**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**ADM NO: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_CLASS: \_\_\_\_\_\_\_\_\_\_**

**233/1**

**CHEMISTRY**

**PAPER1**

**JULY 2015**

**TIME: 2 HOURS**

**Kenya Certificate of Secondary Education**

* Answer **ALL** the questions in the spaces provided.

This paper consists of **12 printed pages.**

Make sure that all the pages are printed and that no page is missing.

*Turn Over*

1. 60cm3 of oxygen gas diffused through a porous partition in 50 seconds. How long would it take 40cm3 of SO2 to diffuse through the same partition under the same conditions? (S=32.0, 0=16.0) (3 mks)

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1. A group of compounds called chlorofluorocarbons have a wide range of uses but they also have harmful effects on the environment. State one;
2. Use of chlorofluorocarbons (1mk)

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1. Harmful effect of chloroflurocarbons on environment (1mk)

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1. At 20oC, NO2 and N2O4 gases exist in equilibrium as shown in the equation below.

2NO2 N2O4(g) H=-VE

Brown Pale yellow

State and explain the observation that would be made when.

1. The syringe containing the mixture is immersed in ice-cold water (2mks)

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1. The volume in the gaseous mixture in the syringe is reduced (2mks)

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1. A student suspected a given sample of water contains suphate ions. Describe how he can show the presence of the sulphate ions in the water sample. (3mks)

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1. In the industrial manufacture of nitric (V) acid the first step is catalytic oxidation of ammonia gas.
2. What is the name of the catalyst used (1mark)

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1. Write the equation for the catalytic oxidation of ammonia gas. (1 mark)

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1. State one use of ammonium nitrate (1mark)

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1. Explain why boiling point of ethanol is higher than that of hexane. (Relative molecular mass of ethanol is 46 while that of hexane is 86) (2mks)

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1. When 94.5g of hydrated barium hydroxide Ba(OH)2.nH2O were heated to a constant mass, 51.3g of anhydrous barium hydroxide were obtained. Determine what is n. (Ba=137, O=16,H=1) (3 marks)

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 HH4+(g) + Cl-(g)

 ∆H2

 ∆H1 NH4+(aq) + Cl(aq)

 Energy

 ∆H3

 NH4Cl(s)

Reaction progress

(a) What do H1 and H2 represent (2marks)

1. H1
2. H2

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 (b) Give an expression to show relationship between H1, H2 and

 H3. (1 mark)

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1. 6.84g of aluminium sulphate were dissolved in 150cm3 of water. Calculate the molar concentration of the sulphate ions in the solution. (R.M.F. = 342) (3 marks)

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1. Study the information given in the table below and answer the questions that follow.

|  |  |
| --- | --- |
| Bond | Bond energy (KJ mol) |
| C-H | 413 |
| C-C | 346 |
| Br-Br | 193 |
| C-Br | 280 |
| H-Br | 365 |

1. Calculate the enthalpy changes for the reaction below (2mks)

 C2H6(g) + Br2(g) C2H5Br(g) + HBr(g)

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1. State whether the reaction is exothermic or endothermic. Explain

 (1 mark)

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Which method is used to collect ammonia gas? Explain (2mks)

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1. What name is given to the compound which undergoes polymerization to produce polypropene (1mk)
2. Name

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1. Write equation for the polymerization (1mk)

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1. How many grams of magnesium would react with excess aqueous hydrochloric acid to produce 1.2 litres of hydrogen gas at room temperature and pressure? (Mg = 24) (1mk)

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1. 3g of iron reacted with hydrogen chloride gas to form iron (II) chloride at s.t.p. Calculate the volume of the hydrogen gas used. (Fe=56, Molar gas volume at s.t.p. =22.4dm3) (2mks)

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1. The following are standard electrode potentials for half reactions
2. ½ Br2(g) + e E θ= +1.07V
3. Fe3+ (aq) + e E θ= +1.77V
4. Mg2+ (aq) + 2e E θ=-2.38V
5. State the strongest reducing agent (1mk)
6. (i) Write the cell notation of the combination that will produce

 the greatest e.m.f. (1mk)

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 (ii) Calculate the e.m.f. of the cell in b(i) (1mk)

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1. Which substance can be used to convert Fe2+ to Fe3+ (1mk)

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1. (a) Distinguish between isotopes and allotropes (2 mks)

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 (b) Give three examples of allotropes (3 mks)

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1. A student has a mixture of solid ammonium chloride and solid zinc sulphate. Which is the simplest method of separation? (1mk)

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1. A student prepared ammonia and bubbled it into a solution of zinc sulphate solution as shown in the diagram below.

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1. Name the two reactants (2mks)

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1. State the observations in the beaker (1mk)

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1. Write ionic equation in the beaker (1mk)

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1. A student prepares some crystals of hydrated sodium sulphate of titrating aqueous sodium hydroxide with dilute sulphuric acid. Describe how he can obtain pure dry crystals of sodium sulphate using this method. (3mks)

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1. Hydrogen peroxide is a covalent compound. It decomposes to form water and oxygen.

 2H2O2(l) 2H2O(l) + O(g)

1. Draw a dot(.) and cross(x) diagram for a molecule of hydrogen peroxide (1mk)

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1. The decomposition of hydrogen peroxide involves a change from the liquid state to the gaseous state. Describe the difference in both the movement and arrangement of particles in a liquid and in a gas. (2mks)
2. In Liquid

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1. In Gas

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1. The following set up was used to investigate the effect of an electric current on silver chloride

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1. Label the cathode and anode on the diagram (1mk)
2. When the switch was closed the bulb did not light. Explain. (1mk)

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1. If the bulb lights, write the equation of the reaction occurring at the cathode (1mk)

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1. State and explain the observation made at the anode

 (1mk)

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22. The table below gives the solubilities of salt L and K at 10oC and 40oC. Solubility in g/100g water

 Salt At 10oC At 80oC

 L 60 75

 K 20 32

 When an aqueous mixture containing 80g of L and 10g of K in 100g water at 80oC was cooled to 10oC, precipitation occurred.

1. Explain the precipitation (1mk)

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1. Determine the mass of the precipitate formed (½ mk)

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1. Name the method of separation (½ mk)

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23. (a) A student electroplated a knife with silver metal. Write an

 Equation for the process that took place at the cathode (1 mk)

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 (b) Calculate the time in minutes required to deposit 2.01g of

 silver if a current of 2 amperes was used (1 faraday = 96500C Ag = 108) (2mks)

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24. In an experiment to determine the percentage of magnesium hydroxide in an anti-acid, a solution containing 0.50g of the anti-acid was neutralized by 23.0cm3 of 0.010M hydrochloric acid (relative formula mass of magnesium hydroxide =58)

1. Calculate the mass of magnesium hydroxide in the anti-acid (2mks)

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1. Calculate percentage of magnesium hydroxide in the anti acid (1mk)

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25. (a) What would be observed in sulphuric IV oxide is bubbled through acidified potassium chromate VI (1mk)

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 (b) In an experiment sulphur IV Oxide was dissolved in water to form solution M.

(i) State the observations made if a few drops of barium chloride solution were immediately added to solution M (1mk)

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(ii) Identify the spectator ions from the reaction above

 (1mk)

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26. An element R(R) which is used for dating decays by emission and has half life of 5600 years

(a) Give an equation for the decay (1mk)

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(b) A fossil skull has an activity of R-14 which was only 6.25% of the activity found in living animals. How old is the fossils? (2mks)

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27. Zeolites (Na2X) is a complex compound used to soften hard water in the ion-exchange methods according to the equation below.

Ca2+ (aq) + Na2X(aq) CaX(s) + 2Na+(aq)

After sometime the zeolites gets exhausted and ceases to soften water. Write a reaction to show how zeolite is reactivated. (2mks)

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28. 19g of fluorine reacted with 21g of an alkene that contains one carbon-carbon double bond.

(i) Calculate the molecular formula of the alkene (1mk)

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(ii) Give the molecular formula of the alkene (2mks)

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