

Name..... Signature.....
School..... Index No.....

545/1
CHEMISTRY
Paper 1
July/August 2023
1 ½ hours



WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

Paper 1

1 hour 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.

Use pen and write clearly.

Do not use pencil.

<i>For examiner's use only</i>

1. When a mixture of ethanol and water was distilled the initial vapour given off contained more ethanol than water vapour. This was observed because ethanol
- A. and water are miscible liquids.
 - B. is more volatile than water.
 - C. is more dense than water.
 - D. is a solute and water is a solvent.
2. Which one of the following gases neither burns nor supports combustion?
- A. Nitrogen.
 - B. Hydrogen.
 - C. Methane.
 - D. Carbon monoxide.
3. The two isotopes of chlorine are chlorine 35 and chlorine 37. The reason why the two isotopes show similar chemical properties is because of the they have.
- A. different number of neutrons
 - B. different mass numbers
 - C. same number of electrons
 - D. same atomic numbers
4. Which one of the following hydro carbons is unsaturated?
- A. CH_4
 - B. C_2H_6
 - C. C_3H_6
 - D. C_4H_{10}
5. The process by which dilute hydrochloric acid converts starch to glucose under suitable conditions of $35 - 40^\circ\text{C}$ is called.
- A. hydrolysis.
 - B. dehydration.
 - C. fermentation.
 - D. neutralization.
6. What is the percentage by mass of oxygen in iron (II) sulphate, heptahydrate, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (Fe = 56, S = 32, O = 16, H = 1)
- A. $\left(\frac{278}{176} \times 100 \right)$
 - B. $(176 \times 100 \times 278)$
 - C. $\left(\frac{176 \times 100}{278} \right)$
 - D. $\left(\frac{176 \times 278}{100} \right)$
7. Which one of the following reactions will yield nitrogen as one of the products?
- A. Oxidation of ammonia by heated copper (II) oxide.
 - B. Reaction of Magnesium nitride with water.
 - C. Catalytic oxidation of ammonia using hot platinum gauze.
 - D. Heating of ammonium nitrate strongly.

8. Which one of the following substances absorbs much water from the atmosphere to the extent that it dissolves in it to form a solution?
- Ferric chloride
 - Copper (II) oxide
 - Anhydrous copper (II) Sulphate
 - Hydrated Sodium Carbonate
9. Potassium nitrate decomposes on heating according to the equation.
- $$2\text{KNO}_{3(s)} \longrightarrow 2\text{KNO}_{2(s)} + \text{O}_{2(g)}$$
- The volume of oxygen at room temperature and pressure that would be produced on heating 5.0 g of Potassium nitrate is (K = 39, N = 14, O = 16; 1 Mole of a gas occupies 24 dm³ at room temperature)
- 0.594 dm³
 - 0.954 dm³
 - 0.459 dm³
 - 0.696 dm³
10. Which one of the following gases is collected by down ward displacement of air?
- Carbon dioxide
 - Nitrogen dioxide
 - Ammonia
 - Chlorine gas
11. Which one of the following elements does NOT readily react with cold water?
- Calcium
 - Sodium
 - Magnesium
 - Potassium
12. 9.35 g of hydrocarbon Y contains 8.01 g of carbon by mass. The empirical formula of Y is (C = 12, H = 1)
- CH₄
 - CH₂
 - C₂H₆
 - C₂H₂
13. The gas evolved when a solution containing hypochlorous acid is exposed to sun rays is
- Hydrogen chloride gas.
 - Chlorine gas.
 - Oxygen gas.
 - Nitrogen gas.
14. Which one of the following classes of organic compounds does Sodium stearate belong to?
- Esters
 - Salt of carboxylic acid
 - Carboxylic acids
 - Alcohols
15. Students observed white coatings inside a school kettle that was used to boil borehole water. The compound in the white coating is.
- Calcium oxide
 - Calcium hydroxide
 - Calcium hydrogencarbonate
 - Calcium carbonate

16. The colour of the universal indicator when mixed with lemon juice turned red. This means that a solution of lemon juice
- has a pH value greater than 7.
 - can react with sodium metal liberating hydrogen gas.
 - turns the color of methyl orange from red to yellow
 - does not liberate carbon dioxide from carbonates.
17. Which one of the following metals is the most powerful reducing agent?
- Copper
 - Zinc
 - Magnesium
 - Iron
18. A compound R contains 2.80 g of iron and 5.35 g of chlorine. The formula of the oxide of R is (Fe = 56, Cl = 35.5)
- FeO
 - FeO₂
 - Fe₂O₃
 - Fe₃O₄
19. Sulphur dioxide is oxidized to sulphur trioxide according to the equation.
- $$2\text{SO}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{SO}_{3(g)} + \text{heat.}$$
- The following conditions will affect the equilibrium yield of sulphur trioxide except the use of;
- low temperatures.
 - finely divided vanadium (V) oxide.
 - excess air in order to react all the sulphur dioxide.
 - high pressure.
20. 24.5 cm³ of 0.046 M solution of an acid HnX required 22.6 cm³ of a 0.15 M sodium hydroxide solution for complete reaction. The basicity of the acid HnX is
- 1
 - 2
 - 3
 - 4
21. When a solution of sodium carbonate is treated with carbon dioxide, a white precipitate is formed. The formula of the compound formed is.
- NaHCO₃.
 - NaOH.
 - Ca(HCO₃)₂.
 - Na₂O₂.
22. 0.1 moles of compound X(HCO₃)₂ weighs 14.6 g. The formula mass of the sulphate XSO₄ is
- 100 g.
 - 106 g.
 - 115 g.
 - 120 g.
23. The electronic structure of element W is 2.8.2. Which one of the following is true about the chloride of W? It is
- a gas at room temperature.
 - a covalent compound.
 - an electrolyte when in solution.
 - soluble in methyl-benzene.

24. Which one of the following substances is responsible for the bleaching action of chlorine water on dyes?
- CaOCl_2
 - HClO_3
 - NaClO_3
 - HClO
25. Carbon dioxide is produced in the laboratory by the action of dilute hydrochloric acid on Calcium carbonate. The rate of production is highest when
- powered Calcium carbonate is reacted with 2 M hydrochloric acid.
 - marble chips are reacted with 2 M hydrochloric acid.
 - powered calcium carbonate is reacted with 1 M hydrochloric acid.
 - marble chips are reacted with 1 M hydrochloric acid.
26. When 4 g of ammonium nitrate were dissolved in 100 g of water, the temperature dropped from 23°C to 20°C . The molar enthalpy change is....
(S.H.C of water = $4.18 \text{ KJ kg}^{-1} \text{K}^{-1}$, N = 14, O = 16, H = 1)
- $\left(\frac{100 \times 4.18 \times 3 \times 80}{4} \right) \text{KJ/mole}$
 - $\left(\frac{80 \times 4.18 \times 3}{4 \times 10} \right) \text{KJ/mole}$
 - $\left(\frac{4 \times 10}{80 \times 4.18 \times 3} \right) \text{KJ/mole}$
 - $\left(\frac{100 \times 4.18 \times 3 \times 4}{80} \right) \text{KJ/mole}$
27. Which one of the following is the name of the process by which the property of rubber is improved by heating rubber with sulphur?
- Polymerization
 - Fermentation
 - Vulcanization
 - Saponification
28. Which one of the following substances dissolves in water to form a solution that can react with both Zinc oxide and hydrochloric acid?
- Na_2O_2
 - P_2O_5
 - CO_2
 - SO_2
29. Which one of the following metals cannot be extracted from its ore by electrolysis?
- Sodium
 - Aluminum
 - Iron
 - Magnesium
30. The purpose of hot compressed air during the extraction of sulphur from its deposit is to
- melt the Sulphur in the deposit.
 - force the molten Sulphur upwards onto the surface.
 - separate Sulphur from sand and other impurities.
 - prevent oxidation of sulphur to Sulphur dioxide.

Turn Over

31. Which one of the following does **NOT** decompose on heating?

- A. Sodium nitrate
- B. Sodium carbonate
- C. Calcium carbonate
- D. Calcium nitrate

☐

32. Element W of mass number 31 belongs to group V and period 3 of the periodic table. The number of neutrons in the atom of W is

- A. 15.
- B. 10.
- C. 24.
- D. 16.

☐

33. Which one of the following ions will react with Lead (II) nitrate to form a yellow precipitate?

- A. CO_3^{2-}
- B. Cl^-
- C. SO_4^{2-}
- D. I^-

☐

34. Sodium carbonate reacts with dilute nitric acid according to the equation.
 $\text{Na}_2\text{CO}_{3(\text{aq})} + 2\text{HNO}_{3(\text{aq})} \longrightarrow 2\text{NaNO}_{3(\text{aq})} + \text{H}_2\text{O}_{(\text{l})} + \text{CO}_{2(\text{g})}$

The mass of sodium nitrate that would be formed when 2.75 g of sodium carbonate is reacted completely with the acid is (Na = 23, O = 16, C = 12, N = 14, H = 1)

- A. $\left(\frac{2.75 \times 85}{106}\right) \text{g}$
- B. $\left(\frac{2.75 \times 2 \times 85}{106}\right) \text{g}$
- C. $\left(\frac{2.75 \times 85}{106 \times 2}\right) \text{g}$
- D. $\left(\frac{85 \times 2}{2.75 \times 106}\right) \text{g}$

☐

35. Which one of the following oxides of metals will **NOT** be reduced by carbon monoxide upon heating?

- A. Copper (II) oxide.
- B. Iron (III) oxide.
- C. Lead (II) oxide.
- D. Calcium oxide.

☐

36. Which of the following pairs of substances will cause a displacement reaction to occur when mixed?

- A. Copper metal and zinc chloride Solution.
- B. Iron filings and copper (II) sulphate solution.
- C. Zinc granules and magnesium nitrate solution.
- D. Bromine liquid and potassium chloride solution.

☐

37. The equation for combustion of methanol is $2\text{CH}_3\text{OH}_{(l)} + 3\text{O}_{2(g)} \longrightarrow 2\text{CO}_{2(g)} + 4\text{H}_2\text{O}_{(l)}$ $\Delta H = -510.4 \text{ KJ/Mole}$. The amount of heat produced when 8 g of methanol is completely burnt in oxygen is (C = 12, O = 16, H = 1)
- A. $\left(\frac{510.4 \times 8}{32}\right) \text{ KJ}$
- B. $\left(\frac{510.4}{8 \times 32}\right) \text{ KJ}$
- C. $\left(\frac{32 \times 8}{510.4}\right) \text{ KJ}$
- D. $\left(\frac{32 \times 510.4}{8}\right) \text{ KJ}$
38. Which one of the following nitrates will leave a shiny mirror coating on the walls of the test tube when heated strongly?
- A. Copper (II) nitrate
- B. Silver nitrate
- C. Sodium nitrate
- D. Ammonium nitrate
39. Which one of the following salts is prepared by double decomposition?
- A. Na_2SO_4
- B. CaCl_2
- C. PbSO_4
- D. $\text{Pb}(\text{NO}_3)_2$
40. Which one of the following substances will dissolve in water to form a solution whose pH is less than 7.
- A. NH_4Cl
- B. NH_3
- C. Na_2O_2
- D. Na_2CO_3

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

Select as follows.

- A. If both assertion and reason are **true** statements and the reason is the **correct** explanation of the assertion.
- B. If both assertion and reason are **true** statements but the reason is **not** the **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 (Reason is a correct explanation)
B. True	True (reason is not a correct explanation)
C. True	Incorrect
D. Incorrect	Correct

41. Ammonium chloride when heated forms a white sublimate on cooling because the ammonia and hydrogen chloride formed recombine on cooling. ☐
42. Sodium bicarbonate is an acidic salt because sodium bicarbonate is formed by replacing all the replaceable hydrogens of the acid by sodium. ☐
43. Sodium amalgam reacts with water to form sodium hydroxide, hydrogen and mercury because sodium is an alkali metal. ☐
44. Manganese (IV) oxide and Lead (IV) oxide are not considered as bases because they both oxidise concentrated hydrochloric acid to chlorine gas, the salt and water. ☐
45. Zinc is used to form galvanized iron because Zinc is below Iron in the reactivity series. ☐

In each of the question 46 – 50 one or more of the answers may be correct. Read each question carefully and then indicate the correct answer as: A, B, C or D 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 Summarised

A	B	C	D
1, 2, 3 only	1 and 3 only	2 and 4 only	4 only

46. Which of the following gas(es) can NOT be suitably collected over water?
 1. Sulphur dioxide gas
 2. Hydrogen chloride gas
 3. Ammonia gas
 4. Carbon monoxide gas ☐
47. The ion(s) that form hydroxide(s) which is/are soluble in excess ammonia is /are
 1. Pb^{2+}
 2. Cu^{2+}
 3. Al^{3+}
 4. Zn^{2+} ☐
48. Which of the following element(s) is/are allotropic?
 1. Phosphorus
 2. Chlorine
 3. Sulphur
 4. Sodium ☐
49. Methane is used as a fuel because,
 1. it burns with a non-sooty flame.
 2. it is a saturated hydrocarbon.
 3. it produces a lot of heat when burnt in oxygen.
 4. it is an alkane. ☐
50. Which of the following is/are characteristics of metal(s)?
 1. They have high melting and boiling points.
 2. They conduct heat and electricity.
 3. They have high densities.
 4. They have low melting point(s) ☐

END