Name:.....Centre/Index No:.....

Signature:.....Stream: .....

545/1

CHEMISTRY

Paper 1

March, 2022

2 ½ hours

MID TERM EXAMINATIONS-2022

Uganda Certificate of Education

CHEMISTRY

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of 50 objective type questions

*Answer **all** questions*

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

Molar gas volume at s.t.p is 22.4 dm^3

*Do **not** use pencil*

SECTION A

1. Which one of the following gases lights a glowing splint?
   A. Carbon dioxide
   B. Hydrogen
   C. Nitrogen
   D. Oxygen

2. Which one of the following substance cannot cause air pollution?
   A. Hydrogen sulphide
   B. Carbon dioxide
   C. Water vapour
   D. Sulphur dioxide

3. What is percentage by volume of ammonia in the resultant volume of a gas when a mixture of $30cm^3$ of hydrogen and $20cm^3$ of nitrogen is exploded?
   A. 15%
   B. 45%
   C. 67%
   D. 40%

4. In an experiment to determine basicity of an acid (H_nX). $25cm^3$ of 0.2M sodium hydroxide solution required $24.6cm^3$ of 0.1M solution of an acid for complete reaction. What is the basicity of the acid H_nX?
   A. 1
   B. 2
   C. 3
   D. 4

5. Components of chlorophyll are separated using chromatography; because they;
   A. Are coloured
   B. Are soluble in each other
   C. Have different solubility
   D. Have different partition rates.

6. Which of the following is the best test for the quality of water?
   A. Determine its boiling point
   B. Determine whether it is clear and colourless
   C. Determine if it dissolves sugar
   D. Determine if it freezes.

7. Metal **P** displaces hydrogen from a dilute acid but metal **Q** does not. Metal **R** displaces **P** from its chloride. The order of reactivity of the metal beginning with the most reactive is;
   A. P, Q, R
   B. Q, P, R
   C. R, Q, P
   D. R, P, Q

8. Which of the following pairs of elements will form an ionic bond?
   A. Hydrogen and oxygen
   B. Potassium and iodine
   C. Copper and zinc
   D. Hydrogen and chlorine

9. Which one of the following substances when heated with ammonium chloride will produce ammonia?
   A. NaOH
   B. $CaSO_4$
   C. $Pb(NO_3)_2$
   D. $MgCl_2$

10. Which one of the following substances is used as a catalyst in the manufacture of nitric acid from ammonia?
   A. Nickel
   B. Iron
   C. Platinum
   D. Vanadium (V) oxide.

11. The pH of solutions **W**, **X**, **Y** and **Z** are 3, 7, 10 and 14 respectively. Which one of the following solutions will react with sodium carbonate to form carbon dioxide?
   A. W
   B. X
   C. Y
   D. Z

12. The atomic number of an element is 13. Which one of the following is the number of electrons in the outer most energy level of the particle M^{3+}?
   A. 2
   B. 3
   C. 8
   D. 10

13. Which of the following pairs of salts can be separated by filtration?
    A. Na_2CO_3 and $(NH_4)_2CO_3$
    B. AgCl and $AgNO_3$
    C. $MgCl_2$ and $Mg(NO_3)_2$
    D. $ZnCO_3$ and $CaSO_4$

14. The percentage by mass of water of crystallization in hydrated calcium chloride; $CaCl_2.6H_2O$ is; (Ca = 40, Cl = 35.5, H = 1, O = 16).
    A. 45%
    B. 60%
    C. 55%
    D. 49.3%

15. Carbon dioxide was bubbled through a solution of calcium hydroxide. The solution became milky after a short time, this is because;
    A. Calcium carbonate was formed
    B. Calcium hydrogen carbonate was formed
    C. Calcium hydroxide was precipitated by carbon dioxide
    D. Carbon dioxide is not soluble in calcium hydroxide.

16. Pigments in a flower extract can be separated by;
    A. Distillation
    B. Fractional distillation
    C. Chromatography
    D. Evaporation

17. An atom of an element **X** has the structure $^{20}_{10}X$. The element;
    A. Forms covalent bonds readily with non – metals
    B. Forms ionic bonds with non – metals
    C. Belongs to group II of the periodic table
    D. Has full shells of electrons

18. Which one of the following gases is a reducing agent?
    A. Nitrogen
    B. Ammonia
    C. Nitrogen dioxide
    D. Carbon dioxide

19. 1.22g of phosphorous combined with 0.95g of oxygen. The simplest formula of the oxide is; (P = 31, O = 16).

A. P_2O_3
B. P_3O_2
C. P_4O_{10}
D. P_5O_{10}

20. The number of moles of sulphate ions in 3.0g of aluminium sulphate, $Al_2(SO_4)_3$ is (Al = 27, S = 32, O=16)

A. $\frac{3.0}{342}$
B. $\frac{3.0 \ x \ 3}{342}$
C. $\frac{3.0 \ x \ 4}{342}$
D. $\frac{3.0 \ x \ 12}{342}$

21. Which one of the following carbonates is not suitable for the preparation of carbon dioxide using dilute sulphuric acid?

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

22. Which one of the following substances is the bleaching agent in chlorine water?

A. HOCl
B. HCl
C. Cl_2
D. $HClO_3$

23. $20cm^3$ of an acid HX was neutralized by $25cm^3$ of a 0.05M sodium carbonate. Which one of the following is the molarity of the acid?

A. $\left(\frac{25 \ x \ 0.05}{20}\right) M$
B. $\left(\frac{2 \ x \ 25 \ x \ 0.05}{20}\right) M$
C. $\left(\frac{2 \ x \ 20 \ x \ 0.05}{25}\right) M$
D. $\left(\frac{25 \ x \ 0.05}{2 \ x \ 20}\right) M$

24. The atomic numbers of elements W, X, Y and Z are 12, 13, 15 and 19 respectively. Which one of the elements reacts most readily with cold water?

A. W
B. X
C. Y
D. Z

25. Which one of the following is observed when hydrogen is passed over heated copper II oxide.

A. A brown solid
B. A grey solid
C. A black solid
D. A yellow solid

26. When heated strongly, calcium nitrate decomposes according to the following equation;

$2Ca(NO_3)_2(s) \longrightarrow CaO(s) + 4NO_2(g) + O_2(g)$

The volume of nitrogen dioxide that can be obtained by heating 200g of calcium nitrate at s.t.p is;

A. $\left(\frac{200 \ x \ 22.4 \ x \ 4}{328}\right) l$
B. $\left(\frac{164 \ x \ 22.4}{200 \ x \ 4}\right) l$
C. $\left(\frac{328 \ x \ 22.4}{200 \ x \ 4}\right) l$
D. $\left(\frac{200 \ x \ 164}{22.4 \ x \ 4}\right) l$

27. Which of the following is **not** true about all mixtures?

A. There composition varies
B. They are separated by physical means
C. They are separated by sublimation
D. Their properties are an average of the components.

28. During the determination of the amount of oxygen in air by passing it over heated copper, the gas collected in the evacuated flask is mainly;

A. Nitrogen
B. Oxygen
C. Carbon dioxide
D. Water vapour

29. Iron is usually galvanized or painted before use because this;
A. Makes the iron stronger
B. Makes the iron more attractive
C. Makes the iron rust free
D. Reduces the cost of the object.

30. Which one of the following hydroxides when heated strongly produces yellow solid on cooling?
A. $Pb(OH)_2$
B. $Cu(OH)_2$
C. $Zn(OH)_2$
D. $Fe(OH)_2$

31. A crystal of sodium chloride is held together by;
A. Covalent bonds
B. Double bonds
C. Positive ions surrounded by electrons
D. Attraction of oppositely charged ions

32. Which one of the following substances is deliquescent?
A. Calcium hydroxide
B. Zinc hydroxide
C. Sodium hydroxide
D. Magnesium chloride

33. Hydrogen peroxide decomposes according to the following equation;
$2H_2O_2(l) \longrightarrow 2H_2O(l) + O_2(g)$
Which one of the following is the volume of oxygen formed when 24.8g of hydrogen peroxide is completely decomposed at s.t.p? (H = 1, O = 16, one mole of a gas occupies $22.4dm^3$ at s.t.p).
A. $\left(\frac{68\ x\ 22.4}{24.8}\right) dm^3$
B. $\left(\frac{34.\ x\ 22.4}{24.8}\right) dm^3$
C. $\left(\frac{22.4\ x\ 24.8}{68}\right) dm^3$
D. $\left(\frac{22.4\ x\ 24.8}{34}\right) dm^3$

34. $20cm^3$ of 0.30M sodium hydroxide was neutralized by the same volume of 0.15M solution of an acid **X**. The basicity of the acid is;
A. 1
B. 2
C. 3
D. 4

35. Which of the following conduct electricity at room temperature?
A. Iodine
B. Graphite
C. Methyl benzene
D. Tetrachloromethane

36. Which of the following would react with copper (II) oxide?
A. Nitrogen
B. Hydrogen
C. Nitrogen dioxide
D. Carbon dioxide

37. Which one of the following gases is produced when lead (II) nitrate is heated strongly?
A. Nitrogen
B. Dinitrogen oxide
C. Nitrogen monoxide
D. Nitrogen dioxide

38. The salt which can be prepared by direct combination is;
A. $FeCl_3$
B. $FeSO_4$
C. $FeCO_3$
D. Na_2SO_4

39. Which of the following salts is normally prepared by precipitation?
A. Calcium carbonate
B. Sodium sulphate
C. Zinc chloride
D. Ammonium chloride

40. Which one of the following is the empirical formula of a hydrocarbon containing 88.88% carbon (H = 1, C = 12)?

A. C_4H_6
B. C_2H_3
C. CH_2
D. CH

Each of the questions 41 to 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 reason.
C. If the assertion is true but the reason is not correct statement.
D. If the assertion is **not** correct but the reaction is a correct statement

Instructions summarized

Assertion	
A. True	True (Reason is a correct explanation)
B. True	True (Reason is not a correct explanation)
C. True	Incorrect
D. Incorrect	True

41.	Hydrogen can be collected by upward displacement of air.	**Because**	Hydrogen is less dense than air
42.	Ethanoic acid acid weak acid	**Because**	It is an organic acid
43.	A mixture of water and petrol can be separated using a separating funnel.	**Because**	Water and petrol are immiscible liquids
44.	Aqueous solution of hydrogen chloride gas conducts electricity.	**Because**	Hydrogen chloride gas is a covalent compound
45.	The elements of group (VII) in the periodic table are the most reactive nonmetals.	**Because**	The atoms of group (VII) elements lacks only one electron for an octet stable configuration to be obtained.

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

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

46. Which one of the following will undergo a permanent change when strongly heated?
    1. Iodine
    2. Potassium permanganate
    3. Potassium carbonate
    4. Potassium chlorate

47. The following is (are) true of alkali metals;
    1. They conduct electricity
    2. They conduct heat
    3. Their atoms form cations
    4. Their atoms form covalent bonds

48. Which of the following salts when dissolved in water cause(s) hardness in water?
    1. Ammonium nitrate
    2. Calcium sulphate
    3. Potassium chloride
    4. Magnesium hydrogen carbonate

49. The most efficient method(s) for separating a mixture of copper (II) sulphate and sodium sulphate is;
    1. Decantation
    2. Sublimation
    3. Filtration
    4. Fractional crystallization

50. Which of the following is / are true about diamond and graphite?
    1. Their atoms have the same mass number
    2. Both conduct electricity
    3. Both burn in excess air to produce carbon dioxide
    4. They both have layered structure

END