



LIDETA SUB CITY ADMINISTRATION EDUCATION OFFICE

GRADE 12 CHEMISTRY MODEL EXAMINATIONS

2016E.C/ 2024G.C

Time Allowed: - 2:30 hours

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS EXAMINATION CHEMISTRY. IN THIS EXAMINATION, THERE ARE A TOTAL OF 80 MULTIPLE CHOICE QUESTIONS. CAREFULLY SELECT THE BEST ANSWER AND BLACKEN ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED. FOLLOW THE INSTRUCTIONS ON THE ANSWER SHEET AND THE EXAMINATION PAPER CAREFULLY. USE ONLY PENCIL TO MARK YOUR ANSWERS. YOUR ANSWER MARK SHOULD BE HEAVY AND DARK, COVERING THE ANSWER SPACE COMPLETELY. PLEASE ERASE ALL UNNECESSARY MARKS COMPLETELY FROM YOUR ANSWER SHEET.

YOU ARE ALLOWED TO WORK ON THE EXAM FOR 2:12 HOURS. WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING, PUT YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTIONS.

ANY FORM OF CHEATING OR AN ATTEMPT TO CHEAT IN THE EXAMINATION WILL RESULT IN AN AUTOMATIC DISMISSAL FROM THE EXAMINATION HALL AND CANCELLATION OF YOUR SCORE (S).

PLEASE MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE ANSWER SHEET BEFORE YOU START TO WORK ON THE EXAMINATION.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

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DIRECTION: EACH OF THE FOLLOWING QUESTIONS IS FOLLOWED BY FOUR POSSIBLE ALTERNATIVES. CHOOSE THE CORRECT ANSWER AND BLACKEN THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED.

- Isotopes are atoms of the same element that differ in their;
 - Number of protons
 - Number of electrons
 - Mass number
 - Atomic number
- How many electrons are there in **d-subshell** in the electron configuration of chromium with atomic number 24?
 - 4
 - 5
 - 6
 - 7
- In which of the following blocks of the periodic table does an element with atomic number 14 located?
 - s
 - p
 - d
 - f
- Which of the following is the **most metallic** element?
 - K
 - Na
 - Mg
 - Ca
- Which of the following substances has the **least ionic character**?
 - LiCl
 - NaCl
 - MgCl₂
 - BeCl₂
- How many **lone pairs** are there in the Lewis structure of CCl₄?
 - 12
 - 10
 - 9
 - 8
- Which of the following molecules has the **strongest London** dispersion force?
 - F₂
 - Cl₂
 - Br₂
 - I₂
- When the following reaction is correctly balanced, what would be the **coefficient** of HNO₃? $\text{Cu} + \text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{NO} + \text{H}_2\text{O}$
 - 4
 - 6
 - 8
 - 10
- Given the reaction: $2\text{KNO}_3 \rightarrow 2\text{KNO}_2 + \text{O}_2$, how many **moles** of potassium nitrate must be decomposed to produce 9 moles of Oxygen gas?
 - 2
 - 3
 - 9
 - 18
- The number of chloride ions in 2 moles of AlCl₃ is;
 - 3.612×10^{24}
 - 3.612×10^{23}
 - 6.02×10^{23}
 - 6.02×10^{24}
- What is the oxidation number of **sulphur** in the molecule of H₂S₂O₇?
 - +2
 - +4
 - +6
 - +8
- Which of the following is **incorrect** concerning factor affecting rate of chemical reaction?
 - An increasing the temperature of the reaction increases the rate of reaction
 - An increasing the concentration of the reactant increases the rate of reaction
 - A catalyst can increases the rate of chemical reaction by lowering activation energy
 - A increasing the surface area of the reactant decreases the rate of the reaction
- Given the reaction: $\text{CaCO}_3 (\text{s}) \rightleftharpoons \text{CaO} (\text{s}) + \text{CO}_2 (\text{g})$. What is the **equilibrium constant** expression for the given reaction?
 - $[\text{CaO}][\text{CO}_2]/[\text{CaCO}_3]$
 - $[\text{CO}_2]$
 - $[\text{CaO}][\text{CO}_2]$
 - $[\text{CO}_2]/[\text{CaCO}_3]$
- A gas occupies a volume of 5 L at 300 torr. What will be the volume of gas if the pressure increases to 400 torr at constant temperature?
 - 1.5 L
 - 3.75 L
 - 10 L
 - 15.5 L
- If you heat 5L balloon from a temperature 5 °C to 50 °C, its new volume will be;
 - 2.5 L
 - 2.9 L
 - 5.8 L
 - 10 L

16. Which one of the following has the **least rate of diffusion**?
 A. O_2 B. N_2 C. CH_4 D. H_2
17. An **alkane** with 19 carbon atoms would have the formula of;
 A. $C_{19}H_{36}$ B. $C_{19}H_{37}$ C. $C_{19}H_{38}$ D. $C_{19}H_{40}$
18. What is the molecular formula of 3, 3-dimethylpentane?
 A. C_5H_{12} B. C_7H_{16} C. C_6H_{14} D. C_8H_{18}
19. What is the product in the following reaction? $CH_3CCH + 2HCl \rightarrow$
 A. $CH_3CCl_2CH_3$ B. $CH_3CHClCH_2Cl$ C. $CH_3CH_2CHCl_2$ D. $CH_3CClCHCl$
20. The gas that is widely used for **cutting** and **welding** of metals has the formula;
 A. C_2H_6 B. C_3H_4 C. C_2H_2 D. CH_4
21. The types of alcohol that is found in all alcoholic beverages like Tella, Areqi, Beer is;
 A. propanol B. butanol C. Methanol D. ethanol
22. What is the **product** formed when carboxylic acid reacts with lithium aluminium hydride?
 A. Ether B. Ester C. Alcohol D. Ketone
23. Which of the following is an **acidic oxide**?
 A. CuO B. SO_2 C. Fe_2O_3 D. Na_2
24. Which one of the following is used as a **raw material** in the production of nitric acid?
 A. NH_3 B. N_2O C. N_2O_3 D. $NaNO_3$
25. All of the following salts are insoluble in water. **EXCEPT**;
 A. Na_2SO_3 B. $BaSO_4$ C. $CaCO_3$ D. $AgCl$
26. Which one of the following gas is formed when dilute acid reacts with active metal?
 A. CO_2 B. O_2 C. N_2 D. H_2
27. Which of the following species is preferentially discharged at the anode in the electrolysis of brine?
 A. OH^- B. H_2O C. Cl^- D. Na^+
28. The electrolyte in lead storage battery is;
 A. HCl B. H_2SO_4 C. $NaOH$ D. HNO_3
29. Which of the following compound is occurs widely in glass, cement and ceramics?
 A. Silicates B. Sulphates C. Carbonates D. Phosphates
30. Which of the following element is the third most abundant element in the earth's crust?
 A. Silicon B. Aluminium C. Calcium D. Iron
31. Among the following identify the purest form of iron?
 A. Cast iron B. Steel C. Pig iron D. Wrought iron
32. Which of the following is **not** the use of phosphorus?
 A. It is used to make fertilizer C. It is used to make sulphuric acid
 B. It is used to make matches D. It is used to make rat poison
33. What is the Kelvin scale corresponding to the temperature readings when the degree Celsius ($^{\circ}C$) is equal with the degree Fahrenheit ($^{\circ}F$)?
 A. 0 K B. 37 K C. 233 K D. 273 K
34. Which of the following is possible while doing an experiment?
 A. Washing hand with soap C. Dangling hair
 B. Smelling chemicals D. Chewing gum
35. What is the ratio of the energy of a photon of 300nm wavelength radiation to that of 600nm radiation?
 A. 1:2 B. 1:1 C. 3:1 D. 2:1

36. The ejection of electron from metals by shining light on the metal surface is;
 A. work function C. binding energy
 B. photoelectric effect D. speed of light
37. Which of the following shows the correct order of filling orbitals for given subshells?
 A. $4f > 6s > 5p$ B. $4s > 3d > 3p$ C. $7s > 6p > 5f$ D. $4d > 6s > 5p$
38. What is the number of unpaired electrons in the electron configuration of iron? ($Z = 26$)
 A. 2 B. 3 C. 4 D. 5
39. Which of the following compounds would be expected to have the highest melting point?
 A. BaCl_2 B. BaBr_2 C. BaI_2 D. BaF_2
40. How many bonding and lone pairs, respectively does the molecule CO_2 have? ($^{12}_6\text{C}$, $^{16}_8\text{O}$)
 A. 2, 4 B. 4, 4 C. 3, 2 D. 3, 3
41. Which of the following molecule has **see-saw** shape?
 A. SF_4 B. H_2O C. XeF_4 D. ClF_3
42. Which of the following is **not correctly** matched the molecule and hybridization around the central atom?
 A. NH_3 : sp^3 B. PCl_5 : sp^3d C. H_2O : sp^3 D. SF_6 : sp^3d
43. If we increase the concentration of a reactant, what happens to the collisions between particles?
 A. There are fewer collisions
 B. There are the same numbers of collisions but they have less energy
 C. There are more collisions
 D. There are the same numbers of collisions but they have more energy
44. The reaction between NO and I_2 is second order in NO and first order in I_2 . What change occurs in the rate of reaction if the concentration of each reactant is tripled?
 A. 3 fold increase B. 9 fold increase C. 18 fold increase D. 27 fold increase
45. Suppose reactions: $\text{A} \rightarrow \text{B}$ and $\text{B} \rightarrow \text{A}$ are both elementary processes with rate constant of 800 s^{-1} and 4000 s^{-1} respectively. What is the value of the equilibrium constant for $\text{A} \rightleftharpoons \text{B}$?
 A. 0.2 B. 2 C. 20 D. 200
46. Consider the reaction: $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}(\text{g})$, $\Delta H = +180\text{ kJ/mol}$ the production of NO is increased by;
 A. Decreasing temperature C. Increasing temperature
 B. Increasing pressure D. Decreasing pressure
47. Which of the following acid is used as chemical defense for ants?
 A. $\text{CH}_3(\text{CH}_2)_2\text{COOH}$ B. HCOOH C. CH_3COOH D. $\text{CH}_3\text{CH}_2\text{COOH}$
48. An alcohol produced in the manufacturing of soap is;
 A. butanol B. ethanol C. glycerol D. methanol
49. Which of the following is correct about the base according to the **Arrhenius concept**?
 A. A substance that causes an increase in the concentration of H^+ in aqueous solution
 B. A substance that can accept a pair of electrons to form a coordinate covalent bond
 C. A substance that can donate a pair of electrons to form a coordinate covalent bond
 D. A substance that causes an increase in the concentration of OH^- in aqueous solution
50. All of the following is a conjugate acid-base pair. **EXCEPT**;
 A. $\text{H}_2\text{SO}_4/\text{HSO}_4^-$ B. $\text{NH}_3/\text{NH}_4^+$ C. $\text{H}_3\text{PO}_4/\text{HPO}_4^{2-}$ D. $\text{H}_3\text{O}^+/\text{H}_2\text{O}$

51. Which of the following statement is **true** about the percent ionization of weak acid?
- It decreases with decreasing concentration
 - It decreases with increasing concentration
 - It increases with decreasing concentration
 - It increases with increasing concentration
52. All of the following combination can produce a buffer solution. **EXCEPT**;
- HClO_4 and NaClO_4
 - HCN and NaCN
 - CH_3COOH and CH_3COONa
 - H_3PO_4 and NaH_2PO_4
53. If CH_3COONa is added to a solution containing CH_3COOH , which of the following statements is **true**?
- The pH of the solution will decrease
 - The pH of the solution will increase
 - The equilibrium shifts to the right
 - The pH will remain the same
54. The salts of which of the following weak acid will be the **most hydrolyzed**?
- HCOOH , $K_a = 1.7 \times 10^{-4}$
 - $\text{C}_6\text{H}_5\text{COOH}$, $K_a = 6.5 \times 10^{-5}$
 - CH_3COOH , $K_a = 1.8 \times 10^{-5}$
 - HF , $K_a = 6.8 \times 10^{-4}$
55. The acid-base indicator methyl orange has a K_a value of 1×10^{-6} . Its acidic form is red while its basic form is yellow. If methyl orange is added to a solution with a $\text{pH} = 7$, the color of the solution will be;
- Pink
 - Red
 - Orange
 - Yellow
56. Which of the following titration will have an equivalence point at a $\text{pH} > 7$?
- Weak acid with strong base
 - Weak acid with weak base
 - Strong acid with weak base
 - Strong acid with strong base
57. Given the reaction: $\text{H}_2\text{S} + \text{HNO}_3 \rightarrow \text{S} + \text{NO} + \text{H}_2\text{O}$. Which of the following is **correct** about the given chemical reaction?
- H_2S is reducing agent
 - H_2S is reduced substance
 - HNO_3 is reducing agent
 - HNO_3 is substance oxidized
58. Which of the following pairs of the charge carrier is selected by the electrode in the electrolysis of dilute NaCl solution?
- Na^+ and OH^-
 - Na^+ and Cl^-
 - H^+ and OH^-
 - H^+ and Cl^-
59. Two cells are connected in series. One contains AlCl_3 and the other contains AgNO_3 as the electrolytes. What mass of Ag is deposited when 1.8 g of Al is deposited at cathode?
- 10.8 g
 - 21.6 g
 - 108 g
 - 216 g
60. The process of coating less active metal on the surface of more active metals using electrolysis is;
- Electro refining
 - Etching
 - Anodic protection
 - Electroplating
61. Which of the following is **not correct** about electrolytic cells?
- Cathode is negative electrode
 - Oxidation occurs at the anode
 - Redox reaction takes place in the cells
 - Convert chemical to electrical energy
62. Which of the following is **correct** about the galvanic cells?
- Oxidation occurs at the cathode
 - Reduction occurs at the anode
 - Cathode is the positive electrode
 - Anode is electron receiver
63. All of the following is the purpose of **salt bridge** in the galvanic cells. **EXCEPT**;
- To maintain the electrical neutrality between the two solution
 - To prevent the flow of electrons inside the galvanic cells

- C. To allow the electrical contact between the two solution
D. To prevent the mixing of the electrode
64. Which of the following statement **cannot** describe the characteristic of chemical industries?
A. It measures the property that does not change the identity of the substance
B. It involves chemical reaction to transform raw materials into new materials
C. It consumes large quantities of energy during manufacturing process
D. Testing their products during and after manufacturing in their quality control laboratories
65. All of the following is non-renewable natural resources. **EXCEPT**;
A. Petroleum B. Salts C. Natural rubber D. Natural gas
66. All of the following is **correctly matched** with its manufacturing process. **EXCEPT**;
A. HClO_4 – Solvay process C. NH_3 – Haber process
B. HNO_3 – Ostwald process D. H_2SO_4 – Contact process
67. Which of the following is the chemical formula of **soda ash**?
A. NaHCO_3 B. Na_2CO_3 C. Na_2SO_4 D. CaCO_3
68. What is the chemical formula of **oleum**?
A. H_2SO_4 B. HClO_4 C. $\text{H}_2\text{S}_2\text{O}_4$ D. $\text{H}_2\text{S}_2\text{O}_7$
69. Which of the following bacteria can convert ammonium ion (NH_4^+) to nitrate ion (NO_3^-) in the soil?
A. Nitrosomonas bacteria C. Nitrosolobus bacteria
B. Elecosolobus bacteria D. Nitrification
70. Which of the following are the **traditional methods** of food preservation?
A. Vacuum-packing B. Freeze-drying C. Freezing D. Smoking
71. Which of the following are the **major raw materials** for the production of Portland cement?
A. Lime stone, clay and silica C. Clay, gypsum and silica
B. Lime stone, gypsum and silica D. Lime stone, silica and pumice
72. Which of the following are the correct steps for the production of sugar?
A. Cleansing → harvesting → juicing → clarifying → evaporation → crystallization
B. Harvesting → cleansing → juicing → clarifying → evaporation → crystallization
C. Harvesting → juicing → cleansing → evaporation → clarifying → crystallization
D. Harvesting → clarifying → juicing → evaporation → cleansing → crystallization
73. Which of the following sequential steps are correct in the preparatory stages of tanning?
A. Curing → soaking → flesh removal → hair removal → scudding → deliming
B. Hair removal → flesh removal → curing → soaking → scudding → deliming
C. Soaking → deliming → curing → flesh removal → scudding → hair removal
D. Deliming → curing → hair removal → scudding → soaking → flesh removal
74. Which of the following substance would be the possible repeating unit for natural rubber?
A. 1,3-dimethyl-2,3-butadiene C. 1,2-dimethyl-1,3-butadiene
B. 2-methyl-1,3-butadiene D. 2-methyl-1,3-pentadiene
75. Which of the following substance would be the possible repeating unit for polyethylene terephthalate?
A. 1, 4-benzenedicarboxylic acid and 1, 6-hexanedioic acids
B. 1, 6-diaminohexane and 1, 6-hexanedioic acid
C. 1, 4-benzene dicarboxylic acid and 1, 2-ethanediol
D. 1, 6-diaminohexane and 1, 2-ethanediol

76. Sucrose is the most abundant disaccharide carbohydrate made up of which kind of monomer?
- A. Galactose and fructose by α -1,4-linkage
 - B. β -glucose and β -glucose by β -1,4-linkage
 - C. Glucose and fructose by α,β -1,2-linkage
 - D. Glucose and glucose by α -1,4-linkage
77. What types of polymerizations occurs when ethylene glycol reacts with terephthalic acids to form polyester?
- A. Addition polymerization
 - B. Substitution polymerization
 - C. hydration polymerization
 - D. Condensation polymerization
78. Which of the following components of the environment is composed of 78 % of nitrogen, 21 % of oxygen and 1 % of other gases?
- A. Hydrosphere
 - B. Atmosphere
 - C. Lithosphere
 - D. Biosphere
79. All of the following is the methods of reducing air pollution. **EXCEPT**;
- A. Reduction of forest fire and smoking
 - B. Using a public transport
 - C. Recycling of non-biodegradable materials
 - D. Avoiding the releasing of SO_2 to the environment
80. Which of the following methods **cannot** be used to reduce water pollution?
- A. Discharging of hot water from industries to the rivers and lakes
 - B. Treatment of water before discharging into rivers
 - C. Recycling an industrial and agricultural wastes
 - D. Using moderate amount of agricultural chemicals and increasing the use of organic fertilizers

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