Name: .....

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545/1
CHEMISTRY
Paper 1
July/August 2023
1½ hours

MASAKA DIOCESAN EXAMINATIONS BOARD

Uganda Certificate of Education

Joint Mock Examinations 2023

CHEMISTRY

Paper 1

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES:

*This paper consists of **50** objective-type questions.*

*Attempt **all** questions.*

*You are required to write the correct answer **A**, **B**, **C** and **D** in the **box** provided on the right-hand side of each question.*

*Do **not** use pencil.*

For examiner's use only

1. Which one of the following substances is a mixture?

   A. Calcium carbonate.
   B. Copper.
   C. Steel.
   D. Iron.

2. Which one of the following substances will increase in mass when heated in air?

   A. Magnesium.
   B. Copper (II) carbonate.
   C. Lead (II) carbonate.
   D. Zinc nitrate.

3. The substance which can dissolve in both sodium hydroxide solution and dilute nitric acid is;

   A. CuO
   B. CaO
   C. MgO
   D. PbO

4. The atomic number of element M is 20. The compound formed when M reacts with chlorine;

   A. is soluble in water.
   B. is soluble in ethanol.
   C. does not conduct electricity in molten state.
   D. has a very high melting point.

5. The compounds that can form a miscible liquid mixture are;

   A. water and petrol.
   B. methylbenzene and water.
   C. oil and paraffin.
   D. water and oil.

6. The two major components of air can be separated by;

   A. fractional distillation.
   B. simple distillation.
   C. chromatography
   D. filtration.

7. When 2.3g of ethanol is burnt in air, 68kJ of heat energy is produced. The heat of combustion of ethanol is;
(molar mass of ethanol – 46g)

A. $68 \times \frac{2.3}{46}$ kJ / mol

B. $\frac{46}{68} \times 2.3$ kJ / mol

C. $68 \times \frac{46}{2.3}$ kJ / mol

D. 68 x 2.3 x 46 kJ / mol

8. Which one of the following salts can be prepared by neutralization?

A. $CaCO_3$

B. PbCl

C. NaCl

D. $PbSO_4$

9. The reaction by which ethanol is produced from carbohydrates is called;

A. hydrolysis.

B. cracking.

C. fermentation.

D. dehydration.

10. Which of the following is a native metal?

A. Cu

B. Al

C. Fe

D. Au

11. Which one of the following sulphates when strongly heated will undergo a physical change?

A. Potassium sulphate.

B. Zinc sulphate.

C. Iron (II) sulphate.

D. Copper (II) sulphate.

12. Which one of the following pairs of reagents can form a yellow precipitate?

A. $Fe(SO_4)_{3(aq)}$ and $Na_2CO_{3(aq)}$

B. $Pb(NO)_3)_{2(aq)}$ and $NaOH_{(aq)}$

C. $FeSO_{4(aq)}$ and $NaOH_{aq)}$

D. $Pb(NO_3)_{2(aq)}$ and $NaOH_{(aq)}$

13. Which one of the following substances does not conduct electricity?

A. Dilute sulphuric acid.
B. Ethanol.
C. Molten sodium chloride.
D. Magnesium chloride solution.

14. Which one of the following will weigh twice the mass of 1 mole of sodium hydroxide?

A. Calcium oxide.
B. Potassium hydroxide.
C. Copper (II) oxide.
D. Magnesium oxide.

15. The percentage of nitrogen in ammonium nitrate is;

A. $\frac{14}{80}$ x 100
B. $\frac{14 \times 2}{80}$ x 100
C. $\frac{80}{14}$ x 100
D. $\frac{143}{80}$ x 100

16. Which one of the following salts can form a white precipitate when added to soap solution?

A. Potassium sulphate.
B. Ammonium carbonate.
C. Sodium sulphate.
D. Calcium sulphate.

17. The catalyst used in the manufacture of nitric acid is;

A. asbestos.
B. copper.
C. platinum.
D. platinum-rhodium gauze.

18. 25.0cm^3 of 0.1M sulphutic required 20.0cm^3 of ammonium hydroxide solution for complete neutralization. The two solutions react according to the following equation.

$$2NH_4OH_{(aq)} + H_2SO_{4(aq)} \longrightarrow (NH_4)_2SO_{4(aq)} + 2H_2O_{(l)}$$

The morality of ammonium hydroxide solution is;

A. $\frac{25 \times 0.1 \times 2}{20}$

B. $\frac{25 \times 0.1 \times 2}{25}$

C. $\frac{25 \times 0.1}{25 \times 2}$

D. $\frac{25 \times 2}{0.1 \times 20}$

19. Copper (II) carbonate reacts with dilute nitric acid according to the following equation:

$$CUCO_{3(s)} + 2HNO_{3(aq)} \longrightarrow CuCl_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$$

The volume of the gas produced at room temperature and pressure, if 3.1g of the carbonate is reacted with the acid will be;

(Cu = 64; O = 16; C = 12; molar gas volume = 24dm^3 at room temperature and pressure)

A. $\frac{124 \times 3.1}{24}$

B. $\frac{3.1}{124 \times 24}$

C. $\frac{24}{124} \times 3.1$

D. $24 \times 124 \times 3.1$

20. Which one of the following pairs of elements will not react under suitable conditions?

A. Sodium and chlorine.

B. Sodium and neon.

C. Sodium and oxygen.

D. Sodium and fluorine.

21. Which one of the following acids is partially ionized when dissolved in water?
    A. Sulphuric acid.
    B. Hydrochloric acid.
    C. Nitric acid.
    D. Ethanoic acid.

22. The gas which re-lights a glowing splint is produced when;
    A. calcium carbonate is heated.
    B. ammonium nitrite is heated.
    C. sodium peroxide is dissolved in water.
    D. magnesium nitride is dissolved in water.

23. Which one of the following salts can be prepared by synthesis?
    A. $MgCl_2$
    B. $MgSO_4$
    C. $FeCl_2$
    D. $FeSO_4$

24. Which one of the following hydrocarbons does not belong to a family whose structure contain a carbon to carbon double bond?
    A. C_2H_4
    B. C_2H_4
    C. C_3H_6
    D. C_4H_8

25. Which one of the following substances reacts with chlorine gas to form a black solid?
    A. Na
    B. Mg
    C. $C_{10}H_{16}$
    D. Fe

26. Which one of the following pairs of substances can produce carbon dioxide gas at a faster rate?
    A. $CaCO_3$ and $H_2SO_{4(aq)}$
    B. $CaCO_3$ and $HCl_{(aq)}$
    C. $PbCO_3$ and $HCl_{(aq)}$
    D. $PbCO_3$ and $H_2SO_{4(aq)}$

27. 4.90g of copper (II) oxide yielded 3.92g of copper when reduced by town gas. The mass of copper (II) oxide required to yield 4g of copper is;

A. $\frac{3.92 \times 4}{4.90}$

B. $\frac{4.90}{4 \times 3.92}$

C. $\frac{4.90 \times 4}{3.92}$

D. $3.92 \times 4 \times 4.90$

28. Which one of the following gases cannot be dried by concentrated sulphuric acid?

A. Oxygen.
B. Ammonia.
C. Chlorine.
D. Sulphur dioxide.

29. Nitrogen monoxide reacts with oxygen to form nitrogen dioxide according to the following equation:

$$2NO_{(g)} + O_2 \longrightarrow 2N_{2(g)}$$

If $10cm^3$ of nitrogen monoxide were reacted with $15cm^3$ of oxygen and the resultant gas cooled to room temperature, the volume of the resultant gaseous mixture would be;

A. $10cm^3$
B. $25cm^3$
C. $15cm^3$
D. $5cm^3$

30. Iron reacts with dilute hydrochloric acid according to the following equation:

$$Fe_{(s)} + 2HCl_{(aq)} \longrightarrow FeCl_{(2)} + H_{2(g)}$$

Which one of the following is the volume of a 1.5M hydrochloric acid that would react completely with 2.8g of iron? [Fe = 56]

A. $\frac{1000 \times 1.5 \times 2.8}{2 \times 56} cm^3$

B. $\frac{1000 \times 2 \times 1.5}{56 \times 2.8} cm^3$

C. $\frac{1000 \times 2.8 \times 2}{56 \times 1.5} cm^3$

D. $\frac{1000 \times 2.8}{56 \times 1.5} cm^3$

31. Element Y has atomic number 12. The chemical bond in the oxide of Y is;
    A. Ionic bond.
    B. covalent bond.
    C. dative bond.
    D. metallic bond.

32. Which one of the following statements is correct about diamond?
    A. It conducts electricity.
    B. It is the hardest substance known.
    C. It has simple molecular structure.
    D. It is used to make electrodes.

33. Which one of the following reagents is normally used to test for the presence of a sulphate ion in solution?
    A. Potassium nitrate.
    B. Silver nitrate.
    C. Lead (II) nitrate.
    D. Barium nitrate.

34. Which one of the following substances is used to test for the presence of sulphur dioxide?
    A. Bromine water.
    B. Iodine solution.
    C. Anhydrous copper (II) sulphate.
    D. Potassium dichromate (V).

35. Which one of the following gases will produce white fumes when placed near concentrated hydrochloric acid?
    A. Ammonia.
    B. Sulphur dioxide.
    C. Hydrogen.
    D. Oxygen.

36. Which one of the following carbonates when heated strongly will decompose to form a black residue?
    A. $FeCO_3$
    B. $CuCO_3$
    C. $MgCO_3$
    D. $ZnCO_3$

37. Sodium carbonate reacts with dilute sulphuric acid according to the following equation:

$Na_2CO_{3(aq)} + H_2SO_{4(aq)} \longrightarrow Na_2SO_{4(aq)} + H_2O_{(l)} + CO_{2(g)}$

Which one of the following is the morality of a $25.0cm^3$ sodium carbonate solution required to neutralize $20.0cm^3$ of a 0.15M sulphuric acid?

A. 0.060M
B. 0.120M
C. 0.188M
D. 0.240M

38. A hydrocarbon C_xH_y burn in excess oxygen according to the following equation:

$2C_xH_{y(g)} + 12O_{2(g)} \longrightarrow 8CO_{2(g)} + 10H_2O_{(l)}$

Which one of the following are the values of x and y respectively?

A. 8 and 20
B. 4 and 8
C. 4 and 10
D. 4 and 20

39. Which one of the following hydroxides will dissolve in excess sodium hydroxide solution?

E. $Pb(OH)_2$
F. $Ca(OH)_2$
G. $Cu(OH)_2$
H. $Fe(OH)_2$

40. Which one of the following compounds will turn bromine from reddish-brown to colourless?

A. CH_4
B. C_4H_{10}
C. C_3H_8
D. C_2H_4

Each of the questions 41 – 45 consists of an assertion (statement) on the left hand side and a reason on the right-hand side. Select;

A. If both the assertion and the reason are true statements and the reason is a correct explanation of the assertion.
B. If both the assertion and the reason are true statements but the reason is not a correct explanation of the assertion
C. If the assertion is true but the reason is not a correct statement.
D. If the assertion is not correct but the reason is a correct statement.

INSTRUCTIONS SUMMARISED

Assertion	Reason
A. True	True and is a correct explanation.
B. True	True but not a correct explanation.
C. True	Incorrect.
D. Incorrect	True.

41.	Carbon dioxide is collected by Downward delivery	because	Carbon dioxide is denser than air.	
42.	Chlorine is used to kill germs in water	because	Chlorine reacts with water to form chloric (I) acid.	
43.	In the manufacture of sodium hydroxide the anode is carbon.	because	Carbon is not attacked by chlorine.	
44.	Copper (II) hydroxide does not Dissolve in sodium hydroxide.	because	Copper (II) hydroxide is Acidic.	
45.	Lead (II) sulphate is prepared in the laboratory by double decomposition.	because	Lead (II) sulphate is soluble in water.	

In each of the questions 46 to 50 one or more of the answers given may be correct. Reach each question carefully and then indicate the correct answer according to the following:

A. If 1, 2 and 3 only are correct.
B. If 1 and 2 only are correct.
C. If 2 and 4 only are correct.
D. If 4 only is correct.

46. Which of the following is/are produced when methane is burnt in little oxygen?
    1. Carbon monoxide
    2. Carbon
    3. Water
    4. hydrogen

47. Which of the following hydroxides dissolve(s) in excess aqueous ammonia?
    1. $Pb(OH)_2$
    2. $Zn(OH_2$
    3. $Al(OH)_3$
    4. $Cu(OH)_2$

48. Which of the following salts can cause temporary hardness in water?
    A. $Mg(HCO_3)_2$
    B. $MgSO_4$
    C. $Ca(HCO_3)_2$
    D. $CaSO_4$

49. The acid(s) which can dehydrate the flesh is / are;
    A. Hydrochloric.
    B. Nitric acid.
    C. Ethanoic acid.
    D. Sulphuric acid.

50. Which of the following is/are true about hydrogen chloride in dry methylbenzene?
    A. It does not conduct electricity.
    B. It has no effect on litmus.
    C. It does not react with carbonates.
    D. It reacts with magnesium to form hydrogen.

END.