| **NAME** |  |
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| **SUBJECT** | **CHEMISTRY** | **CLASS** | **SS2** | **DURATION** |  **2 HOURS** |

KITH & KIN INTERNATIONAL COLLEGE

*7/11 Kaoli Olusanya Street, Owode Ibeshe, Ikorodu, Lagos State.*

**THIRD TERM EXAMINATION 2024/2025 ACADEMIC SESSION**

**SECTION A: OBJECTIVE [20 marks]**

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INSTRUCTION: ***Each question is followed by four options lettered A to D. Find the correct option for each question and shade in pencil on your answer sheet, the answer space which bears the same letter as the option you have chosen.***

1. Which of the following methods is used to remove temporary hardness of water?
 A. Boiling
 B. Filtration
 C. Distillation
 D. Chlorination
2. Permanent hardness of water is caused by the presence of
 A. Calcium bicarbonate
 B. Magnesium bicarbonate
 C. Calcium sulfate
 D. Sodium chloride
3. A good sample of drinking water should be
 A. Tasteless and colored
 B. Colorless and odorless
 C. Smelly and foamy
 D. Cloudy and sweet
4. The solubility of a salt increases with temperature if the dissolution is
 A. Exothermic
 B. Endothermic
 C. Neutral
 D. Spontaneous
5. Which of these substances is most soluble in water?
 A. Sand
 B. Salt
 C. Oil
 D. Sulfur
6. The solubility of a substance is defined as
 A. The volume of solute in solvent
 B. The amount of solute that dissolves in 1g of water
 C. The maximum amount of solute that dissolves in 100g of solvent at a given temperature
 D. The time taken to dissolve
7. What volume of 0.5 mol/dm³ HCl will contain 0.25 mol of HCl?
 A. 0.5 dm³
 B. 0.25 dm³
 C. 0.75 dm³
 D. 1.0 dm³
8. Calculate the mass of 2.5 moles of NaCl (Na = 23, Cl = 35.5).
 A. 58.5 g
 B. 117 g
 C. 146.25 g
 D. 29.25 g
9. What is the volume occupied by 2 moles of a gas at STP?
 A. 11.2 dm³
 B. 22.4 dm³
 C. 44.8 dm³
 D. 33.6 dm³
10. A standard solution is one whose
 A. Solute is not dissolved
 B. Concentration is unknown
 C. Concentration is accurately known
 D. Volume is unknown
11. The apparatus used to measure accurately the volume of acid added in titration is
 A. Pipette
 B. Beaker
 C. Burette
 D. Flask
12. The indicator used in titration of strong acid with strong base is
 A. Methyl orange
 B. Phenolphthalein
 C. Litmus
 D. Universal indicator
13. If 25.0 cm³ of 0.1 mol/dm³ NaOH reacts with 25.0 cm³ of HCl, what is the concentration of HCl?
 A. 0.05 mol/dm³
 B. 0.2 mol/dm³
 C. 0.1 mol/dm³
 D. 0.5 mol/dm³
14. Hydrocarbons are compounds composed of
 A. Hydrogen and oxygen
 B. Carbon and hydrogen
 C. Carbon and nitrogen
 D. Carbon and sulphur
15. The general formula for alkanes is
 A. CnH2n
 B. CnH2n-2
 C. CnH2n+2
 D. CnH2n+1OH
16. Which of the following is an alkane?
 A. C2H4
 B. C3H8
 C. C2H2
 D. CH3OH
17. Alkanes are generally
 A. Unsaturated
 B. Highly reactive
 C. Saturated
 D. Aromatic
18. The first member of the alkane series is
 A. Ethane
 B. Butane
 C. Methane
 D. Propane
19. Which of the following is the general formula for alkenes?
 A. CnH2n
 B. CnH2n+2
 C. CnH2n-2
 D. CnH2n+1
20. Which hydrocarbon is unsaturated and contains a double bond?
 A. Methane
 B. Ethene
 C. Ethane
 D. Butane
21. Which of the following is an isomer of butene?
 A. Butyne
 B. Butanol
 C. 2-butene
 D. Ethene
22. Which of the following represents the general formula for alkynes?
 A. CnH2n+2
 B. CnH2n
 C. CnH2n-2
 D. CnH2n+1
23. Ethene and ethyne can be distinguished by
 A. Their melting points
 B. Reaction with bromine water
 C. Reaction with water
 D. Their boiling points
24. The first member of the alkyne series is
 A. Ethyne
 B. Methyne
 C. Propyne
 D. Butyne
25. The functional group in alkanols is
 A. –COOH
 B. –OH
 C. –CHO
 D. –NH2
26. Which of the following is a primary alkanol?
 A. Propan-2-ol
 B. Methanol
 C. Butan-2-ol
 D. Ethanoic acid
27. Which of the following is not an alkanol?
 A. Methanol
 B. Ethanol
 C. Propanol
 D. Methanal
28. Ethanol can be prepared in the laboratory by
 A. Esterification
 B. Fermentation
 C. Polymerization
 D. Combustion
29. Alkanols can react with carboxylic acids to form
 A. Alcohols
 B. Esters
 C. Alkanes
 D. Ketones
30. Alkanols are generally
 A. Insoluble in water
 B. Non-flammable
 C. Weak acids
 D. Neutral and flammable
31. Which of the following elements is a halogen?
32. Sodium
33. Oxygen
34. Chlorine
35. Magnesium
36. The modern periodic table is arranged based on:
37. Atomic mass
38. Atomic number
39. Number of neutrons
40. Mass number
41. Elements in the same group of the periodic table have the same:
42. Atomic number
43. Mass number
44. Number of valence electrons
45. Number of protons
46. Which of the following is a noble gas?
47. Oxygen
48. Nitrogen
49. Helium
50. Sulphur
51. The period number of an element indicates:
52. Number of protons
53. Number of valence electrons
54. Number of shells
55. Atomic mass
56. Which of the following is always oxidized in a redox reaction?
57. Oxidizing agent
58. Reducing agent
59. Catalyst
60. Product
61. In the reaction: Zn + Cu²⁺ → Zn²⁺ + Cu, which substance is reduced?
62. Zn
63. Cu²⁺
64. Cu
65. Zn²⁺
66. Which of the following is both an oxidizing and reducing agent?
67. Cl₂
68. H₂
69. H₂O₂
70. Na
71. During electrolysis, the anode is:
72. Positively charged
73. Negatively charged
74. Neutral
75. Not connected
76. The process by which an ionic compound is broken down using electricity is called:
77. Neutralization
78. Electrolysis
79. Crystallization
80. Sublimation
81. In the electrolysis of copper(II) sulphate solution using copper electrodes, the mass of the anode:
82. Increases
83. Decreases
84. Remains the same
85. Doubles
86. Which ion is discharged at the cathode during the electrolysis of acidified water?
87. OH⁻
88. H⁺
89. O²⁻
90. SO₄²⁻
91. Electrolysis is used in the following except:
92. Electroplating
93. Extraction of metals
94. Production of gases
95. Fractional distillation
96. Which factor does NOT affect the rate of a chemical reaction?
97. Temperature
98. Surface area
99. Catalyst
100. Colour of reactants
101. Increasing the temperature of a reaction generally:

A. Decreases reaction rate

B. Increases reaction rate

C. Stops the reaction

D. Slows down molecules

1. A catalyst works by:
2. Changing the products
3. Increasing the activation energy
4. Lowering the activation energy
5. Changing the equilibrium position
6. In a reaction between marble chips and HCl, increasing the surface area of marble chips will:
7. Slow down the reaction
8. Have no effect
9. Speed up the reaction
10. Change the reaction products
11. A reversible reaction is one that:
12. Proceeds to completion
13. Can go in both forward and backward directions
14. Is always exothermic
15. Is always endothermic
16. At equilibrium, the rate of forward reaction is:
17. Greater than backward reaction
18. Less than backward reaction
19. Equal to backward reaction
20. Zero
21. In an exothermic equilibrium reaction, increasing temperature will:
22. Shift equilibrium to the right
23. Shift equilibrium to the left
24. Have no effect
25. Stop the reaction

**SECTION B: THEORY (40 marks)**

INSTRUCTION: Answer any **four (4)** questions in this section. All questions carry equal marks.

1. (a) Define periodicity in chemistry. (1 mark)

(b) State two periodic trends and explain how they vary across a period. (4 marks)

(c) Write the electron configuration of the following elements: Na, Mg, Al. (3 marks)

(d) Using your answer in (c), explain the trend in atomic radius across Period 3 from Na to Al. (2 marks)

1. (a) List two sources of natural water. (2 marks)

(b)Why is water a universal solvent? (2 marks)

(c) Define solubility. (2 marks)

(d) A saturated solution has 30g of KNO₃ in 100g of water at 40°C. Find its solubility.

(4 marks)

1. (a) Define electrolysis. (2 marks)

(b) Name the electrodes used in electrolysis of brine. (2 marks)

(c) Write the ionic equations at the cathode and anode. (2 marks)

(d) Calculate the volume of chlorine gas produced at STP when a current of 10A is passed through brine for 1930 s. (F = 96500 C/mol, molar volume = 22.4 dm³) (4 marks)

1. (a) State Le Chatelier’s Principle. (3 marks)

(b) What is the effect of increasing pressure on the equilibrium?

N₂ + 3H₂ ⇌ 2NH₃ (2 marks)

(c) Define dynamic equilibrium. (2 marks)

(d) Given: [N₂] = 0.2, [H₂] = 0.3, [NH₃] = 0.4 mol/dm³. Calculate Kc of the reaction in (b) above (3 marks)

1. (a) Define a base using Bronsted-Lowry theory. (2 marks)

(b) Write equation for HCl and NaOH neutralization. (2 marks)

(c) Calculate pH of 0.01M HCl. (3 marks)

(d) If 25cm³ of 0.1 M NaOH neutralizes 20cm³ of HCl, find the molar concentration of HCl.

 (3 marks)

1. (a) Differentiate between saturated and unsaturated hydrocarbons. (2 marks)

(b) Name and draw first two alkynes. (4 marks)

(c)Write general formula for alkanols. (1 mark)

(d) Calculate % composition of carbon in ethanol (C₂H₅OH). [C=12, H=1, O=16] (2 marks)