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545/1

CHEMISTRY

July/August 2023

1hour 30 minutes

KAMSSA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

Paper 1

1hour 30 minutes

Instructions to candidates

- *Answer any **All** questions.*
- *You are required to write the correct answer **A,B,C,D** in the box on the right hand side.*
- *Molar gas sat* s.t.p $=22.4dm^3$

  Molar gas volume at room temperature $=24dm^3$

(Cu=63.5,Mg=24,C=12,H=1,O=16,S=32,Fe=56,Cl=35.5,Na=23,N=14)

1. Burning magnesium continues to burn when gas **M** is passed over it forming a white solid which when dissolved in water forms an alkaline solution. identify gas **M**.
   A. Carbondioxide
   B. Chlorine
   C. Nitrogen
   D. Carbon monoxide

2. An atom of an element **Q** has three energy levels. If **Q** forms an ion with the formula Q^{3-}, what is the atomic number of **Q**?
   A. 12
   B. 15
   C. 13
   D. 17

3. Which one of the following salts when heated strongly will decompose to give a reddish-brown gas that turn a moist red litmus paper red?
   A. Cu $(NO_3)_2$
   B. $NaNO_3$
   C. KNO_3
   D. $PbCO_3$

4. Which one of the following is the percentage of sodium carbonate in 28.2g of hydrated sodium carbonate; $Na_2CO_3.10H_2O$? **(Na=23, C=12, O=16, H=1)**
   A. 9.865%
   B. 26.20%
   C. 29.02%
   D. 37.06%

5. Which one of the following is **NOT** a property of the product formed when a mixture of ammonium chloride and sodium hydroxide is heated?
   A. It is highly soluble in water
   B. It is less dense than air
   C. It reduces copper (II) oxide to copper
   D. It does not burn in oxygen

6. Which one of the following metal oxides cannot be reduced to the metal by heating the oxide together with coke?
   A. iron (II) oxide
   B. Lead (II) oxide
   C. Copper (II) oxide
   D. Calcium oxide

7. Lead nitrate decomposes according to the following equation.
   $2Pb(NO_3)_{2(s)} \longrightarrow 2PbO_{(s)} + 4NO_{2(g)} + O_{2(g)}$
   The mass lead oxide produced when 3.31g of lead nitrate is completely decomposed is
   A. $(\frac{3.31\ X\ 223}{331})$g
   B. (3.31 X 223 X 331) g
   C. $(\frac{331\ X\ 223}{3.31})$g
   D. $(\frac{3.31\ X\ 331}{223})$g

8. Hydrogen peroxide decomposes to produce oxygen.
   Identify the condition(s) under which the rate of production of oxygen would be fastest.
   A. A 2M H_2O_2 at room temperature
   B. A 2M H_2O_2 plus MnO_2 heated to 35^0C
   C. A 1M H_2O_2 heated at 35^0C
   D. A 1M H_2O_2 plus MnO_2 at room temperature.

9. 12.7g of a metal **X** reacted completely with 11.3 g of oxygen forming an oxide. Which one of the following is the formula of the oxide of **X**?
(X= 27, O = 16)
A. XO_2
B. X_2O
C. X_2O_3
D. X_3O_2

10. When element **X** and **Y** are heated together, they formed a compound with the formula X_3Y_2. Element **X** and **Y** have the following electronic configuration respectively.
A. 2:5 and 2:8:2
B. 2:6 and 2:8:1
C. 2:8:2 and 2:5
D. 2:8:1 and 2:8:5

11. Which one of the following pairs of cations when in solution can be distinguished using potassium iodide solution?
A. Pb^{2+} and Al^{3+}
B. Zn^{2+} and Al^{3+}
C. Zn^{2+} and Fe^{2+}
D. Fe^{2+} and Fe^{3}

12. Which one of the following is the reason why sodium chloride is added to hot solution of oil and alkali during saponification process?
A. To reduce the surface tension of soap
B. To reduce the number of soap bubbles produced
C. To reduce the solubility of soap produced
D. To increase the solubility of soap

13. Which one of the following gases cannot be dried using concentrated sulphuric acid?
A. Sulphur dioxide
B. Hydrogen sulphide
C. Carbon monoxide
D. Hydrogen chloride

14. Which one of the following alloys does not contain copper?
A. Brass
B. Solder
C. Bronze
D. Duralumin

15. In which of the following reactions is chlorine acting as an acidic gas?
A. $2Fe\ (s) + 3Cl_2\ (g) \longrightarrow 2FeCl_3\ (s)$
B. $2Na\ (s) + Cl_2\ (g) \longrightarrow 2NaCl$
C. $H_2\ (g) + Cl_2\ (g) \longrightarrow 2HCl\ (g)$
D. $2NaOH\ (aq) + Cl_2\ (g) \longrightarrow NaOCl\ (aq) + NaCl\ (aq) + H_2O(l)$

16. **25.0 cm^3** of a **2.0 M** sodium hydroxide solution reacted with **16.6cm^3** of a **0.1 M** solution of an acid. The ratio in which the acid reacted with sodium hydroxide is?
A. 1:2
B. 1:3
C. 2:1
D. 3:1

17. During the electrolysis of copper (II) sulphate solution using copper electrodes, which one of the following is observed?

A. The cathode reduces in size
B. The anode increases in size
C. The anode becomes polarized
D. The anode decreased in size.

18. The following are pairs of unsaturated hydro-carbons except?

A. C_2H_2 and C_3H_8
B. C_2H_4 and C_3H_6
C. C_3H_4 and C_2H_4
D. C_4H_8 and C_4H_6

19. Which one of the following solutions will neutralize **100cm^3** of **0.8M** hydrochloric acid?

A. 10cm^3 of 0.08M sodium hydroxide solution
B. 50cm^3 of 0.8M sodium hydroxide solution
C. 50cm^3 of 0.4M sodium hydroxide solution
D. 80cm^3 of 1M sodium hydroxide solution.

20. The formula of the ion formed when excess ammonia solution is added to aqueous solution of copper (II) ions is?

A. $Cu(OH)_4^{2+}$
B. $Cu(OH)_4^{2-}$
C. $Cu(NH_3)_4^{2+}$
D. $Cu(NH_3)_4^{2-}$

21. Which one of the following anions reacts with silver ions in solution to form a white precipitate that dissolves in aqueous ammonia solution?

A. $SO_4^{2-}{}_{(aq)}$
B. $Cl^-{}_{(aq)}$
C. $CO_3^{2-}{}_{(aq)}$
D. $NO_3^-{}_{(aq)}$

22. Which one of the following sulphates can be prepared by precipitation method?

A. Iron (II) sulphate
B. Aluminium sulphate
C. Zinc sulphate
D. Barium sulphate

23. Which one of the following is the process by which rubber can be improved by treating it with Sulphur?

A. Polymerization
B. Fermentation
C. Vulcanization
D. hydrogenation

24. Propane burns in oxygen according to the following equation.

$$C_3H_{8\,(g)} + 5O_{2\,(g)} \longrightarrow 3CO_{2\,(g)} + 4H_2O_{(l)} \qquad \Delta H = -2220KJmol^{-1}$$

The volume of propane measured at room temperature that would be required to produce 4500KJmol^{-1} of heat on complete combustion is?
(1 mole of a gas at room temperature occupies 24.0dm^3)

A. 59.20 dm^3
B. 48.65 dm^3
C. 11.84 dm^3
D. 9.73 dm^3

25. Which one of the following processes will not produce oxygen?
A. Photosynthesis
B. Heating ammonium nitrate
C. Electrolysis of copper (II) sulphate using carbon electrodes
D. Electrolysis of acidified water using platinum electrodes

26. Which one of the following are formed when dilute nitric acid is reacted with copper?
A. Copper nitrate, water and nitrogen monoxide
B. Copper nitrate, water and nitrogen dioxide
C. Copper nitrate, water and ammonia
D. Copper nitrate, water and hydrogen

27. Which one of the following pair of substances can be differentiated by reacting with dilute hydrochloric acid?
A. Aluminium and iron
B. Zinc carbonate and zinc sulphate
C. Silver nitrate solution and lead (II) nitrate solution
D. Sodium carbonate and magnesium carbonate

28. An oxide of a metal Z contains 78% of **Z**. The empirical formula of the oxide is? **(Z= 56 and O = 16)**
A. ZO
B. ZO_2
C. Z_2O_3
D. Z_3O_4

29. Which one of the following can conveniently be used to determine the rate of reaction of;

$$Mg_{(s)} + H_2SO_{4\,(aq)} \longrightarrow MgSO_{4\,(aq)} + H_{2\,(g)}$$

A. Measuring magnesium sulphate formed in a given time
B. Sulphuric acid used up per minute
C. Magnesium ribbon used up per minute
D. Recording the volume of hydrogen gas evolved in a given time.

30. The bleaching action of moist chlorine is best explained by?
A. the high reactivity of the element
B. The fact that it is an oxidizing agent
C. The fact that hypochlorus acid easily gives up its oxygen
D. The fact that chlorine combines so readily with hydrogen

31. Which one of the following catalysts is used in the manufacture of sulphuric acid by the contact process?
A. Vanadium(v) oxide
B. Finely divided iron
C. Manganese(iv) oxide
D. Platinized asbestos

32. What is the percentage by mass of water of crystallization in iron (II) sulphate-7-water **($FeSO_4.7H_2O$)**?

A. $(\frac{100\ X\ 126}{152})$g
B. $(\frac{100\ X\ 18}{170})$g
C. $(\frac{100\ X\ 126}{278})$g
D. $(\frac{100\ X\ 18}{122})$g

33. The electronic configuration of an ion R^{3-} is **2:8:8**. What is the atomic number of element **R**?

A. 8
B. 17
C. 13
D. 15

34. Which one of the following cations when treated with aqueous sodium hydroxide will give a precipitate that does not dissolve in excess alkali?

A. Al^{3+}
B. Fe^{3+}
C. Zn^{2+}
D. Pb^{2+}

35. Which one of the following compounds does not cause hardness of water?

A. calcium hydrogen carbonate
B. Calcium sulphate
C. Sodium carbonate
D. Magnesium sulphate

36. Which one of the following substances when burnt in air does not produce water?

A. Wood
B. Coke
C. Paper
D. Ethane

37. Which one of the following gases is normally collected by downward displacement of air?

A. Ammonia
B. Chlorine
C. Hydrogen chloride
D. Sulphur dioxide

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

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

39. The gas that changes the colour of acidified potassium dichromate solution from orange to green is?

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

40. Which one of the following compounds does not form an electrolyte when dissolved in water?

A. Ethanoic acid
B. Ethanol
C. Hydrogen chloride
D. Potassium chloride

Each of the questions 41 to 45 consist of an assertion (statement) on the left-hand side and a reason on the right-hand side.

Select:

A. If both assertion and reason are true statements and the reason a correct explanation of the assertion

B. If both 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 an incorrect statement

D. If the assertion is not correct but the reason is a correct statement.

Summary of instructions		
	Assertion	**Reason**
A	True	True (reason is a correct explanation)
B	True	True (reason is not a correct explanation
C	True	Incorrect
D	Incorect	True statement

41. Diamond and graphite burns in excess oxygen to form carbondioxide	**because**	they are isotopes of carbon	
42. Zinc hydroxide is soluble in excess aqueous ammonia	**because**	Zinc hydroxide is amphoteric	
43. During electrolysis of concentrated sodium chloride solution, chlorine is liberated At the anode	**because**	the chloride ion is higher than the hydroxide ion in the electrochemical series	
44. A mixture of ammonium Chloride and sodium chloride Can be separated by sublimation	**because**	they both have common anions	
45. When a known volume of concentrates sulphuric acid is exposed to air for a few days, there will be increase in volume of the acid.	**because**	concentrated sulphuric acid is hygroscopic.	

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

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

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

46. Which of the following is/ are observed when ammonia solution is added to aqueous solution containing copper (II) ions dropwise until in excess?

1. White precipitate insoluble in excess
2. Pale blue precipitate is formed
3. Yellow precipitate
4. Deep blue solution

47. Which of the following substances undergo(es) a physical change?

1. Copper (II) carbonate
2. Ammonium chloride
3. Potassium chlorate
4. Zinc oxide

48. Which of the following nitrates will form nitrogen dioxide when strongly heated?

1. Calcium nitrate
2. Sodium nitrate
3. Copper (II) nitrate
4. Potassium nitrate

49. Which of the following usually cause(s) water pollution?

1. calcium hydrogen carbonate
2. Phosphate detergents
3. Magnesium sulphate
4. sewage

50. Which of the following is/ are observed when of copper (II) nitrate is strongly heated?

1. Green solid forms black residue
2. Colourless condensate at the cooler parts of the test tube
3. Brown fumes
4. Grey residue remains

END