CANDIDATE'S NAME _____

Signature _____

Index No:_____

545/1
CHEMISTRY
Paper 1
July/Aug 2023
***2½* hrs**

ERETA EDUCATION CONSULTS

JOINT MOCK EXAMINATIONS 2023

Uganda Certificate of Education

CHEMISTRY

Paper One

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES.

The paper consists of 50 objective type questions.
All questions are compulsory.
You are required to write the correct answer A, B,C or D in blue or black ink in the box provided on the right-hand side of each questions.
All workings must be done with in the paper and therefore no extra sheets are allowed.
Do not use a Pencil to answer.

For Examiner's use only	
Marks scored	Initial

P.T.O

All questions are compulsory. Answer all.

1. Which one of the following reactions represents a chemical change? A. Melting of ice.
   B. Vaporization of water.
   C. Explosion of natural gas with air
   D. Magnetization of Iron.

2. Gas X has the following properties.
   (i) Colourless
   (ii) No effect on litmus.
   (iii) no observable change with Lime water
   (iv) flammable
   Gas X is likely to be .....
   A. Hydrogen.
   B. Chlorine
   C. Ammonia
   D. Oxygen

3. Which one of the techniques can be employed to separate orange dye from blue dye in black ink? A. Sublimation.
   B. Chromatography.
   C. Use of a magnet.
   D. Fractional distillation.

4. Which one of the following bases is insoluble?
   A. $Cu(OH)_2$
   B. KOH
   C. NaOH
   D. CaO

5. When testing for sulphate ions in solution, dilute nitric acid is added before aqueous barium nitrate in order to .....
   A. Change the Sulphate ions into sulphite ions B. Eliminate any Sulphite ions or Carbonate ions.
   C. Acidify the medium for the reaction.
   D. Catalyse the reaction.

6. An aqueous solution containing equal concentration of Zn^{2+} ion and $Cu^{2+}_{(aq)}$ was reacted with Sodiumhydroxide solution until in excess; after which the mixture was filtered. What was the residue that remained on the filter paper? A. $Zn(OH)_2$ and $Cu(OH)_2$.
   B. $Zn(OH)_2$
   C. $Cu(OH)_2$
   D. $[Zn(NH_3)_4]^{2+}$

7. Potassium chlorate decomposes according to the following equation

   $2\,KClO_{3(s)} \longrightarrow 2KCl_{(s)} + 3O_{2(g)}$

   The volume of oxygen evolved at stp, when 5.0g of potassium chlorate is decomposed is.....

   A. $\left(\frac{5\,X\,22.4}{122.5}\right)\,dm^3$

B. $\left(\frac{2 \times 22.4}{122.5}\right) dm^3$

C. $\left(\frac{3 \times 22.4}{245}\right) dm^3$

D. $\left(\frac{5 \times 22.4 \times 3}{245}\right) dm^3$

(Cl = 35.5, O = 16, K = 39 , 1 mole of gas occupies 22.4dm^3 at stp)

8. Which one of the following substances contains a dative bond?
   A. C_2H_4
   B. $MgCl_2$
   C. $Cu(NH_3)_4^{2+}$
   D. CaO

9. A glass rod dipped in a solution of Lead (II) nitrate was then dipped into a boiling tube containing dilute sulphuric acid.
   Which one of the following observations was made?
   A. Colourless solution.
   B. Yellow Precipitate
   C. White Precipitate
   D. D. Dense white fumes.

10. Aluminium Sulphate reacts with Sodium hydrogen carbonate as below
    $Al_2(SO_4)_{3(aq)} + 6NaHCO_{3(aq)} \longrightarrow 2Al(OH)_{3(S)} + 3Na_2SO_{4(aq)} + 6CO_{2(g)}$
    The Mass of aluminium hydroxide precipitated by reacting 34.2g of aluminium sulphate is .....
    (Al = 27, S = 32, O = 16, H = 1)
    A. 15.6g B. 21.2g
    C. 78.0g
    D. 156.0g

11. A white compound T on strong heating produced brown fumes and finally a yellow solid remained in the test tube. The possible cation in T is .....
    A. Zn^{2+}
    B. Al^{3+}
    C. Pb^{2+}
    D. Cu^{2+}

12. Which one of the following compounds decolourises acidified Potassium manganate (VII) solution at room temperature?
    A. C_2H_6
    B. C_2H_4
    C. C_4H_{10}
    D. C_7H_{16}

13. Some Zinc Sulphate crystals were heated to constant mass with the following results. Mass of Crucible = 20.0g
    Mass of Crucible and crystals = 25.74g

Mass of Crucible and residue = 23.22g
From the data the value of X in the formula $ZnSO_4.X\ H_2O$ is.....
A. 1
B. 2
C. 7
D. 10

14. Which one of the following contains elements that make up duralumin?
A. Zinc and Copper only
B. Aluminium and Magnesium only
C. Iron and Carbon.
D. Aluminium, Magnesium and Copper

15. Which one of the following precipitates is soluble in dilute ammonia solution?
A. $Fe(OH)_2$
B. AgCl.
C. $Al(OH)_3$
D. $Pb(OH)_2$

16. 1.60g of the oxide of a metal Y gave 1.44g of the metal when reduced in hydrogen. Determine the formula of the oxide of Y;
(Y = 63.5, O = 16)
A. YO
B. YO_2
C. Y_2O_3
D. Y_2O

17. A and B are atoms of elements in the same period 2 of the periodic table.
A. is in group II and B is in group III.
Which of the following statements is true?
A. B has one more Proton in its nucleus than A.
B. The relative atomic mass of B must be one unit greater than the relative atomic mass of A.
C. A has one electron more than B in the outermost energy level.
D. A and B have the same number of neutrons.

18. Which of the following is the correct order with which halogens displace each other from solutions of their salts?
A. I ⟶ Br ⟶ Cl
B. Br ⟶ I ⟶ Cl
C. Cl ⟶ Br ⟶ I
D. Br ⟶ Cl ⟶ I

19. $28.40cm^3$ of Sulphuric acid required $25.00cm^3$ of 0.12M Sodium hydroxide solution for complete neutralization.
Calculate the molar concentration of Sulphuric acid.
A. $0.0265mol/dm^3$ B. $0.0360mol/dm^3$ C. $0.0480mol/dm^3$
D. $0.0530mol/dm^3$

20. Which of the following is the reason why Zinc is used for sacrificial protection of Iron?
A. Zinc is less reactive than Iron
B. Iron is more electro positive than Zinc.
C. Zinc forms a film of Zinc oxide on the surface of Iron.

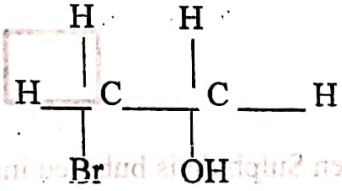
D. Zinc and Iron react in the same way.

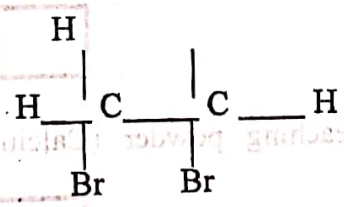
21. 8.50g of an impure sample of Iron required just $75cm^3$ of 3M hydrochloric acid to dissolve it and give neutral solution.
The percentage purity of the sample of Iron is ..... (Fe = 56)
A. 63% B. 74%
C. 85%
D. 90%

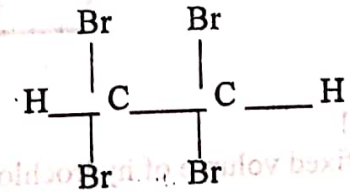
22. Ammonium chloride dissolves in water according to the following equation.
$NH_4Cl_{(s)} + H_2O_{(l)} \rightleftharpoons NH_4^+{}_{(aq)} + Cl^-{}_{(aq)} = {}^+\Delta H$

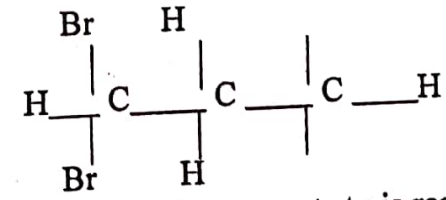
What does the sign $^+\Delta H$ mean?
A. Reaction involved is Endothermic
B. Reaction involved is Exothermic
C. Heat content of the Reactants is greater than the heat content of the Products.
D. Ammonium chloride is only slightly soluble in water.

23. Which one of the following is the structural formula of the compound formed when Ethene reacts with Bromine?

A.


B.


C.


D.


24. What volume of oxygen at stp is required for complete combustion of $40cm^3$ of Butane according to the equation below?

$$C_4H_{10(g)} + \frac{13}{2} O_{2(g)} \longrightarrow 4CO_{2(g)} + 5H_2O_{(l)}$$

A. $40cm^3$

B. $224cm^3$ C. $260cm^3$ D. $448cm^3$

25. Which one of the following is Not a synthetic polymer?

A. Starch

B. Nylon

C. Perspex

D. Polyethene

26. Which one of the following is the correct overall cell equation in an electro-chemical cell made of Magnesium and Copper as electrode in dilute Sulphuric acid as the electrolyte?

A. $Mg_{(s)} \longrightarrow Mg^{2+}_{(aq)} + 2e$

B. $Cu^{2+}_{(aq)} + 2e \longrightarrow Cu_{(s)}$

C. $Mg_{(s)} + Cu^{2+}_{(aq)} \longrightarrow Mg^{2+}_{(aq)} Cu_{(s)}$

D. $Mg_{(s)} + 2H^{+}_{(aq)} \longrightarrow Mg^{2+}_{(aq)} H_{2(g)}$.

27. Which one of the following elements does not exhibit allotropy?

A. Phosphorus

B. Sulphur

C. Chlorine.

D. Carbon.

28. Which one of the following observations is made when hydrogen Sulphide is bubbled into a solution of Lead (II) nitrate?

A. Yellow deposit

B. Dark brown precipitate. C. Colourless solution

D. Black precipitate.

29. Which one of the following gases is evolved when bleaching powder (Calcium hypochlorite) reacts with Carbondioxide?

A. Chlorine

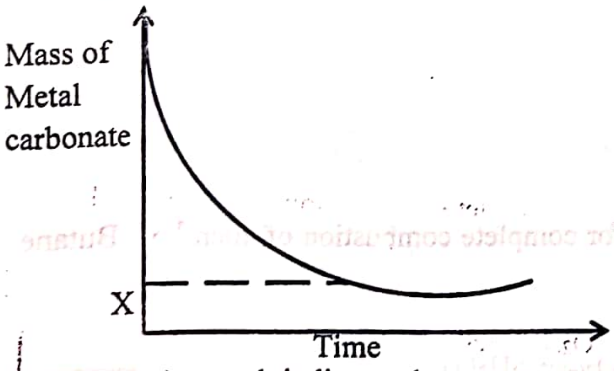
B. Carbon-monoxide

C. Ammonia.

D. Oxygen.

Study the graph below and use it to answer questions 30 and 31.

The graph shows the reaction between metal Carbonate and a fixed volume of hydrochloric acid



30. Point X on the graph indicates that

A. Low yield of Carbondioxide is realized in a longer period of time.

B. Maximum yield of Carbondioxide is realized because all the acid has been used up.
C. Mass of metal carbonate continues to decrease with time.
D. Reaction requires more time to reach completion.

31. How would the rate of reaction be determined using the graph above?
A. By drawing a tangent at some point on the curve and determine its slope.
B. By determining the point at which the least decrease in mass occurs.
C. By measuring volume of Carbondioxide over a long period of time.
D. By determining the average mass of the metal Carbonate that reacts.

32. When 2.5g of solid was heated, $560cm^3$ of the gas was produced at room temperature and residue of 1.4g was left.
The relative molecular mass of the gas is .....
(1 mole of gas at room temperature occupies $24dm^3$)

A. $\left[\frac{(2.5-1.4)X\ 24}{560\ X\ 1000}\right] cm^3$

B. $\left[\frac{1.4\ X\ 24\ X\ 1000}{560}\right] cm^3$

C. $\left[\frac{(2.5-1.4)\ X24000}{560}\right] cm^3$

D. $\left[\frac{560\ X\ 2.5}{24\ X\ 1.4}\right] dm^3$

33. Hydrogen Sulphide burns in excess of oxygen according to the equation below.
$2H_2S_{(g)} + 3O_{2(g)} \longrightarrow 2H_2O_{(l)} + 2SO_{2(g)}$
What is the volume of oxygen required to react with $48dm^3$ of hydrogen sulphide completely at room temperature and pressure?
(All volumes are measured at same temperature and pressure)
A. $24dm^3$
B. $36dm^3$ C. $48dm^3$
D. $72dm^3$

34. What mass of Carbon is required to reduce 2.5g of Lead (II) oxide according to the equation below.
$2PbO_{(S)} + C_{(S)} \longrightarrow 2Pb_{(s)} + CO_{2(g)}$
(Pb = 207, C = 12, O = 16)
A. 0.0335g
B. 0.0673g
C. 0.01345g
D. 0.2690g

35. Calcium nitrate decomposes on heating according to the equation.
$2Ca(NO_3)_{2(S)} \longrightarrow 2CaO_{(S)} + 4NO_{2(g)} + O_{2(g)}$
What is the volume of Nitrogen dioxide evolved at s.t.p when 4.1g of Calcium nitrate is decomposed? A. $1.12dm^3$
B. $2.24dm^3$
C. $3.36dm^3$
D. $4.48dm^3$

(1 mole of gas occupies 22.4dm^3, Ca = 40, O = 16, N = 14)

36. 1.50g of Sodium hydroxide contained in 250cm^3 of solution was used to titrate 0.1M hydrochloric acid. What volume of the acid would be needed to react with 20cm^3 of the alkali?
A. 11.5cm^3
B. 15cm^3 C. 30cm^3
D. 45cm^3

37. Ethane burns in air according to the equation.

$2C_2H_{6(g)} + 7O_{2(g)} \longrightarrow 4CO_{2(g)} + 6H_2O_{(l)}$ $\Delta H = -1560KJ/mol$

Calculate the amount of heat required to liberate 0.46dm^3 of Carbondioxide. A. 2.34KJ
B. 6.24KJ
C. 12.48KJ
D. 16.02KJ
(1 mole of a gas at s.t.p occupies 22.4dm^3)

38. During the haber process, Nitrogen reacts with hydrogen according to the equation.

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$.

The forward reaction in the above case is favoured by.....
A. Decreasing the concentration of reactants.
B. Increasing the pressure of the system.
C. Increasing concentration of ammonia
D. Not applying a catalyst.

39. What is the number of moles of Sodium ions contained in 17.75g of Sodium Sulphate solution? (Na = 23, O = 16, S = 32)
A. 0.125 moles B. 0.160 moles C. 0.250 moles
D. 0.375 moles

40. What mass of copper contains 2.4 x 10^{23} atoms. (Cu = 64 Avogadro's constant = 6.02 x 10^{23})
A. 20.45g B. 25.23g
C. 25.51g
D. 51.02g

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

41. During electrolysis of concentrated sodium chloride Solution, the PH of the Solution at the Cathode becomes alkaline. BECAUSE Sodium ions react with excess hydroxide ions forming Sodium hydroxide.

42. The heat of combustion of methane is greater than that of Propane BECAUSE Propane has higher molecular mass than methane

43. Bond breaking is an endothermic Process **BECAUSE** It involves the evolution of heat to the surrounding.

44. Covalent compounds are unable to Conduct electricity and so are the Non - electrolytes **BECAUSE** they consist of molecules and do not contain ions.

45. All metals of group I in the Periodic table are highly electro positive **BECAUSE** They all accept electrons in their reactions to form positive ions.

In each of the questions 46 – 50, one or more of the answers given may be correct. Read 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 3 only are correct.
C. If 2 and 4 only are correct.
D. If 4 only is correct.

Instructions summarized			
A	**B**	**C**	**D**
1,2, and 3 correct	1 and 3 correct	2 and 4 correct	4 correct

46. The following are ores from which iron can be extracted.
(1 Haematite
(2 Magnetite
(3 Siderite (Spathic Iron)
(4 Cryolite.

47. When chlorine gas is bubbled through dilute sodium hydroxide solution, the following are formed.
(1 Sodium chlorate.
(2 sodium chloride
(3 Oxygen gas
(4 Sodium hypochlorite

48. The following cations form precipitates with solutions of alkalis Except.
(1 Fe^{2+}
(2 Fe^{3+}
(3 Al^{3+}
(4 NH_4^+

49. Which of the following compounds are formed when Ammonium nitrate decomposes?
(1 Nitrogen.
(2 Dinitrogen oxide
(3 Ammonia
(4 Water

50. Which of the following ions in water form precipitates when washing is done with ordinary soap?
(1 Ca^{2+}
(2 Na^+
(3 Mg^{2+}
(4 K^+

END