MANGU HIGH SCHOOL

**233/1**

**CHEMISTRY**

**PAPER 1**

**JULY 2014**

**TIME: 2 HOURS**

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

ADM NO: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ CLASS: \_\_\_\_\_\_\_\_\_\_

**Kenya Certificate of Secondary Education**

**MOCK EXAMINATIONS**

**Chemistry**

**Paper 1**

**2 Hours.**

* 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. Starting with copper metal, describe how solid copper(II) carbonate can be prepared (3mks)
2. The table below shows the first ionization energies of elements B and Q.

|  |  |
| --- | --- |
| Element | 1st ionization energy |
| B | 494 |
| Q | 418 |

1. What do these values suggest about reactivity of b compared to that of Q. Explain (2mks)
2. State one factor that influence ionization energy (1mk)
3. Some moist iron wool was placed in a test tube and the tube was inverted and set as shown below.

The apparatus was left for one week. The water level rose and iron wool turned red brown.

1. Write the chemical equation to show the rusting of iron. (1mk)
2. Write the expression for a……………………..approximate percentage of air that support rusting. (1mk)
3. The table below gives reduction potentials obtained when the half-cells for each of the metals represented by letters J, K, L, and N were connected to a copper half cell as the reference electrode.

Metal Reduction potential (volts)

J -1.10

K -0.47

L 0.00

M +0.45

N +1.16

1. What is metal L likely to be? Give a reason (2mks)
2. Which of the metals cannot be displaced from the solution of its salt by any other metal in the table? Give a reason. (2mks)
3. Study the information in the table and answer the questions that follows.

|  |  |
| --- | --- |
| Substance | Solubility (g/100gH2O at 30oC) |
| A | 1.26 X 102 |
| B | 1.09 X 102 |

Describe how a solid sample of substance A could be obtained from a solid mixture of A and b at 30oC. (2mks)

1. Study the process below and answer the questions that follow

X + n W + R + 3n + energy

1. State one industrial applications of process shown above. (1mk)
2. Find the values of (a) and (b) (2mks)
3. The set-up below shows one of the chemical properties of hydrogen sulphide.
4. State the observations made in tube L. (1mk)
5. If 40cm3 of 0.2M Nitric V acid was used for this experiment. Calculate the mass in grams of the solid deposited. (3mks)

Colourless solution X

Excess ammonia solution

Solid A

yellow (hot)

White (Cold)

Heat

Solid B

+

Steam

Excess sodium hydroxide solution

Colourless solution R

1. Write the ionic equation for the formation of solution R (1mk)

(b) Name solid B (1mk)

(c) Name the process used to prepare solid B. (1mk)

9. Study the diagram below and answer the questions that follow.

1. State the use of the aspirator in the experiment. (1mk)
2. Write the equation for the reaction that takes place in flask Q if excess Carbon II Oxide was used. (1mk)

10. The formula of the phosphate of X is X3(PO4)2 write the formula of the chloride of X. (1mk)

11. Chlorine can be manufactured by electrolysis of saturated sodium chloride solution.

(i) Write the equation for the reaction that takes place at the anode and cathode. (2mks)

12. State two similarities between rusting and combustion (1mk)

13. The table below shows the formulae of the chloride of ABC and D(not the actual symbols)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Elements | A | B | C | D |
| Formulae of chlorine | ACl | BCl2 | CCl3 | DCl5 |

(i) State the group to which the elements A,B,C, and D belong? (2mks)

(ii) Which of the chlorides would conduct electricity when dissolved in water. Explain.

14. Other than cost, give two other reasons why aluminium is used for making electric cables while magnesium is not. (2mks)

15. (a) When do we separate mixtures using fractional distillation. (1mk)

(b) Explain how a solid mixture of sulphur and sodium chloride (common salt) can be separated into solid sulphur and sodium chloride. (2mks)

16. Study the diagram below and answer the questions that follow.

NH4+(g) + Cl-(g)

DH2

Energy DH1 NH4+(aq) + Cl-(aq)

DH3

NH4Cl(s)

1. What do DH and DH2 represent? (2mks)

DH1

DH2

1. Write an expression to show the relationship between DH1, DH2, and DH3. (1mk)

17. Arrange the following gases CO2, SO2, HCl and Cl2 in order of their ease of diffusion through a porous membrane starting with the one which diffuses most readily (C=12, O=16, S=32, CL=35.5, H=1) (2mks)

18. Calculate the amount of calcium carbonate that would remain if 1.5g of calcium carbonate reacted with 0.2moles f hydrochloric acid (C=12, O=16, Ca=40)

(3mks)

19. (a) Ethane can be used to produce ethane in the equation below.

C2 H6  (g) C2 H4 + H2 (g)

Name the process shown above. (1mk)

(b) Name the molecule shown below

(i) CH = CHCH3 (1mk)

O

(ii) Give the general equation for the polymerization of the molecule in b (i) above. (1mk)

20. Two rods X and Y of different metals were placed in a solution containing ions of metal Z. The results were as shown below.

1. Arrange the metals X, Y, and Z in order of their electro-positivity starting with the most electropositive. (2mks)
2. What would you observe if a rod of metal Z is placed in a beaker containing ions of Y. (1mk)

21. 0.32g of a gas at s.t.p occupy 448cm3. Calculate the molecular mass of the gas. (2mks)

22. Trona is a double salt of sodium. Trona is collected dried and heated to convert it to soda ash.

1. Write an equation or the decomposition of Trona by heat. (1mk)
2. State two uses of soda ash. (2mks)

23. Describe how you can prepare crystals of potassium sulphate starting with 50cm3 of 1m potassium hydroxide. (2mks)

24. The diagram below shows an energy level diagram for reaction

1. State and explain whether the reaction is exothermic of endothermic. (2mks)
2. On the same diagram above, draw a graph for the same reaction on addition of a catalyst. Explain (2mks)

25. Dilute nitric acid reacts with copper according to the equation.

3Pb(s) + 8H+(aq) + 2NO-3 (aq) 3Pb2+ (aq) + 2NO(g) + 4H2O(l)

1. What is the oxidation number of nitrogen in (2mks)
2. NO-3
3. NO
4. With respect to nitrogen, explain whether the above reaction is an oxidation or reduction process (2mks)

26. The equations below represent two processes that take place without any change in temperature.

(i) H2 O (s) H2 O (l)

(ii) MgCl2 (s) Ca2+ (l) + 2Cl- (l)

1. Explain why although heat is required for each of the processes to take place, the temperature remains constant in both processes. (1mk)
2. Which of the two processes, has a higher enthalpy (DH). Give a reason (2mks)

27. Zinc metal can be formed by extracting it from its ore. The first step in the extraction process is the roasting of the ore (ZnS). 300kg of zinc sulphide is roasted in air. Calculate the volume of sulphur (IV) oxide give off at room temperature. (3mks)

28. (a) Write an equation for the regeneration of ammonia gas in the Solvay process. (1mk)

(b) State the role of metal baffler in the Solvay tower. (1mk)

29. A small crystal of potassium cromate (VI) was placed in a beaker containing water. The beaker was left standing for 3 days without shaking. State and explain the observations that were made. (2mks)

30. Study the flow chart below and answer the questions that follow.

Colourless gas ignites with a pop sound

Few drops of NH3 (aq)

White precipitate

Solution y

Solid A + HCl (aq)

Excess NH3(aq)

few drops of NaOH

White precipitate

colourless solution T

Excess NaOH

Colourless solution L

1. Name solid A (1mk)
2. State the observations that would be made if solution Y is mixed with aqueous silver nitrate solution. (1mk)
3. Write down the equations for the formation of
4. White precipitate G. (2mks)

31. A solid P was heated to constant weight and a black powder Q was produced and gas which forms a white precipitate with line water was liberated. When the black powder was reacted with dilute sulphuric acid a blue solution R was formed.

1. Identify solid P, powder Q and gas liberated. ( 1½ mks)
2. Write balanced equations for
3. heating solid P (1mk)
4. reaction of Q with dilute sulphuric acid (1mk)
5. Barium chloride was added to solution R. State one observation made after the reaction. (1mk)