NAME…………………………………………………………………………

INDEX NO ………………………………………………….

CLASS ……………………….CANDIDATE’S SIGNATURE………………………………………….

233/1 CHEMISTRY THEORY PAPER 1

2HRS

1. A student was taking a titration practical using a burette as shown below.

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i) What should be the burette reading in tset up A and B. (1mk)

set up A …………………………………. Cm3

set up B…………………………………cm3

ii) What is the colour of phenolphthalein indicator in: (1mk)

Base …………………………………………………………………

Neutral solutions ………………………………………………..

2. When an electric current was passed through two molten substances M and N in different containers, the observations in the table below were made.

|  |  |
| --- | --- |
| Molten M | Conducts an electric current and is not decomposed |
| Molten N | Conducts an electric current and a gas is formed at one of the electrodes |

(a) Suggest the type of bonding present in substance.

M………………………………………………………………………………………………………………………….. (1mk)

N ……………………………………………………………………………………………………………………………… (1mk)

(b) Name the particles that conduct in

M………………………………………………………………………………………………………………………………….. (1/2mk)

N……………………………………………………………………………………………………………………………………… (1/2mk)

(c) What is the name given to substance N (1mk)

……………………………………………………………………………………………………………………………………………….

3. (a) What is an electrolyte?

………………………………………………………………………………………………………………………………………………. (1mk)

(b) State how the following substances conduct electricity: (1mk)

Molten Calcium……………………………………………………………………………………………………………………………………

……………………………………………………………………………………………………………………………………………………………..

Graphite…………………………………………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………………………………………………..

4. A mixture of copper Oxide and Magnesium powder reacts when heated while that of Copper Magnesium Oxide does not. Explain (2mks)

………………………………………………………………………………………………………………………………………………………………..

……………………………………………………………………………………………………………………………………………………………………

5. (a) What is meant by isomerism? (1mk)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….

(b) Draw and name two isomers of butane (2mks)

6. Differentiate between conductors and non conductors. (2mks)

Conductors…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

Non conductors……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….

7. Two pieces of paper are slipped into a luminous flame as shown below.

Draw diagrams to show the effects when wooden splints are placed in region (i) and region (ii). (2mks)

8. (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)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….

(c) How can one determine if the solid sulphur is pure. (1mk)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

9. A student prepared a sample of Hydrogen sulphide and passed it through a test tube containing Copper (II) Sulphate solution.

(a) **State** what was observed in the test tube. (1/2mk)

…………………………………………………………………………………………………………………………………………………………………..

(b) **Explain** the observation in (a) above using an equation. (2mks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

c) State **one** chemical test for hydrogen sulphide gas. (1/2mk)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

10. Explain why burning magnesium continues to burn in a gas jar full of sulphur (IV) Oxide while a burning splint would be extinguished. (3mks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

11. Describe how you would prepare a dry sample of Lead (II) nitrate from the following reagents. (Lead (ii) oxide, dilute nitric acid). (3mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

12. The diagram below represents the laboratory preparation of **Methane gas**. Study it to answer the questions that follow.

(a) Name **two** possible components of mixture X. (1mk)

…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….

(b) Write a word equation for the reaction in the round bottomed flask. (1/2mk)

…………………………………………………………………………………………………………………………………………………………………..

( c) State **one** missing condition in the set up above. (1/2mk)

………………………………………………………………………………………………………………………………………………………….

13. Study the structure labeled M below and answer the questions that follow.

Structure M

(a) What substance does the above represents? (1mk)

……………………………………………………………………………………………………………………………………

(b) Name the labeled parts: (1 1/2mks)

P

Q

R

(C) Name one physical property of M that makes it valuable in machinery industries. (1/2mk)

…………………………………………………………………………………………………………………………………………………………

14. What do you understand by the following terms: (2mks)

(a) Atomicity

…………………………………………………………………………………………………………………………………………….

(b) Radical………………………………………………………………………………………………………………………………………………………………..

15. Sulphur exists in two crystalline forms.

(a) Name **one** crystalline form of sulphur. (1mk)

……………………………………………………………………………………………………………………………………………………………..

(b) State **two** uses of sulphur. (1mk)

…………………………………………………………………………………………………………………………………………………………………

16. When blue crystals of substance W are heated lightly, they melt to form a blue solution and a colourless liquid collects on the cooler part of the tube. On strong heating, a mixture of brown and colorless gas is released and a black residue remains.

(a) Name the initial stage and the second stage of the reaction. (1mk)

Initial stage…………………………………………………………………………………………………………………………………………

Second stage ………………………………………………………………………………………………………………………………………

(b) Identify the brown gas and state the chemical test of the gas. (1mk)

Gas………………………………………………………………………………………………………………………..

Chemical test ………………………………………………………………………………………………………..

17. A compound contains 12.84% by mass of carbon, 2.14% hydrogen and rest is bromine.

(a) Calculate its empirical formula. (2mks)

(c=12, H=1, Br=80)

…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

(b) Calculate its molecular formula if its relative molecular mass is 188. (1mk)

18. Name the particles responsible for both metallic conductivity and electrolytic conductivity. (2mks)

Metallic conductivity…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….

Electrolytic conductivity………………………………………………………………………………………………………………………..

………………………………………………………………………………………………………………………………………………………………

19. State and explain what happens when conc. Nitric acid is poured in a conical flask containing charcoal. (3mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

20. A laboratory technician intended to heat magnesium ribbon in carbon (IV) oxide full jar during a classroom demonstration and cleaned the ribbon with a sand paper.

Deflagrating

White ash spoon

Black specks

a) Why is magnesium ribbon cleaned first before it is heated in air? (1/2mk)

………………………………………………………………………………………………………………………………………

b) Write a word equation for the reaction above. (1/2mk)

…………………………………………………………………………………………………………………………………………………………..

c) Identify the black specks and white ash (2mks)

Black specks………………………………………………………………………………………………………………………………

White ash ………………………………………………………………………………………………………………………………….

21. Magnesium hydroxide is used as a medication to relieve stomach acidity.

a) Write a word equation to for the reaction taking place in the stomach. (1mk)

……………………………………………………………………………………………………………………………………………………….

b) Explain why sodium hydroxide cannot be used for the above purpose. (1mk)

……………………………………………………………………………………………………………………………………………………………….

22. Calculate the oxidation state of Chromium potassium dichromate, k2Cr3O7. (2mks)

…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

23. (a) Illustrate how ammonia gas form ammonium ion, using dot (for hydrogen electrons) and cross (x) for Nitrogen electrons. (2mks)

(b) On the diagram you have drawn above, show the co-ordinate bond. (1mk)

24. Study the diagram below which represents a portion of periodic table atoms and ions and answer the questions that follow.

FFFF

Atomic radii (nm) ionic radii (nm)

Relative atomic size relative

Ionic

Size

(a) Explain why a relative ionic size above is smaller than the atomic size. (2mks)

(b) Name the strongest oxidizing agent above. (1mk)

25. In an experiment, Sulphur (IV) oxide gas was bubbled into water followed by Chlorine gas. The resulting clear solution gave a white precipitate when mixed with acidified barium chloride solution.

Explain these observations. (3mks)

26. The table below shows the tests carried out on separate samples of water drawn from a well and the results obtained.

|  |  |
| --- | --- |
| Tests | Results |
| i) Addition of excess aqueous ammonia | White precipitate. |
| ii) Addition of a few drops of dilute sulphuric acid | No observable change. |
| iii) Addition of dilute hydrochloric acid followed by a few drops of barium chloride. | White precipitate. |

(a) Identify the Cat ion and the Anion present in the water.

Cation………………………………………………………………………………………………………………………… (1/2mk)

Anion…………………………………………………………………………………………………………………………….. (1/2mk)

(b) Write an ionic equation for the reaction which takes place in test (III). (1mk)

27. In an experiment, ammonium chloride was heated in a test tube. A moist red litmus paper placed at the mouth of the test tube first changed blue then red. Explain these observations. (2mks)

28. Describe a simple laboratory experiment that can be used to distinguish between sodium sulphide and sodium carbonate. (3mks)

29. The graph below represent solubility curves of different salts where the steeper the curve the more soluble it is and gentler the curve, the less soluble are the salts. Study it to answer the questions that follow.

KNO4 (NH4)2 SO4

solubility kCl

(g per 100g K2SO4

0f water) NaCl

Temperature (0C)

(a) Which method can be used to separate;

KNO3 and KCl (1MK)

NaCl and CuO (1MK)

(b) What is a saturated solution. (1mk)

30. In the presence of U, V, light, ethane gas undergoes substitution reaction with chlorine.

(a)What is meant by the term substitution reaction? (1mk)

(b)Give the structural formula and the name of the organic product formed when equal volumes of ethane and chlorine react together. (2mks)

31. Ethene and Ethyne are unsaturated hydrocarbons.

(a) Explain what is meant by unsaturation in hydrocarbons (1mk)

(b) Describe giving results, how you would distinguish between ethane and ethane by a chemical means. (1mk)