UMMUL QURA HIGH SHOOL

Arowona Bus-Stop Amuloko Akanran Road, Ibadan.

Third-Term Examination

CLASS: SSS 2 **SUBJECT**: Chemistry **DURATION**: $2\frac{1}{2}$ hours.

Instructions: Answer ***all*** questions in ***Section A*** and ***four*** in ***Section B.***

SECTION A: OBJECTIVES

1. Allotrope of an element differ in their ----.
   A. physical properties
   B. chemical properties
   C. mass numbers
   D. electronic configuration
2. The crystal layers in graphite are held together by -----.
   A. covalent bond
   B. electrovalent bond
   C. ionic bond
   D. Vander waal's forces
3. The liquid product of the destructive distillation of coal is -----.
   A. coal gas
   B. absolute ethanol
   C. aqueous ammonia
   D. ammonical liqour
4. The gas evolved when dilute tetraoxosulphate (VI) acid react with sodium hydrogen trixocarbonate (IV) is
   A. hydrogen
   B. carbon (II) oxide
   C. sulphur (IV) oxide
   D. carbon (IV) oxide
5. Producer gas is a mixture of -----.
   A. CO and H_2
   B. CO and N_2
   C. CO_2 and H_2
   D. CO_2 and N_2
6. Fractional distillation involves one of the following processes.
   A. boiling
   B. boiling and condensation
   C. boiling, evaporation and condensation
   D. condensation and collection
7. The use of diamond in abrasives is due to its -----.
   A. high melting point
   B. hardness
   C. octahedral shape
   D. durability
8. Graphite and diamond are similar in that they ----.
   A. have octahedral shape
   B. have same density
   C. form carbon (IV) oxide
   D. conduct electricity
9. The gasification of coke is used for the manufacture of -----.
   A. producer gas
   B. synthetic gas
   C. natural gas
   D. industrial gas
10. Which of the following gas is a neutral oxide?
    A. Carbon (IV) dioxide
    B. Carbon (II) dioxide
    C. Sulphur (IV) dioxide

D. Sulphur (II) dioxide

11. A form of carbon used for absorbing poisonous gases and purification of noble gases is ----.
    A. wood charcoal
    B. animal charcoal
    C. carbon fibres
    D. carbon black
12. What is the function of concentrated sodium hydroxide in the laboratory preparation of carbon (IV) oxide? To -----.
    A. dry the gas
    B. remove the CO_2
    C. remove any acidic fumes
    D. acidify the gas
13. The following compounds contain the same type of bond ***except*** -----.
    A. NaCl
    B. HCl
    C. CaO
    D. KCl
14. Diamond is used in making which of the following?
    A. Car windscreen
    B. Organic materials
    C. Jewelry
    D. Connecting wires
15. Which of the following salts is stable to heat?
    A. K_2CO_3
    B. $(NH_4)_2SO_4$
    C. $NaHCO_3$
    D. $AgNO_3$
16. It is dangerous to stay in a badly ventilated room which has a charcoal fire because of presence of -----.
    A. hydrogen sulphide
    B. carbon (IV) oxide
    C. carbon (II) oxide
    D. methane
17. Which of the following does not have a peculiar property with others?
    A. Coal
    B. Graphite
    C. Fullerene
    D. Diamond
18. Which of the following compound is a basic salt?
    A. $Mg\ (NO_3)_2$
    B. Zn (OH) Cl
    C. $(NH_4)_2\ SO_4$
    D. $K_4\ Fe\ (CN)_6$
19. Which of the following solids has a network structure?
    A. Diamond
    B. Iodine
    C. Graphite
    D. Sulphur
20. Sea shells contain mainly $Ca\ CO_3$. Calcium oxide can be prepared readily from sea shells by ----.
    A. adding dilute acid
    B. heating at a high temperature
    C. reduction with CO
    D. addition of dilute NaOH
21. The main feature of CO_2 which qualifies it's use in soft drink is -----.
    A. density
    B. solubility
    C. boiling point
    D. refreshing taste
22. The property of graphite that makes it a good lubricant is it's -----.
    A. low melting point
    B. low density
    C. softness
    D. planar molecular structure

23. Which of the following properties makes graphite a good conductor of electricity?
    A. Possession of 6 carbon atoms in its molecule
    B. Presence of mobile electrons in its crystal lattice
    C. Ability to flake easily
    D. Ability to melt at a high temperature
24. The chemical used in testing the presence of CO_2 in the laboratory is -----.
    A. $Ca(OH)_2$
    B. $Mg(OH)_2$
    C. $Zn(OH)_2$
    D. $Cu(OH)_2$
25. A process of continuous circulation of carbon in the atmosphere is called -----.
    A. carbon cycle
    B. atmocarbonated cycle
    C. carbonaceous cycle
    D. carboxylic cycle
26. The rate of production of hydrogen gas from the reaction between zinc graphite and hydrochloric acid can be increased by ----.
    A. cooling the reaction mixture
    B. using zinc rod instead of zinc powder
    C. carrying out the reaction at a room temperature
    D. using zinc powder instead of zinc granules
27. Consider the reaction represented by the equation : $Ca(OH)_{2\,(aq)} + CO_{2\,(g)} \rightarrow CaCO_{3\,(s)} + H_2O_{(l)} + CO_{2(g)}$. In the reaction above, CO_2 acts as a/an -----.
    A. acidic oxide
    B. oxidizing agent
    C. basic oxide
    D. dehydrating agent
28. Carbon (II) oxide and nitrogen are present in producer gas in the volume ratio of -----.
    A. 1:1
    B. 1:2
    C. 2:1
    D. 2:3
29. Water gas is a mixture of -----.
    A. hydrogen and carbon (II) oxide
    B. hydrogen and carbon (IV) oxide
    C. nitrogen and carbon (IV) oxide
    D. steam and carbon (II) oxide
30. The volume occupied by a gas at 37 ^{0}C and 740 mmHg is 100 cm^3. What would be the volume of the gas (in cm^3), if the pressure is increased to 2000 mmHg at the same temperature?
    A. 37.0
    B. 65.5
    C. 74.0
    D. 87.5
31. Which of the following acids can act as both as drying agent and a dehydrating agent?
    A. Fuming HNO_3
    B. Glacial CH_3COOH
    C. Concentrated H_2SO_4
    D. Concentrated HCl
32. Carbon is often deposited in the exhaust pipe of cars because of the -----.
    A. presence of carbon in petrol
    B. dehydration of petrol
    C. incomplete combustion of petrol
    D. contamination of petrol with diesel
33. What process is illustrated by the following equation? $Na_2CO_3.10H_2O_{(s)} \xrightarrow{\text{exposure to air}} Na2CO3\,(s) + 10H_2O_{(g)}$.
    A. decomposition
    B. hygroscopy

C. efflorescence
D. hydrolysis

34. Which of following separation techniques would show that black ink is a mixture of chemical substances?
A. Crystallization
B. Filtration
C. Sublimation
D. Chromatography

35. Which of the following is not an acid anhydride?
A. P_2O_5
B. CO
C. CO_2
D. SO_2

36. What is the function of concentrated H_2SO4 in the following reaction? $C_2H_2O_4 \xrightarrow{\text{concentrated } H_2SO_4} CO_2 + CO$
A. Dehydrating agent
B. Strong acid
C. Oxidizing agent
D. Catalyst

37. An increase in the pressure of a gas results in decrease its -----.
A. mass
B. volume
C. vapour density
D. temperature

38. What is the percentage by mass of calcium in $Ca(OCl)_2$? [Ca = 40, O = 16, Cl = 35.5]
A. 23.5%
B. 28.0%
C. 31.5%
D. 44.5%

39. Two major ways of recovering soluble salts from solution are ----- and -----.
A. evaporation, decantation
B. sieving, crystallization
C. heating to dryness, crystallization
D. heating to dryness, decantation

40. A suitable indicator for titration between sodium triixocarbonate (IV) and hydrochloric acid is -----.
A. phenolphthalein
B. methyl orange
C. bromotyl blue
D. no suitable indicator

41. Producer gas is a mixture of ------.
A. CO and H_2
B. CO and N_2
C. CO_2 and H_2
D. CO_2 and N_2

42. All common gases are dried using P_2O_5 ***except*** -----.
A. NO_2
B. NH_3
C. SO_2
D. H_2S

43. A solid substance with high melting and boiling point is likely to be a/an -----.
A. covalent compounds
B. dative-covalent compound
C. electrovalent compound
D. non-metal

44. Alums are classified as –-----.
A. simple salts
B. acid salts
C. anhydrous salts
D. double salts

45. If 2g of zinc granules react with excess dilute HCl to evolve hydrogen gas which came to completion after 5 minutes. Calculate the rate of the chemical reaction in g/hr.
A. 48
B. 12
C. 24
D. 240

46. For most irreversible reactions, the -----.
    A. reaction rate increases with time
    B. reaction rate decreases with time
    C. rate stabilizes with time
    D. rate produces a curve with time
47. Which of the following samples will react fastest with dilute trixocarbonate (V) acid?
    A. 5g of lumps of Ca CO_3 at 25 ^{0}C
    B. 5g of powdered Ca CO_3 at 25 ^{0}C
    C. 5g of lumps of Ca CO_3 at 50 ^{0}C
    D. 5g of powdered Ca CO_3 at 50 ^{0}C
48. Which of the following is hygroscopic substance?
    A. Na NO_3
    B. Mg Cl_2
    C. Fe Cl_2
    D. Ca Cl_2
49. Which of the following is not a salt?
    A. Sodium trixocarbonate (IV)
    B. Zinc Chloride
    C. Aluminum oxide
    D. Sodium hydrogen trioxosulphate (IV)
50. The mass number of an element is 31. If it's atomic number is 15, what is the composition of the nucleus of its atom?
    A. 15 electrons and 16 protons
    B. 15 protons and 16 electrons
    C. 15 protons and 16 neutrons
    D. 15 neutrons and 16 protons

SECTION B: **THEORY**

1. (a) What do you understand by the following concepts?
   i. allotropy
   ii. polymorphism 4 marks

   (b) The following are allotropes of carbon: diamond, coke, coal, soot, charcoal, carbon fibres, graphite. Name the one that is used;
   i. in the extraction of metals
   ii. as anode / cathode in electrolysis
   iii. in drilling
   iv. as fuel for steam engines and
   v. in gas mask 5 marks

   (c) In tabular form, give ***three*** differences in the properties of a diamond and graphite. 3 marks

   (d) (i) Describe with equation only, the effect of strong heating on calcium trixocarbonate (IV).

   (ii) Give the names of ***two*** polymorphic forms of calcium trixocarbonate (IV). 3 marks
2. (a) (i) Describe the laboratory preparation of carbon (IV) oxide. 4 marks

   (ii) Give ***two*** physical properties of carbon (IV) oxide. 2 marks

   (iii) Describe ***two*** chemical properties of carbon (IV) oxide (use of equation should be included). 4 marks

   (b) How would you test for carbon (IV) oxide in the laboratory? 2 marks

   (c) (i) Give ***two*** uses of carbon (IV) oxide.

   (ii) Mention ***two*** salts that can be obtained from trixocarbonate (IV) acid. 3 marks
3. (a) Explain briefly the following types of reactions and give one example on each.
   i. combustion reaction
   ii. thermal decomposition
   iii. double decomposition
   iv. displacement reaction. 8 marks

   (b) (i) Define rate of chemical reaction.

   (ii) Mention ***six*** factors that affect rates of chemical reaction.

   (iii) What are Photochemical reaction? 7 marks
4. (a) (i) What is meant by destructive distillation of coal?

   (ii) Name ***four*** products obtained from destructive distillation of coal.

   (iii)Give ***one*** use of each of the products mentioned in a(ii) above which are liquid and gaseous at room temperature. 8 marks

   (b) Highlight any ***three*** general properties of trixocarbonates (IV). 3 marks

   (c) Give ***two*** processes that:
   i. increase the amount of carbon (IV) oxide in the atmosphere.
   ii. remove carbon (IV) oxide from the atmosphere. 4 marks
5. (a) (i) What is a catalyst?

   (ii) State ***three*** characteristics of a catalyst. 5 marks

(b) (i) Describe how the producer gas is formed.

(ii) Give ***two*** uses of producer gas.

(c) Mention ***three*** of the types of coal with the percentage composition of carbon in them.

3 marks

(d) State the reason why graphite;

i. conducts electricity.

ii. is used as lubricant. 2 marks