



*Dr. Bbosa Science*

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## **S4 CHEMISTRY**

**Exam 5**

***PAPER 1***

**DURATION: 1 hour 30 minutes**

### **Instructions**

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.

Do not use pencil.

1. In which of the following compounds is the bond different?

- A. hydrogen chloride      B. Sodium chloride      C. magnesium oxide      D. Aluminium oxide

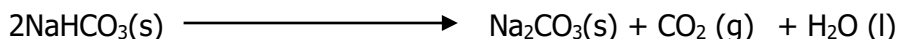
2. Water gas is mainly composed of

- A. steam and carbon dioxide      B. carbon monoxide and hydrogen  
C. carbon dioxide and hydrogen      D. steam and carbon monoxide

3. The electronic configuration of an ion of an element with atomic number 13 is

- A. 2:8:3      B. 2:8      C. 2:8:8      D. 2:3

4 Sodium hydrogen carbonate decomposes when heated according to the following equation



The volume of carbon dioxide evolved at s.t.p when 21g of sodium hydrogen carbonate are heated is (NaHCO<sub>3</sub> = 84, Molar gas volume at s.t.p = 22.4dm<sup>3</sup>)

- A.  $\frac{22.4 \times 21}{84}$       B.  $\frac{2 \times 84}{22.4 \times 21}$       C.  $\frac{22.4 \times 21 \times 2}{84}$       D.  $\frac{22.4 \times 21}{2 \times 84}$

5. The morality of the solution formed by dissolving 10g of potassium chloride to make 300cm<sup>3</sup> of solution is (Cl= 35.5, K= 39)

- A.  $\frac{74.5 \times 1000}{10 \times 300}$       B.  $\frac{10 \times 1000}{74.5 \times 300}$       C.  $\frac{300 \times 74.5}{10 \times 1000}$       D.  $\frac{10 \times 300 \times 1000}{74.5}$

6. Which one of the following salts prepared by reacting an acid and a metal

- A. copper II sulphate      B. sodium sulphate      C. zinc chloride      D. Barium chloride

7. Which one of the following gases cannot reduce copper II oxide

- A. nitrogen      B. Hydrogen      C. ammonia      D. carbon monoxide

8. Potassium hydrogen carbonate solution can be differentiated from potassium carbonate solution by

- A. addition of zinc nitrate solution      B. addition of dilute nitric acid  
C. addition of lead II nitrate solution      D. Addition of magnesium nitrate solution

9. When one of the following equations represents a reaction that takes place at the anode when copper (ii) sulphate solution is electrolyzed using a copper anode and a graphite cathode?

- A.  $2\text{H}^+(\text{aq}) + 2\text{e}^- \longrightarrow \text{H}_2(\text{g})$   
B.  $4\text{OH}^-(\text{aq}) - 4\text{e}^- \longrightarrow 2\text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$   
C.  $\text{Cu}(\text{s}) - 2\text{e}^- \longrightarrow \text{Cu}^{2+}(\text{aq})$   
D.  $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \longrightarrow \text{Cu}(\text{s})$

10. Limestone is added to the blast furnace during the extraction of iron to

- A. Remove the major impurity  
B. reduce the iron ore  
C. reduce the melting point of the ore  
D. produce carbon dioxide that reduces iron (III) oxide

11. A compound contains 72% X and 28% Y by mass. The empirical formula of the compound is (X = 24, Y = 14)

- A.  $\text{X}_2\text{Y}_3$                       B.  $\text{X}_3\text{Y}_2$                       C. XY                      D.  $\text{X}_2\text{Y}$

12.  $4.2\text{dm}^3$  of a gaseous compound weighs 5g at s.t.p. The molecular mass of the compound is (1 mole of a gas at s.t.p occupies  $22.4\text{dm}^3$ )

- A.  $\frac{5 \times 4.2}{22.4}$                       B.  $\frac{22.4 \times 4.2}{5}$                       C.  $\frac{5}{22.4 \times 4.2}$                       D.  $\frac{22.4 \times 5}{4.2}$

13. Which one of the following methods can be used to separate a mixture of sulphur and water?

- A. sublimation                      B. chromatography                      C. filtration                      D. crystallization

14. Which one of the following pairs of substances reacts when heated?

- A. zinc and aluminium oxide                      B. Carbon and lead II oxide  
C. copper and lead II oxide                      D. iron and magnesium oxide

15. The number of moles of ammonium ions contained in  $20\text{cm}^3$  of 0.1M ammonium sulphate solution is

- A.  $\frac{20 \times 0.1 \times 2}{1000}$                       B.  $\frac{1000}{20 \times 0.1 \times 2}$                       C.  $\frac{20 \times 0.1}{2 \times 1000}$                       D.  $\frac{0.1 \times 1000}{20 \times 2}$

16. Which one of the following ions reacts with sodium chloride solution to form a white precipitate that dissolves on heating?

- A.  $\text{Pb}^{2+}$                       B.  $\text{Mg}^{2+}$                       C.  $\text{Ca}^{2+}$                       D.  $\text{Al}^{3+}$

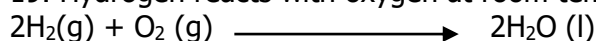
17. The formula of aluminum acetate is  $(\text{CH}_3\text{COO})_3\text{Al}$ . deduce the charge on the acetate ion

- A. +1                      B. +3                      C. -1                      D. -3

18. Sulphur dioxide and oxygen can be converted to sulphur trioxide on a large scale in the presence of

- A. silicon (IV) oxide                      B. manganese (IV) oxide  
C. Phosphorus (IV) oxide                      D. Vanadium (V) oxide

19. Hydrogen reacts with oxygen at room temperature according to the following equation



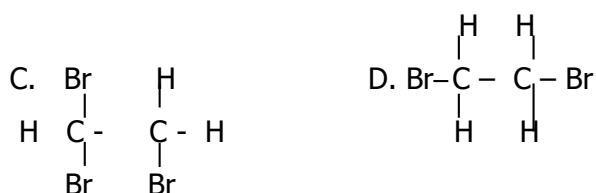
If  $60\text{cm}^3$  of hydrogen react with  $20\text{cm}^3$  of oxygen, the volume of the residual gas is

- A.  $60\text{cm}^3$                       B.  $40\text{cm}^3$                       C.  $20\text{cm}^3$                       D.  $80\text{cm}^3$

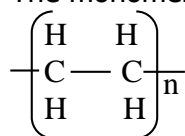
20. Which one of the following salts is soluble in cold water?

- A. Lead II chloride                      B. Zinc sulphate  
C. Barium sulphate                      D. Magnesium carbonate

21. The formula of the compound formed when ethene reacts with bromine is



22. The monomer of the polymer shown below is



- A. propene                      B. Butene                      C. Ethene                      D. Ethyne

23. Which one of the following is observed when a solution of ammonium chloride is tested with litmus paper?

- A. red litmus turns blue                      B. blue litmus turns red  
C. No observable change                      D. litmus was bleached

24. Which one of the following is observed when soap solution is added to aqueous calcium hydrogen carbonate?

- A. scum                      B. immediate lathering                      C. white precipitate      D. Pale yellow solid

25. The solubility of salt Q is 30g/100g of water at 65°C. The amount of Q that can dissolve in 25g of water at 65°C is

- A.  $\frac{100}{25 \times 30}$                       B.  $\frac{25 \times 100}{30}$                       C.  $\frac{25 \times 30}{100}$                       D.  $\frac{30 \times 100}{25}$

26. Which one of the following is soluble in ammonia solution?

- A. Al(OH)<sub>3</sub>                      B. Fe(OH)<sub>2</sub>                      C. Pb(OH)<sub>2</sub>                      D. Cu(OH)<sub>2</sub>

27. Which one of the following nitrates will produce nitrogen dioxide when heated strongly?

- A. ammonium nitrate                      B. potassium nitrate                      C. sodium nitrate                      D. silver nitrate

28. The gas formed when chlorine water is exposed to sunlight is

- A. chlorine                      B. oxygen                      C. hydrogen                      D. hydrogen chloride

29. The atomic numbers of elements T, R, W and Z are 6, 11, 12 and 16 respectively. Which one of the following pairs forms a covalent compound when reacted?

- A. T and Z                      B. T and R                      C. T and W                      D. W and Z

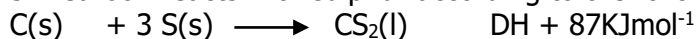
30. Which one of the following solutions conducts electricity?

- A. hydrogen chloride in carbon tetrachloride  
B. hydrogen chloride in ethanol  
C. Hydrogen chloride in water  
D. hydrogen chloride in methylbenzene

31. The discharge of ions of electrodes during electrolysis depends on the following factors except.

- A. the quantity of electricity used  
B. nature of electrodes used  
C. concentration of the electrolyte  
D. position of the ion in the electrochemical series

32. Carbon reacts with sulphur according to the following equation



The amount of heat absorbed when 1.9g of carbon disulphide is formed is (C = 12, S =32)

- A.  $\frac{76}{87 \times 1.9}$                       B.  $\frac{87 \times 1.9}{76}$                       C.  $\frac{87 \times 76}{1.9}$                       D.  $\frac{1.9 \times 76}{87}$

33. The chemical name of rust is

- A. anhydrous iron (II) oxide  
B. anhydrous iron (III) oxide  
C. hydrated iron (II) oxide  
D. hydrated iron (III) oxide

34. The particles which conduct electricity in molten sodium chloride are  
A. molecules            B. electrons            C. ions            D. atoms

35. Which one of the following equations represents a redox reaction?

- A.  $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \longrightarrow \text{H}_2\text{O}(\text{l})$   
B.  $\text{Zn}(\text{s}) + \text{Cu}^{2+}(\text{aq}) \longrightarrow \text{Zn}^{2+}(\text{aq}) + \text{Cu}(\text{s})$   
C.  $\text{Pb}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \longrightarrow \text{PbSO}_4(\text{s})$   
D.  $2\text{H}^+(\text{aq}) + \text{CO}_3^{2-}(\text{aq}) \longrightarrow \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$

36. The gaseous product in the oxidation of copper using concentrated nitric acid is  
A. Nitrogen dioxide            B. nitrogen monoxide            C. dinitrogen oxide            D. Oxygen

37. The percentage of water of crystallization in copper (II) sulphate -5- water  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  is  
(Cu = 64, S = 32, O =16,  $\text{H}_2\text{O}$  =18)

- A.  $\frac{250}{90 \times 100}$             B.  $\frac{160 \times 100}{250}$             C.  $\frac{90 \times 100}{160}$             D.  $\frac{90 \times 100}{250}$

38. When aqueous sodium hydroxide was added to solution J, a green precipitate that turned brown on standing was formed. The cation in J is

- A.  $\text{Al}^{3+}$             B.  $\text{Fe}^{3+}$             C.  $\text{Fe}^{2+}$             D.  $\text{Cu}^{2+}$

39. The following are produced when ethanol is burnt completely in oxygen except

- A. carbon monoxide            B. carbon dioxide            C. water vapour            D. heat energy

40. The reaction in which concentrated sulphuric acid reacts with ethanol to form ethene is known as

- A. Neutralization            B. Dehydration            C. Oxidation            D. Reduction

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.

- 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 statement 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 summarized***

Assertion

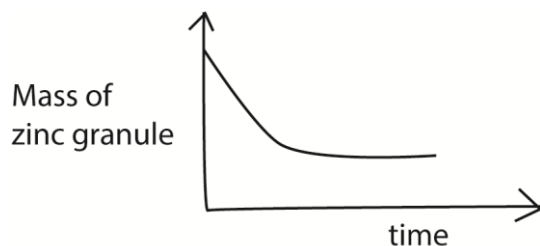
Reason

- |              |  |
|--------------|--|
| A. True      | True (reason is a correct explanation)     |
| B. True      | True (reason is not a correct explanation) |
| C. True      | Incorrect                                  |
| D. Incorrect | Correct                                    |
- 
41. Hydrochloric acid reacts faster with Zinc powder than zinc granules **because** Zinc granules provide greater surface area.
42. Carbon dioxide turns limewater **because** carbon dioxide is an acidic gas
43. When concentrated nitric acid **because** concentrated nitric acid oxidises iron (II) to iron (III) ions.
44. Potassium carbonate when dissolved in water forms an acid solution **because** it forms a solution that turns red litmus blue
45. 2M ethanoic acid is a Weak acid **because** the acid ionizes only slightly in water.

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 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. The figure below shows the variation of the mass of reactants with time when excess zinc granules react with dilute sulphuric acid.



The best explanation for the shape of the graph between A and D is

- 1. zinc is used up
  - 2. the reaction is taking place at a constant rate
  - 3. the reactants formed an insoluble salt.
  - 4. sulphuric acid is used up
47. Which of the following gas (es) is/are found in polluted air
- 1. Nitrogen
  - 2. Nitrogen dioxide
  - 3. Carbon dioxide
  - 4. Sulphur dioxide

48. When anhydrous copper sulphate is heated strongly until no further change, the products are

1. Copper (II) oxide
2. Sulphur dioxide
3. Sulphur trioxide
4. Copper (I) oxide

49. Which of the following gases decolorize acidic potassium dichromate solution?

1. Ethene
2. Carbon dioxide
3. Sulphur dioxide
4. Chlorine

50. Which of the following statements is true about the zinc- copper electrochemical cell?

1. The zinc rod is negatively charged
2. The copper rod dissolves to form copper (ii) ions
3. Copper (ii) ions are discharged at the copper rod
4. The zinc ions are discharged at the zinc rod

END