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**233/1**

**CHEMISTRY**

**PAPER 1**

**JULY /AUGUST 2016**

**TIME: 2 HOURS**

**BARINGO COUNTRY EDUCATIONAL IMPROVEMENT EXAMINATION**

***Kenya Certificate to Secondary Education***

**INSTRUCTIONS TO CANDIDATES**

* *Write your* ***name, admission number, date, index number*** *and school in the spaces provided*
* *Answer* ***all*** *the questions in the spaces provided*
* *All working* ***MUST BE*** *clearly shown where necessary*
* *Scientific calculators may be used*
* *Candidates should answer the questions in English*

***FOR EXAMINER’S USE ONLY***

|  |  |  |
| --- | --- | --- |
| **Questions** | ***Maximum score*** | ***Candidate’s score*** |
| **1 – 30** | 80 |  |

*This paper contains*  ***11printed pages****. The candidates should check to confirm that all pages are printed and that no question is missing.*

1. (i) What is a fume chamber. (1mk)

(ii) State 2 uses of fume chamber in a school laboratory (2mks)

2. The chromatogram below shows the constituents of a flower extract. Study it and answer the questions.

X

Red

Yellow

Y

(a) Give a reason to explain the different positions of red and yellow pigments. (2mks)

(b) What does the line labeled X represent? (1mk)

3. (a) State the chemical name of rust (1mk)

(b) Two iron nails were coated with zinc and copper as shown below

Iron nail

Zinc

Iron nail

Copper

**A**

**B**

State and explain what was observed on each nail. (2mks)

4. After a meal, bacteria in the mouth break down some food to produce organic acids, such as acetic acid and lactic acids. Therefore one is advised to brush his/her teeth using tooth paste containing fluoride compounds. Give a reason why. (2mks)

5. A mixture of ammonium chloride and sodium nitrite was heated as shown in the set up below

Cold water

Gas A

Heat

Ammonium chloride + sodium nitrite

(i) Identify gas A (1mk)

(ii) State and explain the precaution that should be taken before heating is stopped. (2mks)

6. Study the table below and answer the questions that follow.

(The letters are not the actual symbols of the elements)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Element | B | C | D | E | F |
| Atomic number | 18 | 5 | 3 | 5 | 20 |
| Mass number | 40 | 10 | 7 | 11 | 40 |

(i) Which two letters represent the same elements? Give reason (2mks)

(ii) Give the number of neutrons in an atom of element D. (Show your working) (1mk)

7. Explain why red hot iron reacts with chlorine to form iron (III) chloride, but red hot iron reacts with iodine to form iron (II) iodine. (1mk)

8. Explain the following trends in the periodic table

(i) Reactivity of alkali metals increases down the group. (1mk)

(ii) The atomic radius of elements decreases across a period (1mk)

9. Using dot(.) and cross(x) draw a diagram to represent carbon (II) oxide (2mks)

10. When aluminium chloride is dissolved in water, an acidic solution is formed. Write the chemical equations to represent the observation made. (2mks)

11. Study the flow chart below and answer the questionss

**Step III**

Add NH4OH (aq) till excess

Add Pb(NO3)2(aq)

Add HNO3(aq)

Add water, filter

**Step I**

Mixture

Black solid

Coloured solution

White

Precipitate

Insoluble on boiling

Blue precipitate

**Step II**

White Precipitate

Soluble in excess

(i) Name cations present in the mixture (1mk)

(ii) Anions present in the mixture (1mk)

(iii) Write an equation to show reaction taking place at step 3 . (1mk)

12. State two gases found in water gas formed when carbon at about 1200˚C reduces steam (1mk)

13. (a) Explain why potassium carbonate cannot be manufactured by Solvay process. (1mk)

(b) Write an equation for the reaction that takes place in the carbonator or Solvay tower. (1mk)

(c) State one commercial use of soda ash. (1mk)

14. (a) State the Gay Lussac’s law . (1mk)

(b) In an experiment 436cm3 of hydrogen sulphide was exploded in 363cm3 of oxygen and reacted as per the following equations

2H2S(g) + 3O2(g) 2SO3(g) + 2H2O(g)

Determine the volume of the residue gas (2mks)

15. **5.34g** of a salt of formula M2SO4 was dissolved in water. The sulphate was precipitated by

adding excess barium chloride solution. The mass of the precipitate formed was **4.6g**.

(Ba=56, S=32, O=16)

(i) Determine the moles of sulphate ions present. (1mk)

(ii) Calculate the relative atomic mass of M in M2SO4 . (2mks)

16. Study the flow chart below and answer questions that follow:

Air + Heat

Cl2(g)

**Step II**

HBr

**Step I**

C12H26

C9H20

C3H6

M

C3H8

N

**Step III**

1. Name the process labeled in steps above

Step I (½mk)

Step II (½mk)

1. State the physical condition required for step I to occur. (1mk)
2. Name the reagent and state the conditions required for step 2 to occur. (1mk)

17. State one use of sulphur which is associated with.

(a) Medicine (1mk)

(b) Agriculture (1mk)

18. The set up of apparatus below used to prepare sulphur (VI) oxide :

Solid SO3

Ice

Dry gas M

Dry gas N

Catalyst X

Drying agent Y

(i) Name

Gas N (½mk)

Gas M (½mk)

Catalyst X (1mk)

(ii) Why is it necessary to use drying agent Y? (1mk)

19. Consider the apparatus shown below when a small amount of water is introduced into the flask by squeezing the bulb of the medicinal dropper, water is squirted upward out of the long glass tubing. Explain this observation. (2mks)

HCl(g)

Rubber bulb

Water

20. A certain detergent was found to contain a molecule represented by the formula C17H35COONa. When this detergent was added to a sample of water a white precipitate was formed.

(i) State a possible reason for formation of the white precipitate . (1mk)

(ii) Write down one possible formula of the white precipitate formed . (1mk)

21. The solubility of salt X in water at 750C is 82g /100g of water, while that of salt Y is 37g/100g of water. Describe how a sample of salt Y can be obtained from their solid mixture. (2mks)

22. The figure below shows the variation in rates of the following reaction,

2NO(g) + O2(g) 2NO2(g) H = +Ve

Curve II

Curve I

Time (minutes)

Rate of reaction

Other than concentration of either reactants or products, identify two other factors that can affect the rate of reaction above. Explain your answer. (2mks)

23. In the industrial production of aluminium a current of 300,000A is passed through molten aluminium oxide for 24 hours. Calculate the mass of aluminium produced at the cathode.

(Al =27, 1F=96500C) (3mks)

24. (a) Radioactive materials pollutes the environment with great effects. State two ways of controlling the effects of radioactive material to the environment (2mks)

(b)In a sample, there are 5.12x1020 atoms of Krypton 92 initially. If half-life of Krypton is 3.0 seconds, determine the number of atoms that will have decayed after 6 seconds. (2mks)

25. Study the Solvay tower diagram shown below and answer the questions that follow:

1. Give reasons why the baffles are used in the Solvay . (2mks)
2. A factory produces 63.6 tonnes of anhydrous sodium carbonate on a certain day by this process. Calculate the number of tonnes of sodium chloride used upon on this particular day. Assume the plant is working 100% efficient (C=12 , H=1, Cl=35.5, Na =23) (2mks)

26. When reacting sulphur (IV) oxide and hydrogen sulphide gases, some traces of water vapour is required for the reaction to occur.

(i) State the role of water vapour (1mk)

(ii) Write the equation for the reaction that occurs . (1mk)

(iii) Identify the reducing agent in the reaction in (b) above. (1mk)

27. (a) Give the IUPAC names of the compounds listed below (2mks)

(i) CH2Br CHBrCH2CH3

(ii) CH2= CH =CH CH3

(b) Draw the structural formula of 2, 3- dimethylbutane (1mk)

28. (a) The terms malleability and ductility are commonly used in chemistry. What is meant by the

terms:

(i) Malleability (1mk)

(ii) Ductility (1mk)

1. Name and write chemical formula for the slag formed during extraction of the

following metals.

(i) Copper (1mk)

(ii) Iron (1mk)

29. Study the diagram below used to investigate the property of steam on aluminium

Steam

Aluminium powder

1. Explain why no gas was collected in the set up above. (1mk)
2. Explain why the reaction between aluminium and steam stops after a short time (2mk)

30. (a) State Hess law. (1mk)

(b) Study the bond energies below and answer the questions that follow

|  |  |
| --- | --- |
| Bond | Bond Energy kJ/mole |
| H H  N H  N N | 436  388  944 |

Calculate heat of formation of one mole of ammonia gas from the equation below

N2(g) + 3H2(g) 2NH3(g) (3mks)