LIDETA SUB CITY ADMINISTRATION EDUCATION OFFICE GRADE 12 CHEMISTRY MODEL EXAMINATIONS 2017E.C/ 2025G.C

Time Allowed: - 2:30 hours

GENERAL DIRECTIONS THIS BOOKLET CONTAINS EXAMINATION CHEMSITRY. 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.

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.

1. Which one of the following is correctly **explain** the Modern Atomic Theory?
   A. Atoms are indivisible
   B. Atoms are the smallest particles of all elements
   C. Atoms of the same element are identical
   D. Atoms of the same elements have different chemical properties
2. Why some of the alpha particles were deflected during the experiment of Ruther ford?
   A. The presence of heavy negative particles in the nucleus
   B. The presence of neutral particles around shell of atom
   C. The presence of heavy positive particles in the nucleus
   D. The presence of proton in the shell of atom
3. Identify the number of nucleons in $^{238}_{92}U$
   A. 92 B. 146 C. 230 D. 238
4. How many electrons enter into 3d sub-shell of an atom whose atomic number is 29?
   A. 10 B.9 C.8 D.7
5. Which one of the following list is the correct increasing order of energy of subshells?
   A. 3s,3p,3d,4s B. 3p,3s,3d ,4s C. 3s,3p,4s,3d D. 3s,3d,3p,4s
6. Find the block of an element in the periodic table with atomic number 14.
   A. s B. f C. d D. p
7. The classification of an element in period and group respectively in the periodic table with atomic number of 19 is;
   A. 4 and IIA B. 4 and IA C. 4 and IB D. 4 and IIB
8. Identify the correct ionic radii comparison.
   A. $Al^{3+} < F^{-} < O^{2-} < Cl^{-}$ C. $F^{-} < Al^{3+} < O^{2-} < Cl^{-}$
   B. $O^{2-} < Cl^{-} < Al^{3+} < F^{-}$ D. $Cl^{-} < O^{2-} < F^{-} < Al^{3+}$
9. If you compare the properties of elements down the same group;
   A. Atomic size decreases down a group
   B. The number of valence electrons increases down a group
   C. The first ionization energy of metal increases down a group
   D. The electronegativity of non-metal decreases down a group
10. Why we use periodic classification of elements? Periodic classification **does not** help to;
    A. describe the energy of the elements
    B. Predict the formula of compounds
    C. know the nature of oxides
    D. explain the physical and chemical properties of elements
11. Why elements can form chemical bond? Because chemical bond helps to;
    A. avoid the concept of octet rule
    B. increase the stability of the compound compared to the isolated atoms
    C. decreases the stability of the compound compared to the isolated atoms
    D. increase the energy of the compound compared to the isolated atoms
12. Which properties do typically ionic compounds have?
    A. High melting point and good conductivity in solid state
    B. Low melting point and good conductivity in solid state
    C. High melting point and non-conductor in solid state
    D. Low melting point and poor conductivity in solid state

13. Which of the following chemical formulas can shows the **correct** chemical formula for ionic compound?
    A. MgN B. Al_3O_2 C. CaN_3 D. AlN
14. From the following molecules identify non-polar molecule with polar bonds.
    A. CCl_4 B. NF_3 C. KCl D. H_2O
15. Distinguish the number of lone pairs present in the Lewis structure of CCl_4.
    A. 8 B.12 C. 9 D. 10
16. Which of the following is the **most metallic** element?
    A. Mg B. Na C. K . D. Ca
17. Which of the following molecules has the **strongest London** dispersion force?
    A. F_2 B. Cl_2 C. Br_2 D. I_2
18. Select the **Lewis acid** in the reaction of; $Cl^- + BCl_3 \rightarrow BCl_4^-$.
    A. Cl^- B. BCl_3 C. BCl_4^- D. Cl^- and BCl_4^-
19. Identify the possible **conjugate acid-base** pair from the following pairs of compounds?
    A. H_2SO_4/SO_4^{2-} B. NH_4^+/NH_2^- C. H_3O^+/H_2O D. H_3PO_4/HPO_4^{2-}
20. Which of the following aqueous solutions has the **highest hydroxide ion** concentrations?
    A. Pure water C. A solution with a pH of 3.0
    B. A 1 x 10^{-4} M solution of HNO_3 D. A solution with a pOH of 12.0
21. What is the percent ionization of HF in a solution containing 0.1 M HF?(K_a = 6.8 x 10^{-4})
    A. 25.8 % B. 19.07 % C. 8.25 % D. 7.91 %
22. If CH_3COONa is added to a solution containing CH_3COOH, which of the following statements is true?
    A. The pH of the solution will increase C. The equilibrium shifts to the right
    B. The pH of the solution will decrease D. The pH will remain the same
23. Which of the following could be added to a solution of sodium acetate to produce a buffer solution?
    A. Acetic acid or HCl C. Hydrochloric acid only
    B. Acetic acid only D. Potassium acetate
24. Salts from 0.1 M of CH_3COOH (K_a = 1.8 x 10^{-5}) and 0.1 M NH_3 (K_b = 1.8 x 10^{-5}) would be;
    A. Slightly acidic salt C. Neutral salt
    B. Slightly basic salt D. Strongly basic salt
25. Select the titration from the following options that will have an equivalence point at pH>7
    A. Weak acid with weak base C. Weak acid with strong base
    B. Strong acid with weak base D. Strong acid with strong base
26. Choose the correct role of an acid-base indicator in titration.
    A. To calculate the molarity of the solution C. To neutralize the acid or base
    B. To measure the volume of the solution D. To show the end point of the reaction
27. Given the reaction: $H_2S + HNO_3 \rightarrow S + NO + H_2O$. Which of the following is correct about the given chemical reaction?
    A. H_2S is reducing agent C. HNO_3 is reducing agent
    B. S is reduced substance D. N is substance oxidized
28. Which of the following reaction in aqueous solution is **redox reaction**?
    A. $Li_2SO_4 + Ba(NO_3)_2 \rightarrow LiNO_3 + BaSO_4$ C. $NaOH + HCl \rightarrow NaCl + H_2O$
    B. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ D. $AgNO_3 + NaCl \rightarrow NaNO_3 + AgCl$

29. Which of the following substance is bubbled towards the cathode in the electrolysis of brine solution?
    A. O_2 B. H_2 C. Cl_2 D. N_2
30. In the electrolysis of aqueous solution of $CuSO_4$ using copper electrodes, which one of the following is **classified** as anodic half reaction?
    A. Cu^{2+} (aq) + $2e^-$ → Cu (s)
    B. Cu^{2+} (aq) → Cu (s) + $2e^-$
    C. Cu (s) + $2e^-$ → Cu^{2+} (aq)
    D. Cu (s) → Cu^{2+} (aq) + $2e^-$
31. 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 18 g of Al is deposited at cathode?
    A. 21.6 g B. 216 g C. 270 g D. 280 g
32. All of the following is the industrial application of electrolysis. **EXCEPT**;
    A. Production of electricity
    B. Production of metals
    C. Electroplating of metals
    D. Purification of metals
33. Which of the following is **incorrect** about the voltaic cell?
    A. Electron flow from anode to cathode
    B. Reduction takes place at cathode
    C. Oxidation takes place at anode
    D. Cathode is negative electrode
34. Which of the following is **not** the purpose of salt bridge in galvanic cells?
    A. To maintain electrical neutrality between two solution
    B. To allow electrical contact between two solution
    C. To allow mixing of electrolyte between two solution
    D. To allow the migration of ions in the electrolyte
35. Which of the following is **not** the general characteristic of chemical industries?
    A. Using naturally available raw material to produce the desired product
    B. Testing their products before manufacturing in their quality control laboratories
    C. Involving chemical reaction to transform raw materials into new materials
    D. Consuming large quantities of energy during manufacturing process
36. All of the following is non-renewable natural resources. **EXCEPT;**
    A. Natural rubber B. Petroleum C. Natural gas D. Salts
37. Which category of chemical industry produces fertilizers, pesticides, and herbicides?
    A. Pharmaceutical industry
    B. Food industry
    C. Agrochemical industry
    D. Cosmetic industry
38. What is the most accurate definition of natural resources?
    A. Resources created by humans for economic development
    B. Artificial substances designed to mimic natural materials
    C. Renewable energy sources used for industrial processes
    D. Materials found in nature that can be used by humans for various purpose
39. Which of the following is considered as primary purpose of natural resources?
    A. Replacing man made resources
    B. Providing raw materials for human use
    C. Generating synthetic materials
    D. Increasing global temperatures
40. Which of the following is the main industrial process for synthesizing of ammonia?
    A. Haber process B. Solvay process C. Ostwald process D. Contact process
41. What is the role of oleum ($H_2S_2O_7$) in the production of sulfuric acid?
    A. It is used as a drying agent
    B. It acts as a catalysts
    C. It is used to absorb excess sulfur dioxide
    D. It is an intermediate product in sulfuric acid production

42. What is the role of carbon dioxide in the Solvay process?
    A. It reacts with ammonia and water to form sodium bicarbonate
    B. It reacts with sodium chloride to form sodium carbonate directly
    C. It decomposes calcium hydroxide
    D. It neutralize calcium hydroxide
43. Which of the following statement correctly describe the natural compost?
    A. It is a synthetic product that enhance the plant growth
    B. It is an organic materials that decomposes to form nutrient-rich soil amendment
    C. It is a chemical fertilizer used for soil enrichment
    D. It is a liquid solution used in hydroponics
44. Which of the following bacteria can convert ammonium ion (NH_4^+) to nitrate ion (NO_3^-) in the soil?
    A. Nitrosomonas bacteria
    B. Elecosolobus bacteria
    C. Nitrosolobus bacteria
    D. Nitrification
45. Which of the following represent the chemical formula of **soda ash**?
    A. Na_2CO_3 B. $CaCO_3$ C. Na_2SO_4 D. $NaHCO_3$
46. Which of the following is the traditional method of food preservation?
    A. Freeze-drying B. Smoking C. Vacuum-packing D. Freezing
47. Which of the following is the **correct step** for the production of sugar?
    A. Cleansing → harvesting → juicing → clarifying → evaporation → crystallization
    B. Harvesting → juicing → cleansing → evaporation → clarifying → crystallization
    C. Harvesting → cleansing → juicing → clarifying → evaporation → crystallization
    D. Harvesting → clarifying → juicing → evaporation → cleansing → crystallization
48. Which of the following is the **major raw material** for the production of Portland cement?
    A. Lime stone, silica and pumice
    B. Lime stone, gypsum and silica
    C. Clay, gypsum and silica
    D. Lime stone, clay and silica
49. Which of the following is the **most common method** for an industrial preparation of ethanol?
    A. Catalytic hydration of ethene
    B. Catalytic dehydration of ethene
    C. Fermentation of carbohydrate
    D. Catalytic hydration of ethane
50. Which of the following substance is **not used** for bleaching purpose during manufacturing of paper?
    A. Hydrogen per
    B. Magnesium bisulphate oxide
    C. Chlorine
    D. Chlorine oxide
51. Who first suggested about atom is indivisible?
    A. Dalton B. Plato C. Democritus D. Aristotle
52. According to Modern atomic theory, one of the Dalton's atomic theory was wrong. Which one is it?
    A. Atoms combine in small whole number ratios to form compounds
    B. Elements are made up of small particles called atoms
    C. Atoms of one element differ from atoms of other element.
    D. Atoms of the same element are identical in mass and other properties.
53. What is the main purpose of Robert Millikan's oil drop experiment? To determine;
    A. The magnitude of charge of electron
    B. The ratio of mass of electron to charge of electron
    C. the speed of electron
    D. the mass of electron

54. The sum of the number of electron, proton and neutron in $^{56}_{26}Fe$ is;
    A. 26 B. 56 C. 30 D. 82
55. Which region of electromagnetic spectrum is capable of inducing electron transition with the greatest energy?
    A. Orange B. Red C. Violet D. Green
56. Solve the wavelength of the yellow sodium emission which has a frequency of $5.09\times10^{14}S^{-1}$? ($C = 3 \times 10^{8}$m/s).
    A. 400nm B.589nm C. 670nm D. 890nm
57. The ejection of electron from metals by shining of a light on the metal surface is;
    A. work function B. binding energy C. photoelectric effect D. speed of light
58. The subshell representation for n = 3, l = 2 is;
    A. 3p B.3d C.3s D.3f
59. What are the possible values of the azimuthal quantum number for an electron in the n= 3 shell?
    A. 0,1,2 B. 1, 2, 3 C. 2, 3, 4 D. 3, 4, 5
60. Which one of the following is **true** about ionization energy?
    A. The second ionization energy of an element is less than the first ionization energy
    B. The first ionization energy is greater than the third ionization energy
    C. Ionization energy decreases across a period
    D. The second ionization energy of an element is less than the third ionization energy
61. Select the one that does not satisfy octet rule in its outer most shell.
    A. 10 Ne B. 18 Ar C. 11 Na^{+} D. 26 Fe^{2+}
62. Which of the following element can form the most ionic bond with Cl_2?
    A. C B. Si C. Mg D. P
63. Identify the main group to which Y belongs to form ionic compound of Y_2O_3
    A. IVA B. IIIA C. IIA D. IA
64. One of the following compounds contains ionic, covalent and dative bonds between their atoms?
    A. NH_4CN B. KI C. Mg_3N_2 D. CH_3OH
65. Determine the total number of valence electrons pairs in PH_4^{+}.
    A. 2 B. 3 C. 4 D. 5

66. How many bonding and lone pairs, respectively does the molecule CO_2 have? ($^{12}_{6}C$, $^{16}_{8}O$)
    A. 2, 4 B. 4, 4 C. 3, 2 D. 3, 3
67. How many sigma bonds and pi bonds are present respectively in the molecule $CH_3-CH=CH-CH_3$;
    A. 8 and 1 B. 8 and 2 C. 10 and 2 D. 11 and 1
68. Which of the following is the physical property of covalent bonding?
    A. Low melting and boiling point C. They have high density
    B. They are solid crystal at room temperature D. They are hard and brittle
69. Which one of the following are not the characteristics of metallic bonding?
    A. Malleable B. Ductile C. Metallic lustre D. Low melting and Boiling point
70. According to valence bond theory, which atomic orbitals overlap in the formation of Cl_2 ($^{35.5}_{17}Cl$)?
    A. 3s B. 4p C. 3p D. 2p

71. What is the bond order of N_2^+ ($^{14}_{7}N$)?
    A. 2.5 B. 1.5 C. 3 D. 2
72. One of the following can illustrate the covalent network crystal?
    A. NaCl B. Diamond C. Sugar D. I_2
73. A physical state of matter, the atoms are stripped of their electrons and exist in their ionized form is;
    A. Gas B. Solid C. Liquid D. Plasma
74. Which one of the following is correctly illustrate the properties of matter?
    A. Gases have fixed shape and volume
    B. Liquids have definite shape but not definite volume
    C. Solids are not compressible
    D. Liquids have higher density than solids
75. Which of the following is correct?
    A. 1L = $1dm^3$ B. 1L = $10dm^3$ C. 10L = $1dm^3$ D. 1L = $1m^3$
76. A gas occupies a volume of 5L at 300 torr. What will be the volume of gas if the pressure increases to 400 torr at constant temperature?
    A. 10L B. 3.75L C. 15.5L D. 1.5L
77. If you heat 5L balloon from a temperature 5℃ to 50℃, its new volume will be;
    A. 5.8L B. 10L C. 2.9L D. 2.5L
78. Which one of the following has the least rate of diffusion?
    A. H_2 B. N_2 C. CH_4 D. O_2
79. What is the pressure at normal boiling point of liquid?
    A. 3 atm B. 2 atm C. 1 atm D. 0 atm
80. The process of changing solid directly to vapour is;
    A. Deposition B. Sublimation C. Freezing D. Crystallization

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