cations in (b) above are removed during water softening.   (1mk)

....

....

20.   In an experiment to investigate the solubility of solids P and Q, the following results were obtained.

Temperature (^0C)	0	10	20	30	40	50
Solubility of solid P (g/ 100g of water)	8	13	24	38	61	98
Solubility of solid Q (g/ 100g of water)	28	32	35	38	42	46

a)   Plot a graph of solubility of P and Q against temperature on the axis   (5mks)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
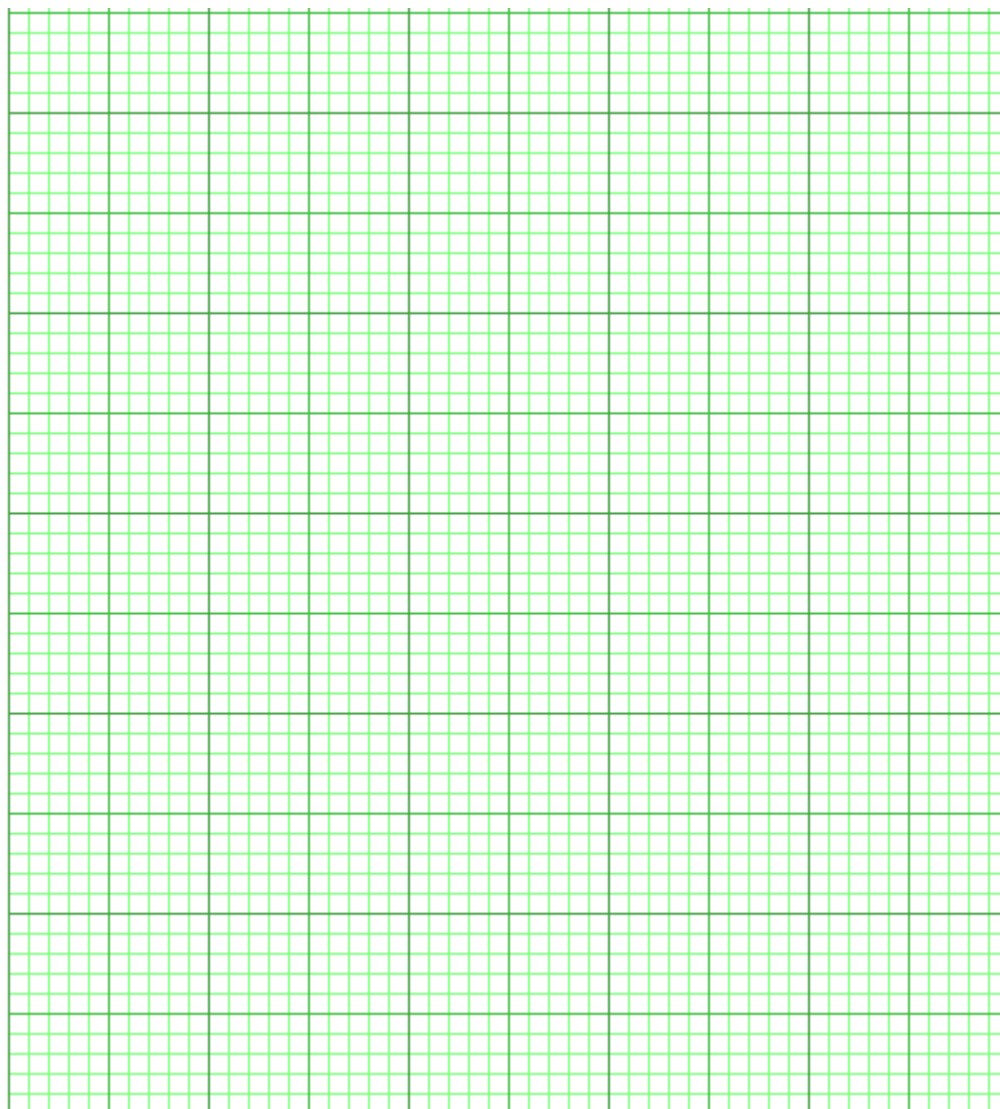
b) From your graph determine

    i) The solubility of P at room temperature (25^0C)   (1mk)

    ii) The temperature at which the solubility of P is 45g/100g   (1mk)

c) If a solution of P containing 35g of solid in 100g of water is cooled from 40^0C, determine:

    i) The temperature at which crystals will first form   (1mk)

    ii) The mass of the crystals deposited if the solution is cooled to 5^0C (1mk)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

d)   How much of substance Q could be soluble in 80g of water at 50⁰C   (2mks)

e)   State the temperature at which P and Q have the same solubility.   (1mk)

21.   In an experiment to determine the solubilities of two salts M and N at different temperatures, a student recorded his observation as shown below.

Temperature (⁰C)	0	10	20	30	40	50	60	70	80	90
Solubility of min g/100g of H_2O	14.3	17.4	20.7	25.0	28.5	33.3	40.0	47.0	55.0	64.0
Solubility of N in g/100g of H_2O	25.0	27.5	30.0	32.5	35.0	37.6	40.1	42.4	45.0	48.0

a) On the same axis plot the solubility curves of M and N.   4mks

b) Determine

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

(i)   the solubility of M and N at 45^{0}C

Solubility of M 1mk

Solubility N 1mk

ii) The temperature at which the two salts are equally soluble in water.   1mk

c) If 60g of M is dissolved in 100g of water and heated to 90^{0}C, calculate the amount of salt that crystallized out if cooled to 20^{0}C.   1mk

d) A mixture of 55g of salt M in 100g of water and 30g of solid N in 100g of water were cooled from 90^0 to 70^{0}C. State and explain the observation.   3mks

e) State two applications of solubility.

2mks

ENERGY CHANGES IN CHEMICAL REACTIONS

1.   Use the information below to answer the questions that follow:

	Equation:	**Enthalpy of formation.**
(i)	$H_{2(g)} + \frac{1}{2} O_{2(g)} \longrightarrow H_2O_{(l)}$	$\Delta H_1 = -286kJmol^{-1}$
(ii)	$C_{(s)} + O_{2(g)} CO_{2(g)} \longrightarrow$	$\Delta H_2 = -394kJmol^{-1}$
(iii)	$2C_{(s)} + 3H_{2(g)} + \frac{1}{2} O_{2(g)} \longrightarrow C_2H_5OH_{(l)}$	$\Delta H_3 = -277kJmol^{-1}$

Calculate the molar enthalpy of combustion of ethanol. Given that:

$$C_2H_5OH_{(l)} + 3O_{2(g)} \longrightarrow 2CO_{2(g)} + 3H_2O_{(l)}$$

(3mks)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
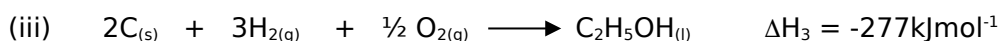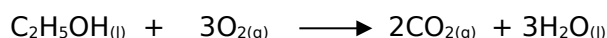
2.   Study the information in the table below and answer the questions that follow

Bond	Bond energy (KJmol^{-1})
C – H	414
Cl – Cl	244
C – Cl	326
H - Cl	431

Calculate the enthalpy change of the reaction

$$CH_{4(g)} + 2Cl_{2(g)} \longrightarrow CH_2Cl_{2(g)} + 2HCl_{(g)}$$

(3mks)

3. When 25 cm^3 of 0.5MHCl is added to 25 cm^3 of 0.5 M NaOH the temperature of the solution rose from 25^{0}C to 26^{0}C. Given that the density of the solution is 1g cm^{-3} and its specific heat capacity is 4.2 jg^{-1}k^{-1},

b. **Determine** the amount of heat evolved that caused the temperature rise. (1mark)

c. **Work** out the molar enthalpy of neutralization for this reaction.   (2marks)

4.   Study the following equilibrium equation.

$$2A_{2(g)} + B_{2(g)} \rightleftharpoons 2A_2B_{(g)} \qquad \Delta H = -197KJmol^{-1}$$
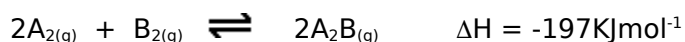
a) Suggest two ways of increasing the yield of A$_2$B.   (2mks)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

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

b) Draw the energy level diagram for the forward reaction.

(1mk)

5.   Use the data below to calculate the enthalpy of formation of propane.   (3mks)

$C_{(g)} + O_{2(g)} \longrightarrow CO_{2(g)}$ $\Delta H = -393.5 KJmol^{-1}$

$H_{2(g)} + \frac{1}{2} O_{2(g)} \longrightarrow H_2O_{(l)}$ $\Delta H = -285.9 KJmol^{-1}$

$C_3H_{8(g)} + SO_2 \longrightarrow 3CO_{2(g)} + 4H_2O_{2(l)}$ $\Delta H = -2220.0 KJmol^{-1}$

....
....
....
....
....
....
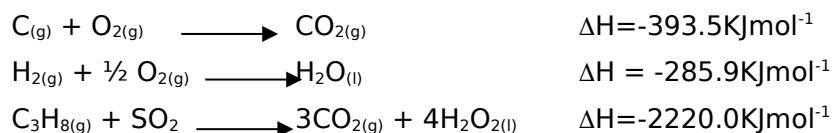
6. Study bond energies shown below and answer the questions that follow.

Bond	Bond Energy KJmol^{-1}
C – C	348
C – H	412
Cl – Cl	242
C – Cl	338
H – Cl	431

a) Calculate the enthalpy change (ΔH) for the reaction given below.

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
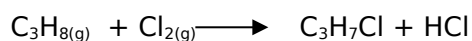
$$C_3H_{8(g)} + Cl_{2(g)} \longrightarrow C_3H_7Cl + HCl \qquad \text{(2mks)}$$

....

....

....

....

b) State the condition necessary for the above reaction to occur. (1mk)

....

....

7. 10.0g of ethanol (C_2H_5OH) were completely burnt in air. The heat evolved caused the temperature of 400cm^3 of water to rise from 22^{0}C to 87^{0}C. Calculate the molar heat of combustion of ethanol   (H=1, C=12, O=16, specific heat capacity of water = 4.2 kJkg^{-1}k^{-1};
Density of water = 1gcm^{-3})

(3mks)

8. (a) Consider the following reaction: $A_{2(g)} + B_{2(g)} \rightleftharpoons 2AB_{(g)}$ $DH = 75KJ$

Sketch an energy level diagram showing the relative activation energies for the catalysed and uncatalysed reactions using the axes below. (2 marks)

Energy
(KJ)

Reaction path

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
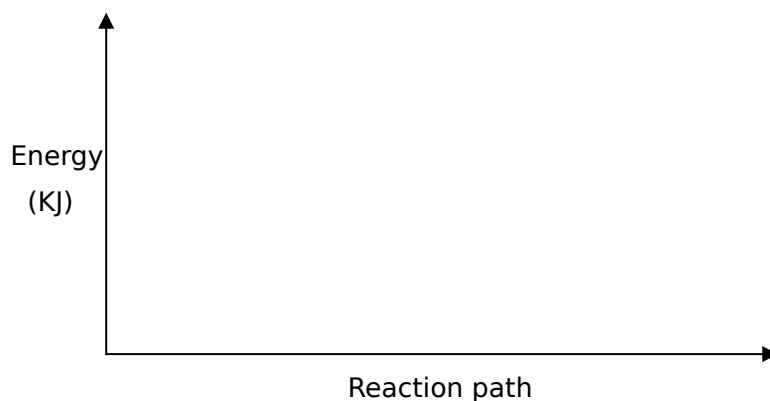
(b)

$$Given \quad \Delta H_f(Al_2O_3) = -1590\, KJ\, mol^{-1}$$

$$\Delta H_f(Cr_2O_3) = -1134 KJ\, mol^{-1}$$

Calculate the heat of reaction for
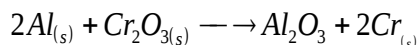
$$2Al_{(s)} + Cr_2O_{3(s)} \longrightarrow Al_2O_3 + 2Cr_{(s)} \qquad\qquad \text{(2marks)}$$

b) The following data was obtained during an experiment

Mass of ethanol burnt	=	0.2g
Mass of water in the calorimeter	=	200g
Specific heat capacity of water	=	4.2 j $g^{-1}k^{-1}$
Initial temperature of water	=	23.5 ^{0}C
Final temperature of water	=	28.0 ^{0}C

(i) **How** was the mass of ethanol that burnt determined? (1mark)

....

....

(ii) **How** much heat was required to raise the temperature of water from 23.5 ^{0}C to 28.0^{0}C?

(2marks)

....

....

(iii) Two assumptions were made in calculating the enthalpy of combustion for ethanol. **State them**.

(1mark)

....

....

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

(iv) **Determine** the molar enthalpy of combustion of ethanol
(2marks)
(C= 12, H=1, O= 16)

(v) **Write** a thermochemical equation for the combustion of ethanol given the accurate value for enthalpy of combustion is -1368 Kj mol^{-1}.

(1mark)

9. Iron fillings were thoroughly mixed with sulphur then placed in two test tubes as shown below.
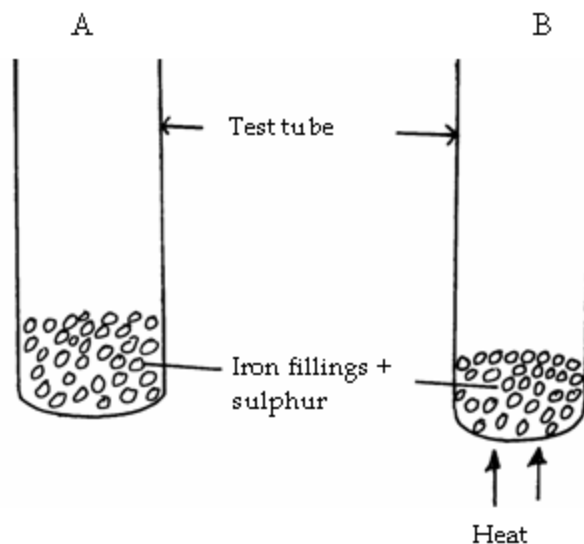
Both test tubes were cooled to room temperature then 3cm^3 of 2M Hydrochloric acid was added.

a) What is the general name given to the substance in. (2mks)

(i) Test tube A

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

....

....

(ii) Test tube B

....

....

b) Identify the gas produced when 2M Hydrochloric acid was added to test tube A. Explain your answer.   (2mks)

....

....

....

c) Write an equation for the reaction that takes place when 2M Hydrochloric acid is added to test tube B.   (1mk)

....

....

d) In another experiment excess iron powder was added to $25.0cm^3$ of 0.2M copper II sulphate solution in a plastic cup wrapped in tissue paper. The temperature of this solution rose from 21.5^0C to 31.5^0C.

(i) What was the main reason for using a plastic cup wrapped in tissue paper?   (1mk)

....

....

(ii) Give reason for using excess iron powder.   (1mk)

....

....

(iii) State two other observations made in the above experiment.   (2mks)

....

....

....

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

(iv) Calculate the molar enthalpy of displacement of copper II ions by iron powder. (3mks)
(Density of solution =1.0gcm^{-3} heat capacity of soln 4.2J/g/k.)

....

....

....

....

....

....

....

....

v) Write a Thermo chemical equation for the reaction that took place.   (1mk)

....

....

RATE OF REACTION

(j) The graph below shows the amount of calcium carbonate and calcium chloride
varying with time in the reaction:

$$CaCO_{3(s)} + 2HCl_{(aq)} \longrightarrow CaCl_{2(aq)} + H_2O_{(L)} + CO_{2(g)}$$
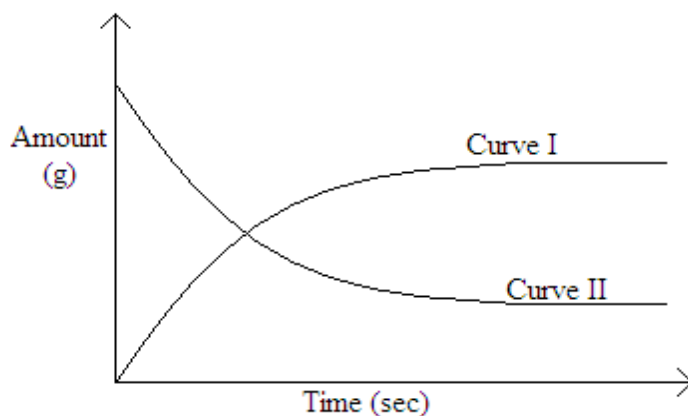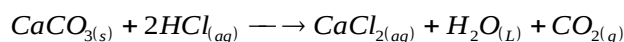
2. **Which** curve shows the amount of calcium chloride varying with time (1mark)

....

(b)   **Explain** why the two curves become horizontal after a given period of time.   (1mark)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

....

....

....

(b) **Sketch** on the graph how curve II would appear if the experiment was repeated using a more dilute hydrochloric acid solution. (1mark)

2. A diagram of the apparatus which could be used to investigate the rate of reaction between magnesium and an excess of an acid is drawn below.
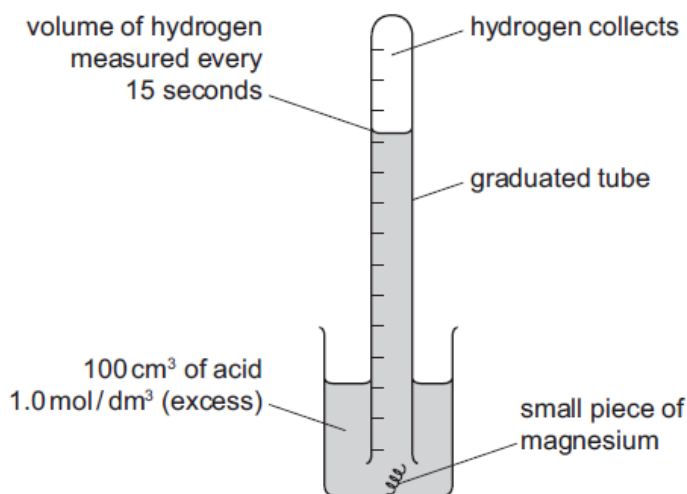
(a) The magnesium kept rising to the surface. In one experiment, this was prevented by twisting the magnesium around a piece of copper. In a second experiment, the magnesium was held down by a plastic net fastened to the beaker.
(i) Suggest a reason why magnesium, which is denser than water, floated to the surface.

....

.... [1]

(ii) Iron, zinc and copper have similar densities. Why was copper a better choice than iron or zinc to weigh down the magnesium?

....

.... [1]

(b) The only difference in the two experiments was the method used to hold down the magnesium. The results are shown below.

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
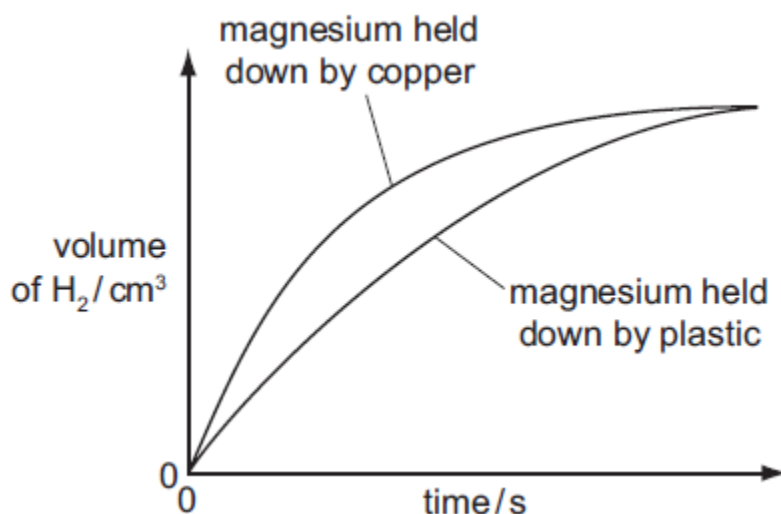
(d) In which experiment did the magnesium react faster?

.... [1]

(e) Suggest a reason why the experiment chosen in **(i)** had the faster rate.

.... [1]

(c) The experiment was repeated using 1.0 mol / dm3 propanoic acid instead of 1.0 mol / dm3 hydrochloric acid. Propanoic acid is a weak acid.

(i) How would the graph for propanoic acid **differ** from the graph for hydrochloric acid?

.... [1]

(ii) How would the graph for propanoic acid be the **same** as the graph for hydrochloric acid?

.... [1]

(d) Give **two** factors which would alter the rate of this reaction.
For each factor explain why it alters the rate.

Factor...

Explanation..

....

Factor...

Explanation..

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

.... [4]

[Total: 10]

3. (a) The diagram below shows a set – up used by a student in an attempt to prepare and collect oxygen gas.
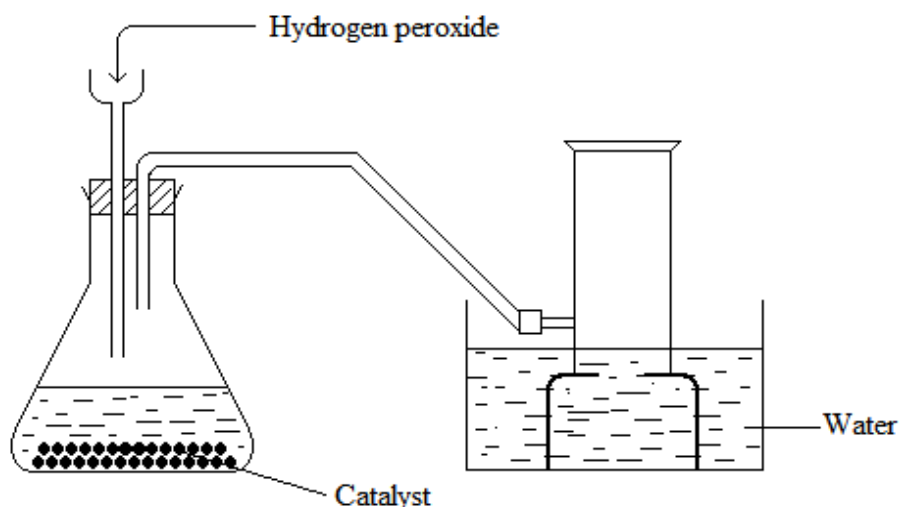
c) **Complete** the diagram by correcting the mistakes on it.   (2mks)

d) **Name** the catalyst used.   (1mk)

....

e) **Write** the equation for the production of oxygen gas.   (1mk)

....

(b) A piece of phosphorus was burnt in excess air. The product obtained was shaken with a small amount of hot water to make it a solution.

c) **Write** an equation for the burning of phosphorus in air.   (1mk)

....

d) The solution obtained in (b) above was found to have a Ph of 2. **Give reasons** for this observation.   (1mk)

....

(c) **Sketch** graph on the grid given below showing how the volume of oxygen (vertical axis) varies with time when:-

(iii)   0.5g of the catalyst is mixed with 100cm^3 of 0.2Mhydrogn peroxide solution at 20^{0}C, label the curve R.   (1mk)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
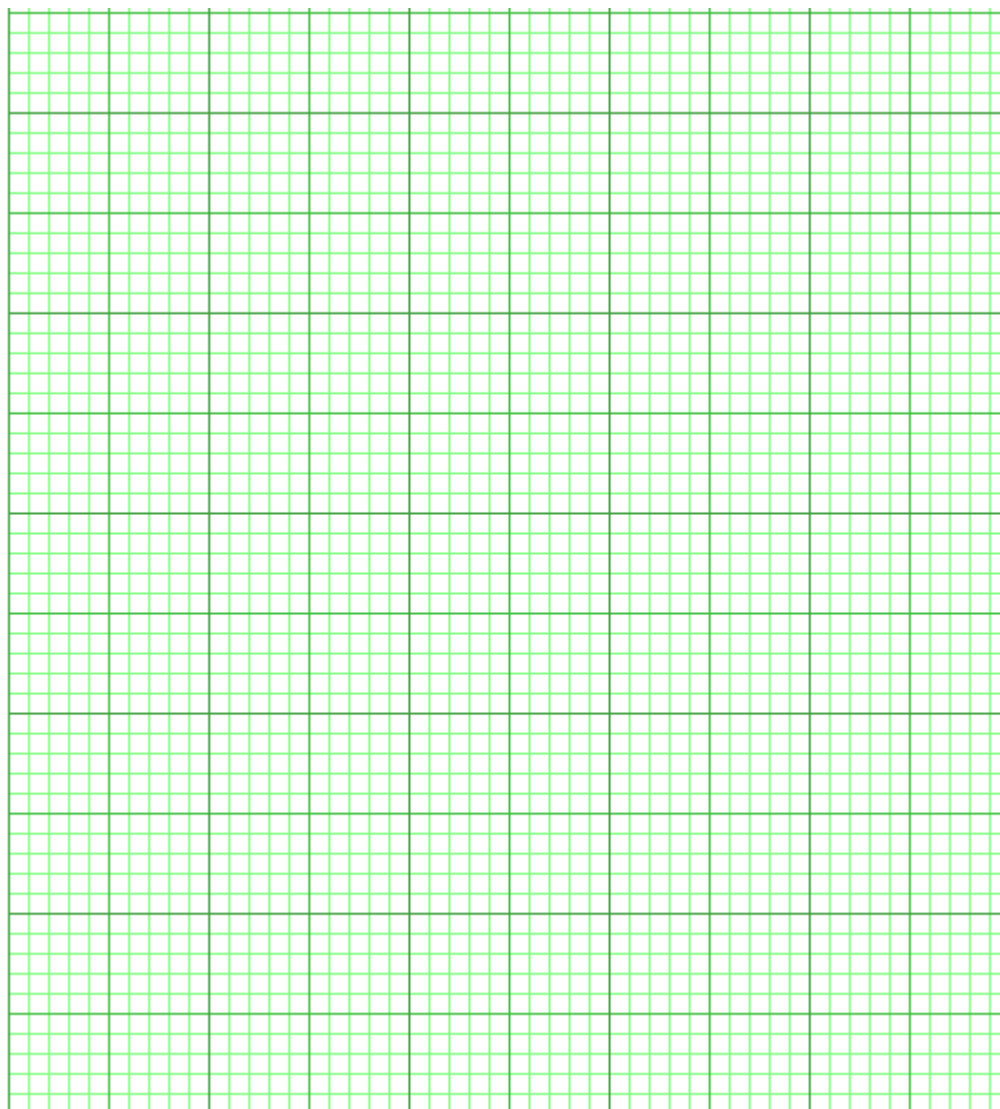
(iv)   The same experiment is repeated at 30^{0}C, label the curve S.   (1mk)

(v)   The same experiment is repeated at 40^{0}C, label the curve T.   (1mk)

4.   The reaction between 0.65g of zinc granules and excess of 0.5M hydrochloric acid was followed by measuring the amount of gas produced. The following results were obtained

Time (sec)	0	30	60	90	120	150	180	210	240	270
Total volume of gas at r.t.p (cm^3)	0	80	140	190	220	230	240	240	240	240

a) Plot a graph of volume of gas produced against time.

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
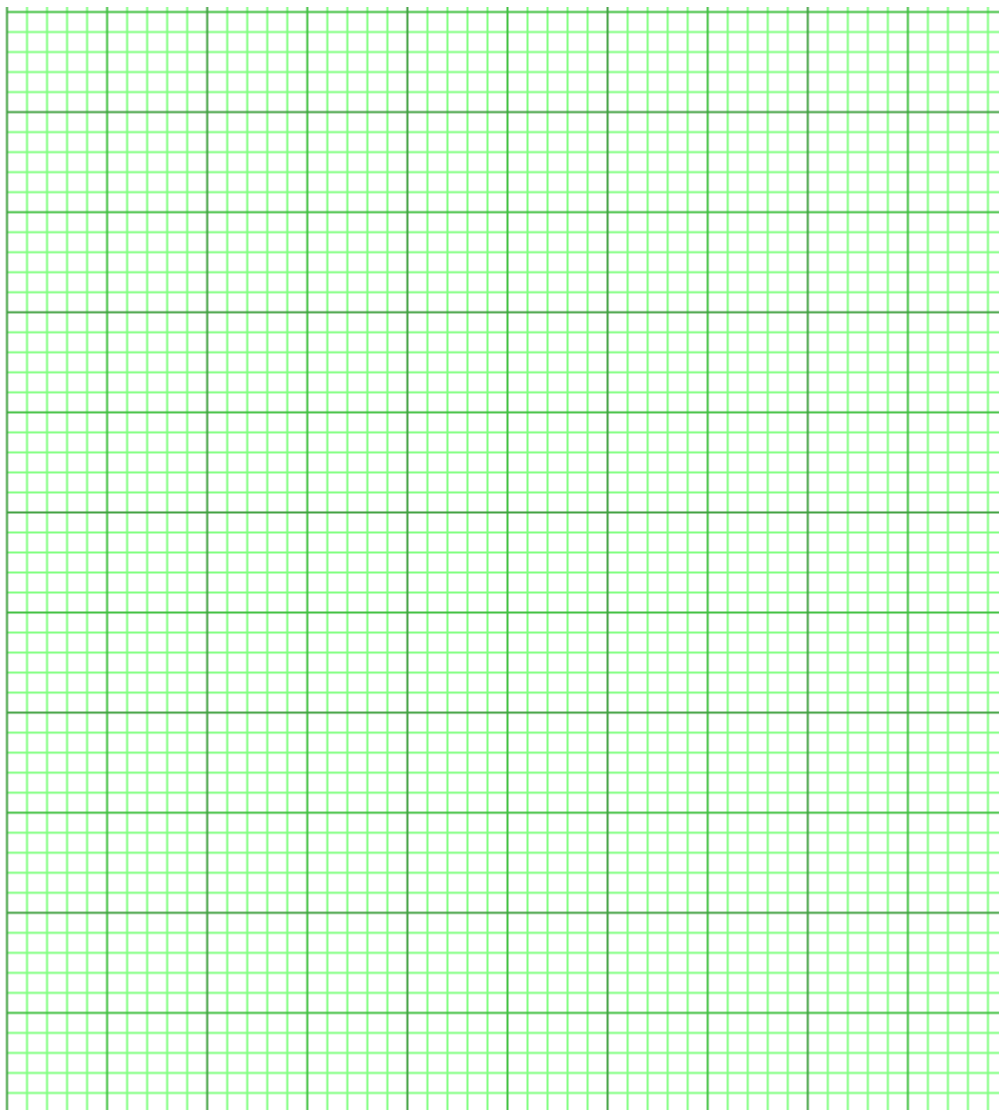
4mks

b) (i) Write an equation for the reaction taking place. 1mk

(ii) How would the gas produced be identified? 1mk

(iii) Why is an excess of an acid used? 1mk

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

c) From the graph:
i) What is the volume of the gas evolved at 75 seconds?   1mk

ii) At what time is the reaction complete?   1mk

(c)   On the same graph, sketch the curves that you expect if the experiment was repeated
        under the same conditions but using:

(i) 0.4M hydrochloric acid, instead of 0.5M hydrochloric acid. Label the graph X.   1mk
(ii) Zinc powder (same quantity) was used in place of granulated zinc. Label the graph Y.
                                                                1mk

(d)   Calculate the volume of the gas that would be produced at r.t.p from 13g of zinc.
        (Zn = 65.0, molar gas volume at r.t.p. = 24.0dm³)

REVERSIBLE REACTIONS

1. An equilibrium exists between the chromate ion $\left(CrO_4^{2-}\right)$ and the dichromate ion $\left(Cr_2O_7^{2-}\right)$ as

represented by the following equation

$$2CrO_{4\ (aq)}^{2-} \quad + 2H^+_{(aq)} \qquad \rightleftharpoons \qquad Cr_2O_{7\ (aq)}^{2-} + H_2O_{(l)}$$

        $(yellow)$ $(Orange)$
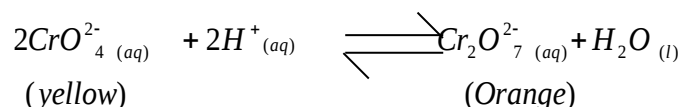
State and explain the observation made on adding aqueous potassium hydroxide solution

to the equilibrium mixture

        (2mks)

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

(f) Consider the following reaction at equilibrium.

$$PCl_{5(g)} \qquad \rightleftharpoons \qquad PCl_{3(g)} + Cl_{2(g)}$$

Complete the table below to show the effect of different factors on the position of equilibrium.

(3marks)

Factor	Effect on the equilibrium position
b) Decrease pressure	
c) Removing chloride	

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

d) Adding Helium gas to mixture	

3. Iodine reacts with chlorine to form dark brown iodine monochloride.

$$I_2 + Cl_2 \rightleftharpoons 2ICl$$
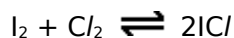
This reacts with more chlorine to give yellow iodine trichloride.
There is an equilibrium between these iodine chlorides.

$$ICl\ (l) + Cl_2(g) \rightleftharpoons ICl_3(s)$$
Dark brown   yellow
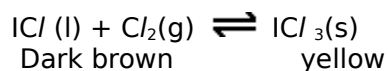
f) Explain what is meant by *equilibrium*.

………

………

……… [2]

(b) When the equilibrium mixture is heated it becomes a darker brown colour.
Is the reverse reaction endothermic or exothermic? Give a reason for your choice.
………

………

……… [2]

(c) The pressure on the equilibrium mixture is decreased.
(i) How would this affect the position of equilibrium and why?

It would move to the…………………………………………………………………………………… [1]

reason……

……… [1]

(ii) Describe what you would observe.

………

…… [1]

[Total: 7]

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

ELECTROCHEMISTRY

1. Below is a table of reduction potentials and volts of some half cells. The letters are not actual symbols but use them to answer the questions which follow

Reaction	Volts
$A^{2+}_{(aq)} + 2e \longrightarrow A_{(s)}$	-2.80
$B^{+}_{(aq)} + e \longrightarrow B_{(s)}$	-1.50
$2C^{+}_{(aq)} + 2e \longrightarrow C_{2(g)}$	0.00
$D_{2(g)} + 2e \longrightarrow 2D^{-}_{(aq)}$	+3.20
$G^{+}_{(aq)} + e \longrightarrow G_{(s)}$	+1.80

(a) Select the species with the largest

(i) Oxidizing power   (1mk)

(ii) Reducing power   (1mk)

(b) Calculate the electrode potential (e.m.f) for a cell constructed using half-cells of A and B

(1mk)

2. What is the oxidation number of

(i) Chromium in $Cr_2O_7^{2-}$ (1mk)

e) Phosphorus in PO_4^{3-}

(1mk)

3. An element P has a relative atomic mass of 88. When a current of 0.5 amperes was passed through the fused chloride of P for 32 minutes and 10 seconds, 0.44g of P was deposited at the cathode. Determine the charge on an ion of P. (1 faraday = 96500 coulombs)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

4. The setup below was used to show that metal P is more reactive than metal Q.

-Metal Q

-Metal P

-Freshly cut section of an orange
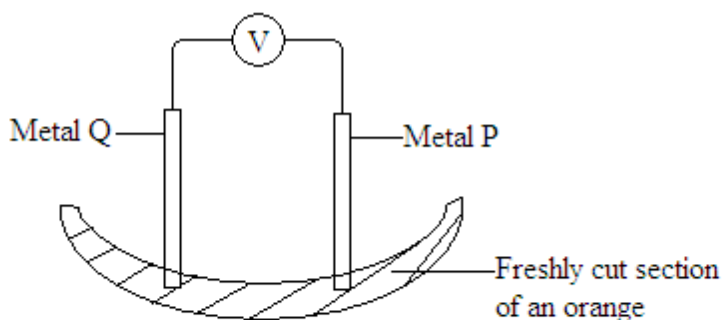
(iv) **Show** the direction of flow of electrons on the diagram using an arrow. (1mark)

(v) **Explain** your answer in (a) above. (1mark)

....

....

5.A dry cell is constructed using the following substances: Zinc metal, graphite rod, ammonium chloride paste and manganese (IV) oxide mixed with carbon powder.

(g) (i) **State** the roles of (i) ammonium chloride paste (1mark)

....

....

(ii) Manganese (IV) Oxide mixed with carbon powder (1mark)

....

....

(b) Given that

$$NH_{4(aq)}^{+} + 2e^{-} \longrightarrow 2NH_{3(g)} + H_{2(g)} \qquad E^{\vartheta} = +0.74V$$

$$\text{and} \quad Zn_{(aq)}^{2+} + 2e^{-} \longrightarrow Zn_{(s)} \qquad E^{\vartheta} = -0.76V$$
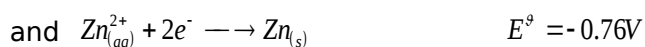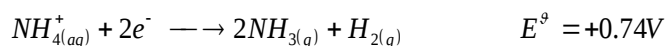
Calculate the Emf of the cell given Zinc forms the negative electrode.

(1mark)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

6. (a) **Study** the table below and indicate with a tick (✓) where a reaction takes place or a cross (✗) where no reaction takes place. (2marks)

Metal	Solution Containing Ions Of:	Reaction/ No Reaction
Cu	Zn^{2+}	
Zn	Ag^+	
Mg	Cu^{2+}	
Ag	Mg^{2+}	

   (b)   **Write** an ionic equation for one reaction that occurred. (1mark)

7. Fluorine can be obtained on large scale through electrolysis of potassium fluoride dissolved in liquid hydrogen fluoride but not by electrolysis of KF dissolved in water. **Explain.** (2marks)

....

....

8.   a) Determine the oxidation state of sulphur in sodium thiosulphate, $Na_2S_2O_3$. (1mk)

   ....

   ....

   b) Write the equation for the reaction of sodium thiosulphate and dilute hydrochloric acid. (1mk)

   ....

   ....

   c) Of what use is the reaction in (b) above in our school laboratory? (1mk)

....

....

9.   Study the following electrode potentials, E^0

   $Fe^{2+}_{(aq)} + 2e^- \longrightarrow Fe_{(s)}$ $E^0 = -0.44v$

   $Ag^+_{(aq)} + e^- \longrightarrow Ag_{(s)}$ $E^0 = + 0.80v$

   $Cu^{2+}_{(aq)} + 2e^- \longrightarrow Cu_{(s)}$ $E^0 = + 0.34v$

   $Zn^{2+}_{(aq)} + 2e^- \longrightarrow Zn_{(s)}$ $E^0 = - 0.76v$

   $Mg^{2+}_{(aq)} + 2e^- \longrightarrow Mg_{(s)}$ $E^0 = -2.36v$

   $\frac{1}{2} Cl_{2(g)} + e^- \longrightarrow Cl^-_{(aq)}$ $E^0 = +1.36v$

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
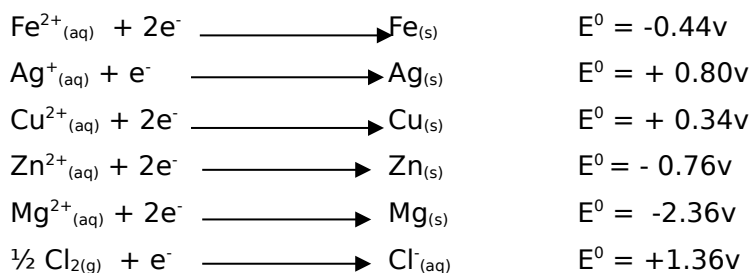
(c) Name:
  (i) The strongest reducing agent.   (1mk)
  ....
  ....

  (ii) The strongest oxidizing agent.   (1mk)
  ....
  ....

  b) Write the cell notation for combination of half-cells that would give the highest e.m.f
                                                                              (1mk)
  ....
  ....

10.   Metals zinc, copper and silver were placed in different solutions as shown in the table
below.

Metal	Solution containing ion of	Reaction / No reaction
Cu	Zn^{2+}	
Zn	Ag^{+}	
Ag	Pb^{2+}	

  a) Indicate with a tick (✓) where a reason takes place or a cross (x) where no reaction
  takes place, in the table above.   (1 ½ mks)
  ....
  ....

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

....

....

b) Arrange the elements in their correct order of reactivity, starting with the least reactive.

(½ mk)

....

....

11. Chromium (IV) ion and chromium (III) ion exist in equilibrium as shown below.

$Cr_2O_7^{2-}$ (aq) + 14 H^+ (aq) $\rightleftharpoons$ 2Cr^{3+} (aq) + 7H_2O (l)
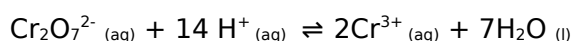
State and explain the observation that would be made when a few drops of hydrochloric acid solution is added to the solution. (2mks)

....

....

....

12. Study the set up below and answer the questions that follows
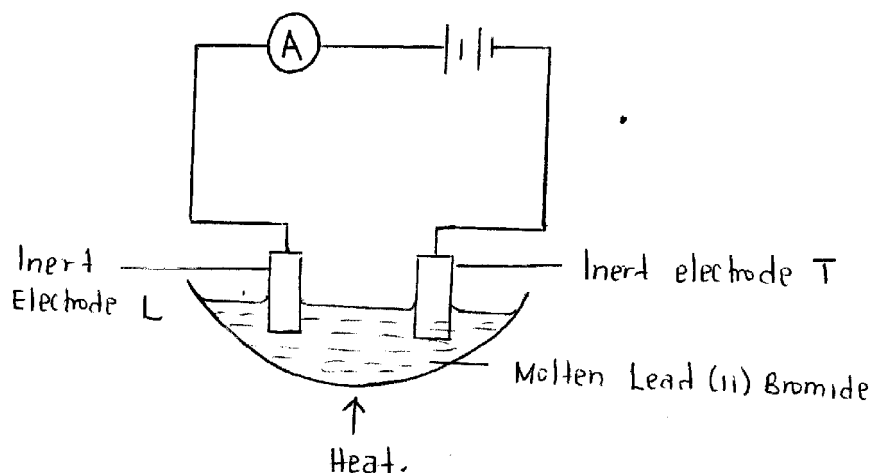
(a) **What** observations would be made at electrode L (½ mk)

....

....

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

(b) **Write an ionic** equation for the reaction at electrode. T.   (½ mk)

....

....

(c) If a current of 2 amperes was passed through the molten lead (II) bromide for 15 minutes. **Calculate** the mass of product at electrode T. **(Pb = 207, Br = 80, If = 96500 coulombs)**

(1½mks)

13.   Use the ionic equations below to answer the questions that follow. Letters used are not actual symbols of elements.

$A_{2(g)} + 2B^-_{(aq)} \longrightarrow 2A^-_{(aq)} + B_{2(g)}$ E = +0.34v

$B_{2(g)} + 2C^-_{(aq)} \longrightarrow 2B^-_{(aq)} + C_{2(g)}$ E = +0.66v
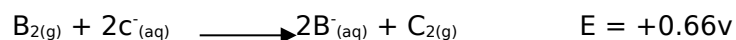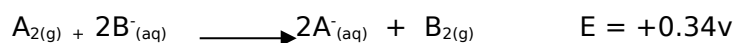
a) Identify the least reactive element.   (1mk)

....

....

3. Calculate the standard reduction potential of B given that

$A_{2(g)} + 2e \longrightarrow 2A^-_{(aq)}$ E = + 1.42v

(2mks)

....

....

....

....

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
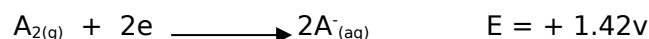
14. Determine the oxidation number of

      (a)   Manganese in $KMnO_4$ (1mk)

    (h) Sulphur in Na_2SO_3

                                                                                      (1mk)

15. During electrolysis of copper (II) Sulphate solution, a current of 4.0 Amperes was passed through the solution for Y minutes to deposit 2.39g of copper at the cathode. Determine the value of Y (Cu=64, 1F=96,500C).   (2mks)

    ………

    ………

    ………

    ………

    ………

    ………

16. The table below gives the standard reduction potentials of some elements represented by letters U,V,W,X and Z. (They are not the actual symbols)

Element	Standard electrode potentials (volts)
U	-2.36
V	+0.34
W	+0.79
X	0.00
Z	-0.76

a) (i) Identify the strongest reducing agent. Give a reason for your answer.   2mks

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

(ii) Which two half cells would produce the highest e.m.f? Determine the e.m.f that would be produced.   2mks

(iii) What would element X represent?   1mk

b) Elements V and Z were connected to form an electrochemical cell as shown in the diagram below.
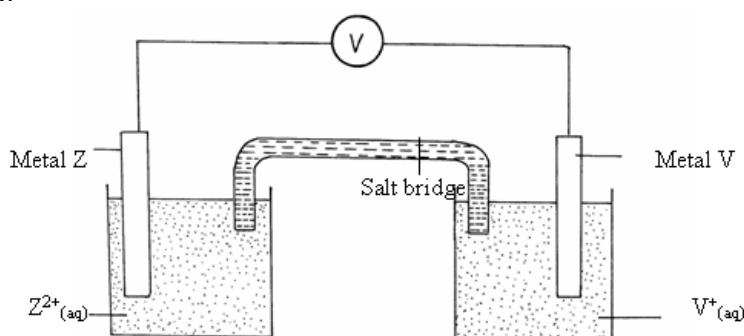
(i) Write the equation for the reaction that occurs at:
   Metal Z electrode   1mk

   Metal V electrode   1mk

(ii) Write the cell representation for the above electrochemical cell.   1mk

(iii) Determine the Emf of the above cell.   1mk

iv) Write the overall cell reaction indicating the E.m.f   1mk

v) Give one use of electrochemical cells.   1mk

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

vi) State one use of a salt bridge, and name two salts that can be used in the salt bridge.

Use 1mk

Salts 2mks

17. The standard electrode potential of some half cells (in volts) are given below.

(i) $Zn^{2+}_{(aq)} + 2e \rightleftharpoons Zn_{(s)}$ -0.76

(ii) $Cr^{3+}_{(aq)} + 3e \rightleftharpoons Cr_{(s)}$ -0.74

(iii) $Sn^{2+}_{(aq)} + 2e \rightleftharpoons Sn_{(s)}$ -0.14

(iv) $2B^{+}_{(aq)} + 2e \rightleftharpoons B_2$ 0.00

(v) $Cu^{2+}_{(aq)} + 2e \rightleftharpoons Cu_{(s)}$ +0.34

(vi) $Fe^{3+}_{(aq)} + 2e \rightleftharpoons Fe^{2+}_{(aq)}$ +0.77

(vii) $Br_{2(aq)} + 2e \rightleftharpoons 2Br^{-}$ +1.07

a) Which element is represented by letter B? Explain.   (1 mark)

....

....

....

b) Identify the strongest reducing agent and strongest oxidizing agent.   (1 mark)
(i) Strongest reducing agent

....

....

(ii) Strongest oxidizing agent

....

....

c) Write the equation and calculate the e.m.f of the electrochemical cell constructed from half cells in b(i) and (ii) above.   (2 marks)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

....

....

....

....

....

....

d) Write the cell representation for the electrochemical cell made using half cells (v) and (vi).

(1 mark)

....

....

....

e) Draw the diagram for the cell represented in (d) above.   (3 marks)

f) A current of 1.8 A was passed through molten aluminium oxide for 3 hrs. Calculate

i) The number of faradays used.(F=96500C)   (2 marks)

....

....

....

....

....

ii) The moles of aluminium deposited   (2 marks)

....

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

....

....

....

iii) The mass of aluminium deposited (Al = 27)   (2 marks)

....

....

....

....

18.   a) (i) Which of the following metals could be used as a sacrificial anode in order to prevent
        the corrosion of iron? Explain your answer.

                        Magnesium, zinc, lead, copper.   (2mks)

....

....

....

....

(ii) An iron becomes coated when placed in a solution of copper (II) sulphate, $CuSO_{4(aq)}$.
Write half equations for the oxidation / reduction reaction involved.   (2mks)

....

....

....

....

b) Study the diagram and the data on the table to answer the questions that follow.

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
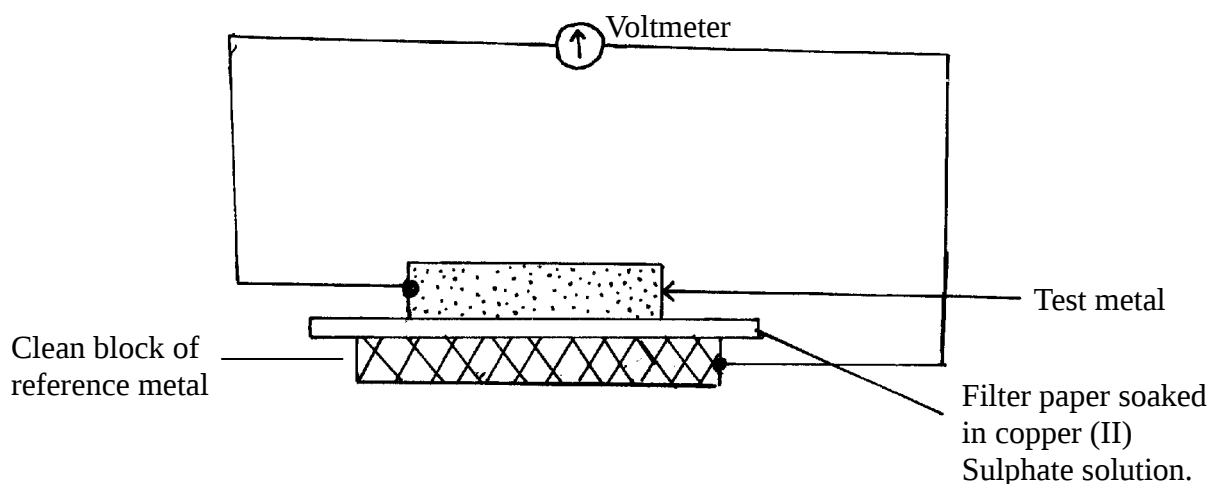
Using the above arrangement the results obtained were:-

Test metal	Voltmeter deflection units
Sodium	2.5 to the right
Magnesium	1.6 to the right
Metal X	0.8 to the right
Iron	0.6 to the right
Tin	0.4 to the right
Copper	0.0
Silver	0.4 to the left

(i) What was the reference metal for which the results were based?   (1mk)

....

(ii) Identify two aqueous solutions in which an observable chemical change would occur when metal X is added to them.   (1mk)

....

....

(iii) When the reference metal is iron, what would be the test metal which could give a voltmeter deflection of 0.2 to the left.   (1mk)

....

....

c) What mass of copper is produced at a cathode by a current of 2 Amps flowing for 10 minutes? (Cu = 64, IF = 96500C).   (2mks)

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

....

....

....

(vi)   Use the std electrode potentials below to answer the questions that follow.

Ion discharge reaction   **E⁰(v)**

$X^+_{(aq)}$ + e ⟶ $X_{(s)}$ - 2.92

$Y^{2+}_{(aq)}$ + 2e ⟶ $Y_{s)}$ -2.34

$A^+_{(aq)}$ + e ⟶ $A_{(s)}$ + 0.80

$R^{2+}_{(aq)}$ + 2e ⟶ $R_{(s)}$ +0.34

(i) Identify the letter representing the strongest reducing agent. Explain.   (1mk)

....

....

(ii) Is it appropriate to keep aqueous solution of the chloride of X in a container made of R? Explain.   (1mk)

....

....

(iii) Write down the cell representation for the pair that would give the largest e.m.f. showing the position of the salt bridge.   (1 ½ mks)

....

....

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

METALS

1. The following diagram represents extraction of sodium by the Down's cell
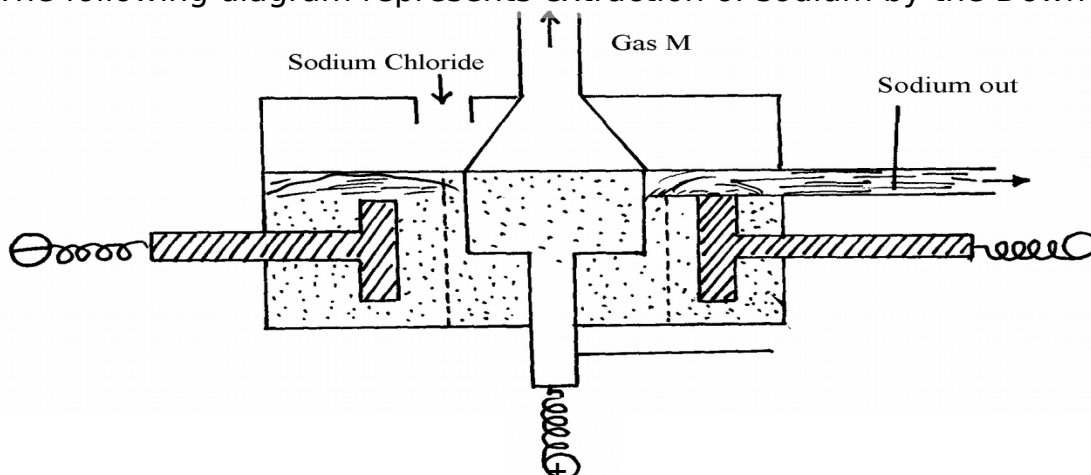
(a) Why is the anode made of graphite in this case instead of steel which is a better conductor
of electricity?

(b) How are the electrolytic products separated from reacting?

(c) Give reasons why large quantities of electricity is required for this process

2. a) Give **one** environmental hazard associated with the extraction of zinc metal

b) Suggest **one** manufacturing plant that can be set up near zinc extraction plant. Give reasons for your answer

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

c) What properties of aluminium and its alloys make it suitable for use in making aircraft parts

3. Aluminium is used in making overhead cables. State **two** properties of aluminium that
       makes it suitable for this use

4. The stages shown in the following diagram can be used to extract zinc from its oxide:-
       Name the stage and the process taking place in it:-

$C_{(s)} + O_{2(g)}$		$ZnO_{(s)} + CO_{(g)}$		$Zn_{(s)}$:
stage 1		**stage 2**		$CO_{(g)} + O_{2(s)}$
				stage 3
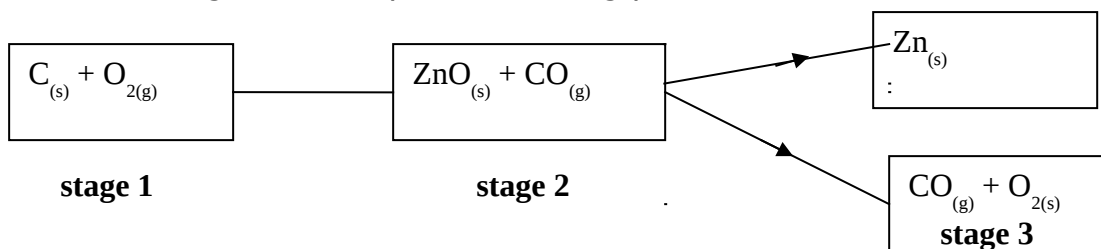
Name each sage and the process taking place in it:

Stage 1...

Stage

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

2..

Stage
3..

5. Study the flow chart below and answer the questions that follow:
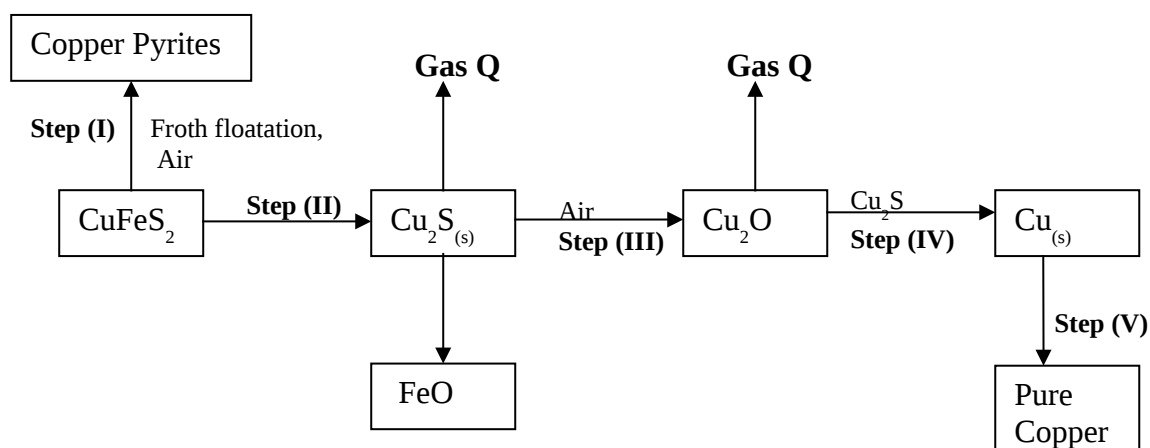
(a) Name gas **Q** ....

(b) With the help of diagram, describe how step (V) is carried out

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

6. The flow chart below shows steps used in the extraction of zinc from one of its ores.

| Lead (II) Carbonate ore | | Crushing → Step I | Powdered Lead (II) Carbonate ore | | Step 2 → | Concentrated Lead (II) Carbonate ore |

Step 3 | Heat
Gas →

Coke
| Lead (II) Metal | ← Step 4 | Lead (II) Oxide |
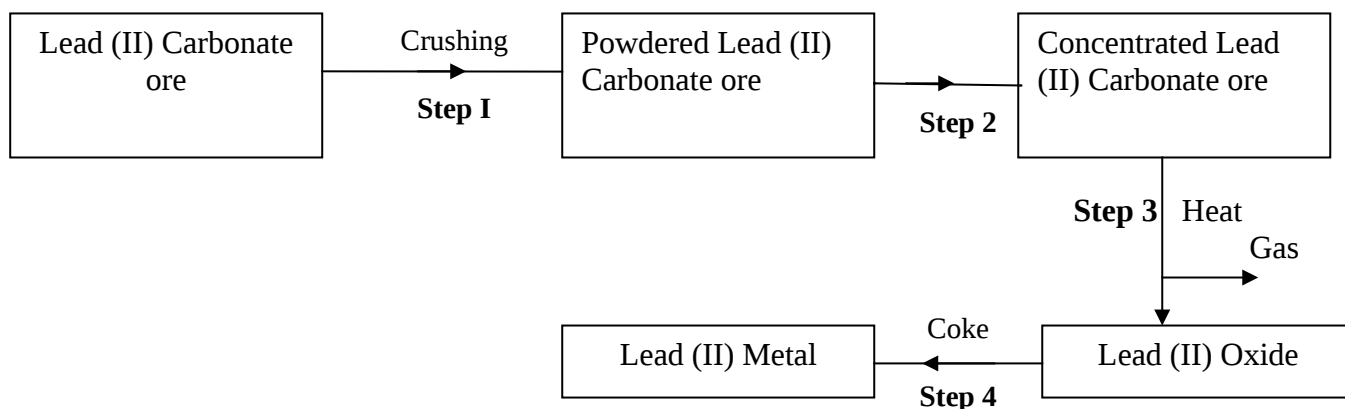
g) Name the process that is used in **step 2** to concentrate the ore

h) Write an equation for the reaction which takes place in **step 3**

i) Name **one** use of lead

7. Name the chief ores from which the following metals are extracted

   a) Aluminium ....

   b) Copper ....

8. The diagram below represents the second stage in extraction of aluminium metal

Aluminium

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
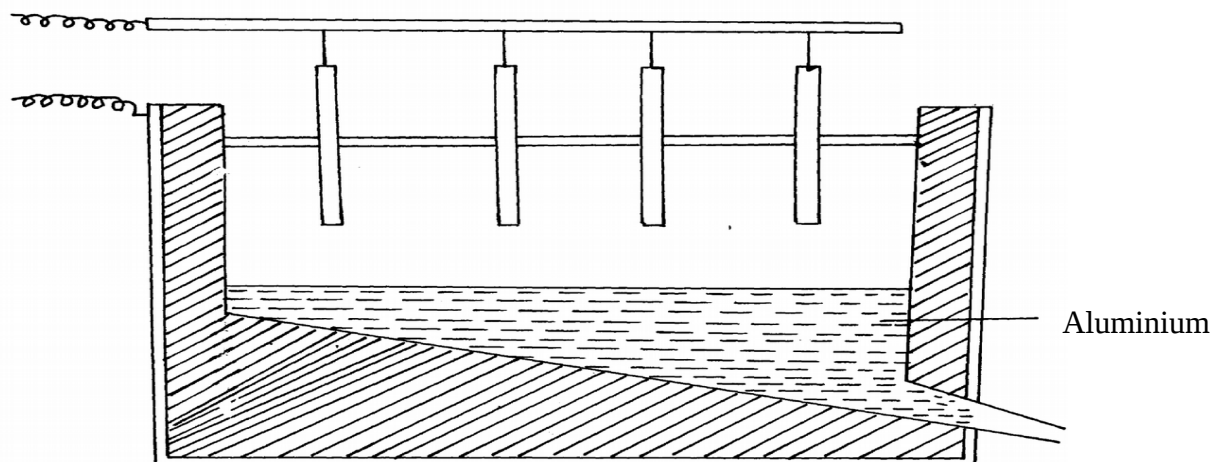
i) On the diagram label the: Anode, cathode and the electrolyte region

ii) The melting point of aluminium oxide is 2054ºC, but the electrolysis is carried out at between
    800-900ºC
(vi)   Why is the electrolysis not carried out at 2054ºC

(vii)   What is done to lower the temperature?

iii) The aluminium which is produced is tapped off as a liquid .What does this suggest about its melting points?

ORGANIC CHEMISTRY II (ALKANOIC ACIDS AND ALKANOLS)

1.   A student mixed equal volumes of Ethanol and butanoic acid. He added a few drops of
        concentrated Sulphuric (VI) acid and warmed the mixture
        (i) Name and write the formula of the main products

        Name.....................................

        Formula..

        (ii) Which homologous series does the product named in (i) above belong?

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

2.   The structure of the monomer phenyl ethene is given below:-

$$HC = CH_2$$
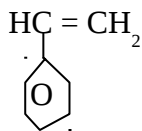
   (viii)   Give the structure of the polymer formed when four of the monomers are
             added together

   (ix)   Give the name of the polymer formed in **(a)** above

3.   Explain the environmental effects of burning plastics in air as a disposal
method

4.   Write chemical equation to represent the effect of heat on ammonium
carbonate

5.   Sodium octadecanoate has a chemical formula $CH_3(CH_2)_6 COO^-Na^+$, which is
used as soap.
       Explain why a lot of soap is needed when washing with hard water

6.   A natural polymer is made up of the monomer:

$$CH_3CH_2CH - C - OH$$
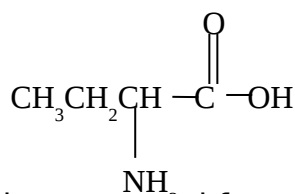
   e) Write the structural formula of the repeat unit of the polymer

       (b) When 5.0×10^{-5} moles of the polymer were hydrolysed, 0.515g of the
monomer

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

were obtained.

Determine the number of the monomer molecules in this polymer.
(C = 12; H = 1; N = 14; O =16)

7. The formula below represents active ingredients of two cleansing agents **A** and **B**

$$CH_3(CH_2)_n\ C \underset{H}{\overset{H}{-}}\!\!\!\!\!\!\!\!\bigcirc\!\!\!\!\!\!\!\!- SO_3^-Na^+ \qquad CH_3(CH_2)_6\ COO^-Na^+$$
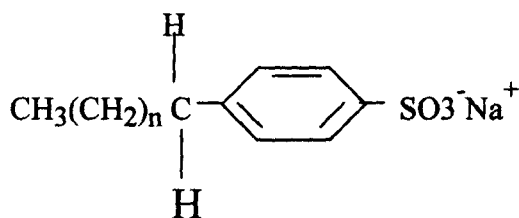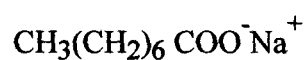
Agent A   Agent B

Which one of the cleansing agents would be suitable to be used in water containing magnesium
hydrogen carbonate? Explain

8. Study the polymer below and use it to answer the questions that follow:

$$\begin{array}{cccc} H & H & H & H \\ | & | & | & | \\ C - & C - & C - & C \\ | & | & | & | \\ \bigcirc & H & \bigcirc & H \end{array}\Bigg]_n$$
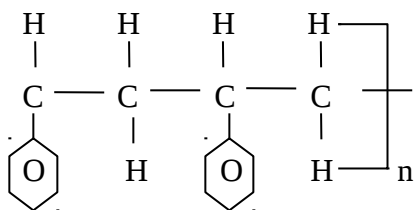
j) Give the name of the monomer and draw its structures

k) Identify the type of polymerization that takes place

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

l) State **one** advantage of synthetic polymers

9.   Ethanol and Pentane are miscible liquids. Explain how water can be used to separate a mixture
        of ethanol and pentane

10.

| GLUCOSE SOLUTION | **G** | CRUDE ETHANOL | **H** | 95% ETHANOL | | ABSOLUTE ETHANOL |

$$\text{GLUCOSE SOLUTION} \xrightarrow{\textbf{G}} \text{CRUDE ETHANOL} \xrightarrow{\textbf{H}} \text{95\% ETHANOL} \longrightarrow \text{ABSOLUTE ETHANOL}$$
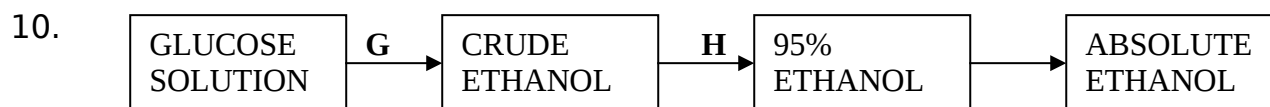
(vi)   What is absolute ethanol?

(vii)   State **two** conditions required for process **G** to take place efficiently

11.   (a) Give the IUPAC names of the following compounds:
        (i) $CH_3COOCH_2CH_3$

(ii) $CH_2 = C - CHCH_3$
                    $|$
                  Br

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com
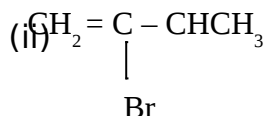
(b) The structure below shows some reactions starting with ethanol. Study it and answer
   the questions that follow:
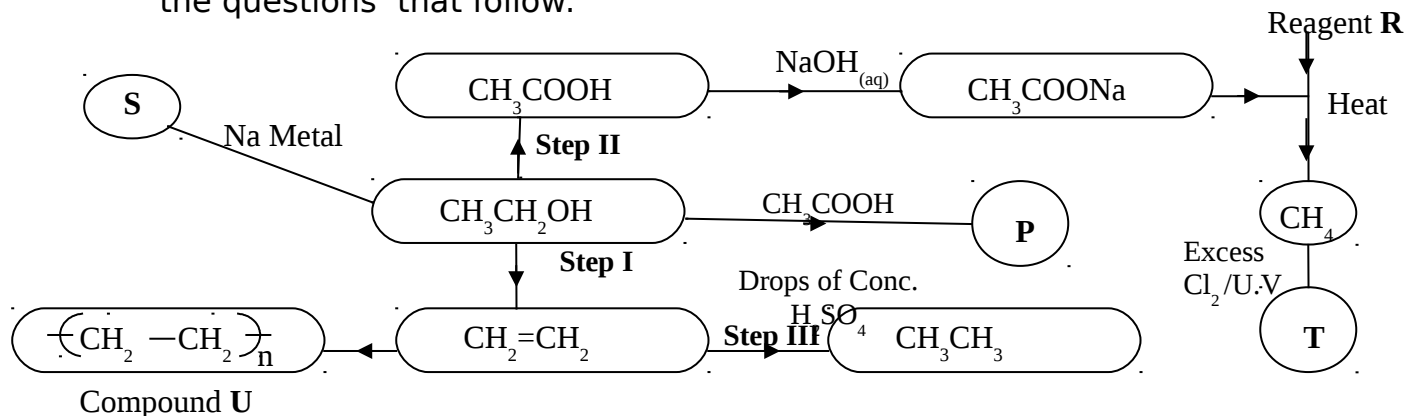
(i) Write the formula of the organic compounds **P** and **S**

(ii) Name the type of reaction, the reagent(s) and condition for the reactions in the following steps :-
   (I) Step I
   (II) Step II
   (III) Step III
(iii) Name reagent **R** ....

(iv) Draw the structural formula of **T** and give its name

(v) (I) Name compound **U**...

   (II) If the relative molecular mass of **U** is 42000, determine the value of n (**C**=12, **H**=1)

(viii)   State why C_2H_4 burns with a more smoky flame than C_2H_6

12.   a) State **two** factors that affect the properties of a polymer

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

b) Name the compound with the formula below :
CH₃CH₂CH₂ONa

c) Study the scheme below and use it to answer the questions that follow:-

i) Name the following compounds:-
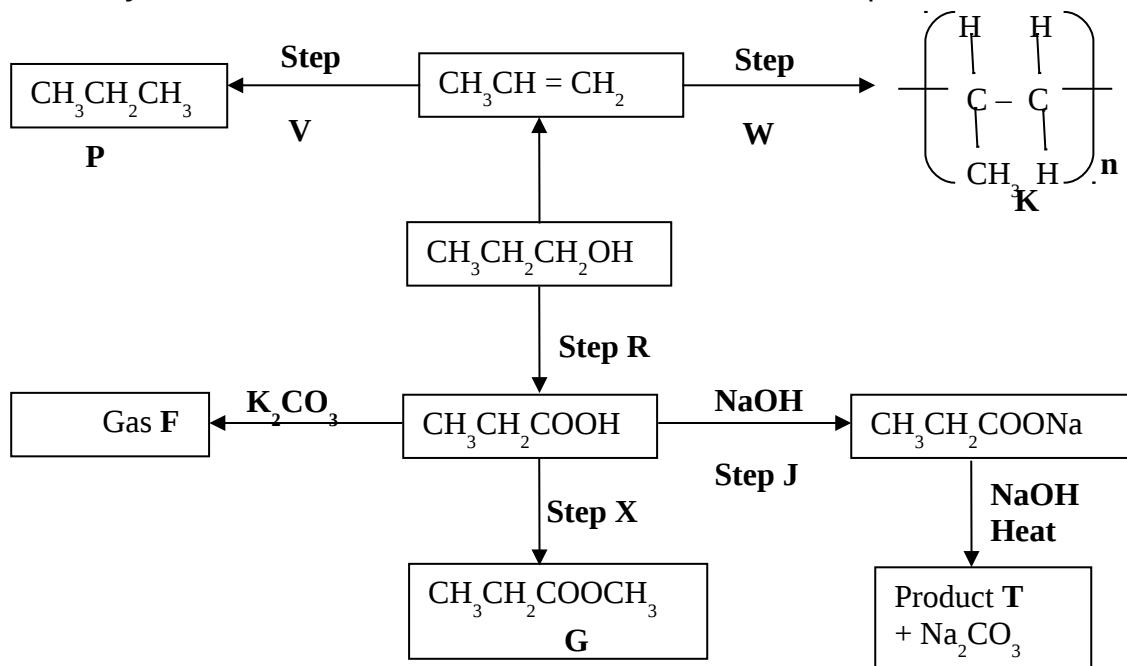
   I. Product **T** ....   II. **K** ....

   ii) State **one** common physical property of substance **G**

   iii) State the type of reaction that occurred in step **J**

   iv) Give **one** use of substance **K**

   v) Write an equation for the combustion of compound **P**

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

vi) Explain how compounds CH_3CH_2COOH and $CH_3CH_2CH_2OH$ can be distinguished chemically

vii) If a polymer K has relative molecular mass of 12,600, calculate the value of n
(H=1 C =12)

RADIOACTIVITY

1.   Complete the following equation by determining the values of **U** and **V**.

$$^{234}_{90}\text{Th} \longrightarrow ^{u}_{v}\text{Pa} + ^{0}_{-1}\text{e}$$
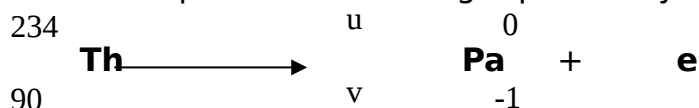
U.........   V.................

2.   (a) Distinguish between nuclear fusion and fission

     (b) Compete the nuclear equation below:-

$$^{230}_{90} \longrightarrow ^{230}_{91} + \underline{\hspace{2cm}}$$
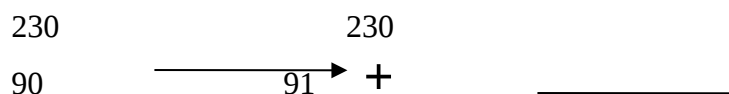
3.   Uranium -238 disintegrates by emitting an alpha particle to form substance **Y**.
     Nuclide **Y** emits a beta particle to form substance **Z**. Write down nuclear equations to show how
     substance **Y** and **Z** are formed   (U=At No. 92)

4.   (a) What is a nuclide?

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

(b) The graph below shows the radioactive decay of a certain nuclide. Determine the half-life of the nuclide
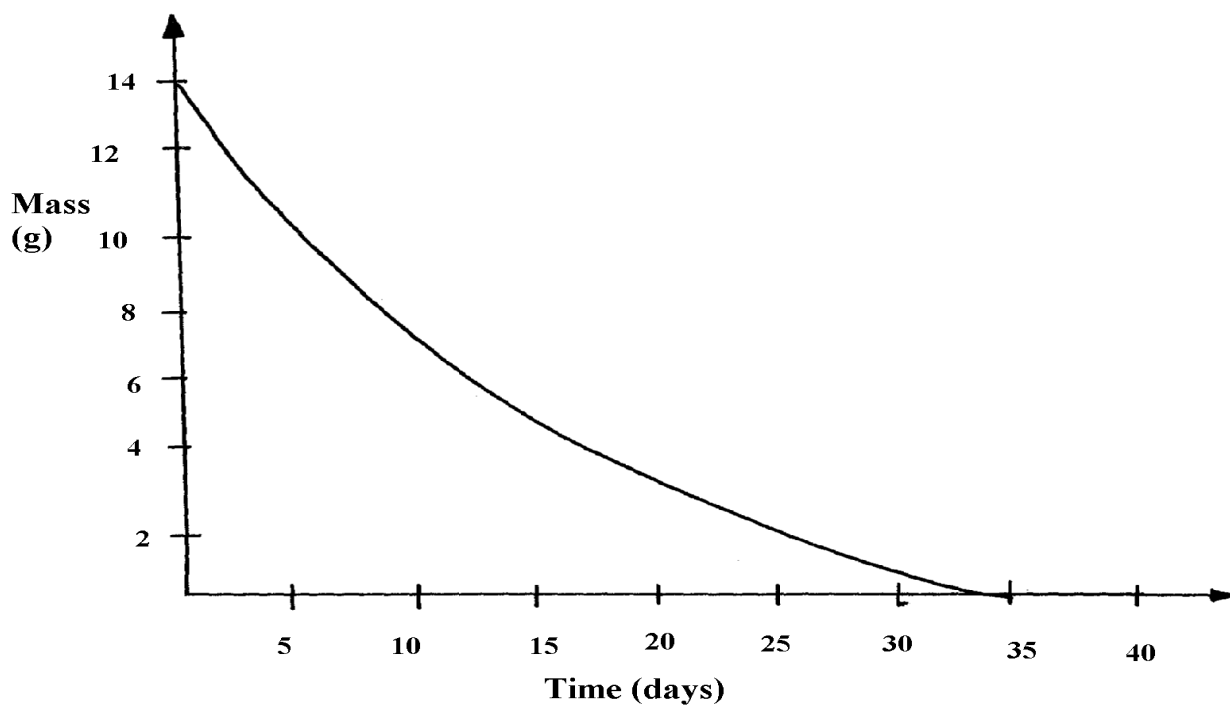
(c) What effect do excess exposures of radiation have on metals?

5. (a) State **one** way in which nuclear reactions differ from ordinary chemical reactions

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

(b) The following is a part of Uranium decay series

$$^{238}_{92}U \xrightarrow{\text{Step I}} {}^{234}_{90}Th \xrightarrow{\text{Step II}} {}^{234}_{91}Pa \xrightarrow{\text{Step III}} {}^{Z}_{A}X$$
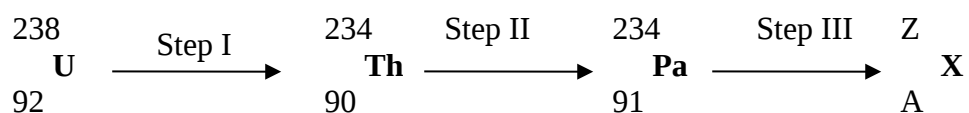
m) Which particles are emitted in **step I** and **II**

n) If a beta particle is emitted in **step III,** find **Z** and **A**

o) If the activity of Thorium -234 is reduced to 25% in 48hours, find its half life

6.   Some **two** elements are represented as:

$$^{16}_{8}X \quad \text{and} \quad {}^{27}_{13}Y$$
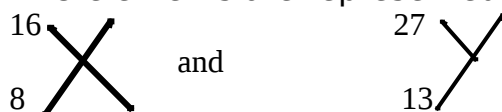
(d)   How many protons does **X** have?

(e)   How many neutrons does **Y** have?

(f)   Draw the structure of the compound formed between **X** and **Y**

Compiled and supplied online by Schools Net Kenya | P.O. Box 85726 – 00200, Nairobi
Tel:+254202319748 | +254 733 836593 | email: infosnkenya@gmail.com
Order answers online at: www.schoolsnetkenya.com

7. **Y** grams of a radioactive isotope take 120days to decay to 3.5grams. The half-life period
    of the isotope is 20days
    (j) Find the initial mass of the isotope

    (b) Give **one** application of radioactivity in agriculture

8. Study the nuclear reactions given and answer the questions that follow:

    $^{12}_{6}$**X** Step I $^{14}_{6}$ Step II**Y** $^{14}_{7}$ **Z**

    (a) Write an equation for the nuclear reaction in step II
                (lmk)

    (b) Give **one** use of   **Y**
                (lmk)

9. Give **two** uses of radioactive isotopes in medicine.

10. Study the information in the following table and answer the questions that follow. The letters
    do not represent the actual chemical symbols of the elements.

ELEMENT	U	V	W	X	Y	Z
NUMBER OF PROTONS	18	20	6	16	19	17
NUMBER OF NEUTRONS	22	20	8	16	20	20

    Which of the above elements are:
    f) Likely to be radioactive?

    (ii) Able to form a compound with the highest ionic character?