

YEKA SUBCITY EDUCATION OFFICE (A.A)

GRADE 12 CHEMISTRY MODEL EXAMINATION

YEKATIT 2014/MAY 2022

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS **CHEMISTRY** EXAMINATION. IN THIS EXAMINATION .THERE ARE A TOTAL OF **80** MULTIPLE CHOICE QUESTIONS. CAREFULLY SELECT THE BEST ANSWER AND WRITE THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED BELLOW.USE ONLY PENCIL TO MARK YOUR ANSWERS.

YOU ARE ALLOWED TO WORK ON THE EXAMINATION FOR 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 SCORES

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 OVER UNTIL YOU ARE TOLD TO DO SO.

NOTICE: USE THE FOLLOWING CONSTANTS AND ATOMIC MASSES

Plank's constant, $h = 6.626 \times 10^{-34}$ J.s

Rydberg constant, $R_H = 2.18 \times 10^{-18}$ J

- Which of the following branch of chemistry is the study of all elements and their compounds with the exception of carbon and its compound?
A. Physical chemistry B. Analytical chemistry C. Inorganic chemistry D. organic chemistry
- How many significant figures are there in 0.000450602?
A. 9 B. 8 C. 7 D. 6
- Which one of the following is solid – Solid solution?
A. NaCl solution B. 18 carat gold C. Coca-Cola D. Amalgam
- All cathode rays are the same regardless of the nature of electrode material, residual gas and conductive wire used in cathode ray tube. The observation shows that :
A. Cathode rays do not deflected by magnet. C. Cathode rays have particle nature
B. Electrons are fundamental particles. D. Cathode rays are attracted by negative plate
- There are two isotopes of lithium found on earth . Isotope ${}^6\text{Li}$ ($6.01512m_u$) accounts for 7.42% of the total and isotope ${}^7\text{Li}$ ($7.01600m_u$) accounts for the remaining 92.58%. What is the average atomic mass of lithium?
A. $7.942m_u$ B. $6.942m_u$ C. $6.015 m_u$ D. $8.942m_u$
- What is the solubility of oxygen gas in a sample of Tana lake water at 25°C under oxygen's partial pressure of 2.0×10^{-2} atm? ($K_H = 1.23 \times 10^{-3}$ mol/L.atm)
A. 2.46×10^{-5} mol/L B. 0.0213 mol/L C. 0.0615 mol/L D. 16.26 mol/L
- Calculate the energy , in joules , of a photon of red light that has the frequency of $3.73 \times 10^{14} \text{ s}^{-1}$?
A. 2.47×10^{-19} B. 2.47×10^{-20} C. 8.04×10^{-7} D. 1.119×10^{24}

8. Which region of the electromagnetic spectrum is capable of inducing electron transition with the greatest energy?

A. Microwave B. visible C. X-ray D. Infrared

9. Which of the following is **NOT TRUE** about rays emitted from radioactive element?

A. α - particles is neutral charged particle

B. β^- particle is negative charged particle

C. γ -radiation is positive charged particle

D. All are not true except B.

10. The maximum number of electrons in an orbital of an atom possessing a quantum number $n=3$, $l=2$ and $m_l=0$

A. 32

B. 18

C. 8

D. 2

11. When the atoms Cl, S, P, Si are arranged in order of decreasing atomic size, which is correct order? (Atomic Number Si=14, P=15, S=16, Cl=17)

A. Si, P, S, Cl

B. Cl, S, P, Si

C. P, Si, Cl, S

D. Cl, Si, S, P

12. Which one of the following substance can function as Lewis acid?

A. BF_3

B. NH_3

C. H_2O

D. CH_4

13. Which of the following ionic compound the largest lattice energy?

A. LiF

B. LiI

C. NaF

D. CsBr

14. Which of the following species is amphoteric?

A. S^{2-}

B. CO_3^{2-}

C. HCO_3^-

D. CH_3COO^-

15. The prefix Tera stands for the exponential _____

A. 10^{-12}

B. 10^9

C. 10^{12}

D. 10^6

16. Which of the following contradict the Bohr model of the atom?

A. Aufbau principle

C. Heisenberg uncertainty principle

B. Pauli's exclusion principle

D. Hund's rule

17. Which of the following molecule would you expect to be non-polar?

A. NH_3

B. H_2O

C. BCl_3

D. HCHO

18. Which of the following molecule has V-shape ?
A. CO₂ B. H₂O C. NH₃ D. CH₄
19. All of the following are crystalline solid except?
A. Sodium chloride B. Gold C. Dry ice D. Rubber
20. Metallic bond is formed by electrostatic attraction between
A. Delocalized electrons and cations C. Delocalized electrons and positive nuclei
B. Delocalized electrons and anion D. Cations and anions
21. What is the hybridization of boron in BCl₃ ? (At.no B=5, Cl=17)
A. sp B. sp₃ C. sp₂ D. sp₃d
22. Which of the following is **NOT TRUE** about the features of the titration curve for the titration of a strong acid with strong base.
A. The P^H is low at the beginning of the titration.
B. At the equivalent point , the P^H is 7.00
C. The initial P^H is higher
D. The P^H change slowly until just before the equivalent point.
23. Which of the following systems **CANNOT** be classified as a buffer system?
A. NH₃/NH₄NO₃ B. HCOOH/HCOONa C. HCN/NaCN D. HCl/NaCl
24. How many lone pairs of electrons are there on the oxygen atom in O₃?
A. Six B. Five C. Four D. Three
25. If a 0.1 M solution of monoprotic weak acid is 4.5% ionized. Calculate the Concentration of hydrogen ion, [H⁺] ?
A. 4.5x10⁻³ B 4.5 x10⁻² C. 0.45 D. 4.5
26. Which of the following gives PH>7 when dissolved in water?
A. NH₄Cl B.KF C. NaCl D. Mg(NO₃)₂
27. Which of the following molecule contain a two pi bond and one sigma bond?
A. CO B. CH₄ C. HCN D.H₂O

28. What is the bond order for CN^- ? (At.no C=6, N=7)
 A. 2.5 B. 2 C. 1.5 D. 3
29. Which of the following temperature scale is greatest?
 A. 15°C B. 288K C. 59°F D. All are equivalent
30. Which one the following is molecule do **NOT** obey octet rule except? (At.no H=1, B=5, N=7, O=8, F=9)
 A. NO B. NO_2 C. BF_3 D. H_2O
31. One of the following colligative properties are **NOT TRUE** about the number of mole of ions increases in a given electrolytic solution.
 A. Osmotic pressure decreases. C. Boiling point of solution increases.
 B. Vapor pressure lowering increases. D. Freezing point depression increases.
32. What is the boiling point of 1.93m solution of a non-volatile solute in nitrobenzene? (b.p nitro benzene = 210.88°C , K_b for nitro benzene = 5.24°C/m)
 A. 220.99°C B. 10.11°C C. 210.88°C D. 200.77°C
33. A 0.0622m solution of iron (III) chloride, FeCl_3 , in water freezes at -0.412°C . Determine the Van't Hoff's factor of FeCl_3 in this solution? (f.p of water = 0°C , K_f for water = 1.86°C/m)
 A. 3.55 B. 0.116 C. 2.5 D. 1.16
34. From the given molecular equation, what is the spectator ion?

$$2\text{AgNO}_3(\text{aq}) + \text{Na}_2\text{CrO}_4(\text{aq}) \rightarrow \text{Ag}_2\text{CrO}_4(\text{s}) + 2\text{NaNO}_3(\text{aq})$$

 A. Ag^+ B. CrO_4^{2-} C. Na^+ And NO_3^- D. Na^+ only
35. What volume of 0.4M sucrose ($\text{C}_{11}\text{H}_{22}\text{O}_{11}$) contains 6.02×10^{22} molecules of sucrose?
 A. 25ml B. 50ml C. 250ml D. 400ml
36. What volume of 2M HCl solution is required to react with 6g of magnesium?

$$\text{Mg}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{MgCl}_2(\text{aq}) + \text{H}_2(\text{g})$$

 A. 25ml B. 50ml C. 250ml D. 400ml

37. You have 200ml of a 0.4M NaCl solution and you want to dilute it to exactly 0.2M. How much water should you add?
- A. 100ml B. 200ml C. 300ml D. 400ml
38. What is the SI unit of molality?
- A. mol/L B. Eq/L C. mol/kg D. mol/g
39. 2mole of alcohol is mixed with 6 mole of water. Calculate the mole fraction of alcohol and water respectively?
- A. 0.5 and 0.5 B. 0.4 and 0.6 C. 0.7 and 0.3 D. 0.25 and 0.75
40. A solution consists of 20.6g of glucose dissolved in 53.5g of water. What is the Percentage by mass of glucose in solution?
- A. 27.8% B. 72.2% C. 20% D. 80%
41. Which group of elements are more reactive of all the metallic elements?
- A. Transition metals B. Alkaline earth metals C. group B metals D. Alkali metals
42. What is the normality of 1.0M solution of Na_2CO_3 ?
- A. 2N B. 1N C. 0.5N D. 3N
43. All of the following species can function as Bronsted-Lowery base except
- A. H_2O B. NH_3 C. S^{2-} D. NH_4^+
44. Which is the correct representation that contains 16 protons, 18 electrons and 16 neutrons
- A. $^{32}_{16}\text{S}$ B. $^{32}_{18}\text{S}^{2-}$ C. $^{32}_{16}\text{S}^{2-}$ D. $^{32}_{18}\text{S}$
45. Which one of the following is true about the chemistry laboratory safety rules?
- A. Wear appropriate protective clothing. C. Do not smell any chemicals directly.
B. Wear shoes that cover your feet. D. All of the above.
46. One of the following is uncertainty in measurement can be caused by:
- A. Observational error C. Instrumental error
B. Variability in the item measured D. All of the above

47. A concise verbal statement or a mathematical equation that summarizes a broad variety of observations and experience is
- A. Scientific law B. Hypothesis C. Theory D. Principle
48. A common ion effect in a certain weak acid will make the solution less acidic. This is because the presence of a common ion
- A. Suppresses the ionization of the weak acid. C. Enhances the ionization of the salt of weak acid.
 B. Enhances the ionization of the weak acid. D. Suppresses the ionization salt of weak acid.
49. Which one of the following is **NOT TRUE** about the solution?
- A. $[H^+] > [OH^-]$ is acidic solution C. $[H^+] < [OH^-]$ is basic solution
 B. $[H^+] < [OH^-]$ is acidic solution D. $[H^+] = [OH^-]$ is neutral solution
50. What is correct order of increasing acid strength in the following species?
 $HClO$, $HClO_3$, $HClO_4$, $HClO_2$
- A. $HClO > HClO_2 > HClO_3 > HClO_4$ C. $HClO_4 < HClO_3 < HClO_2 < HClO$
 B. $HClO_4 > HClO_3 > HClO_2 > HClO$ D. $HClO < HClO_2 < HClO_3 < HClO_4$
51. What is the most important type of solute – solvent interaction in a solution hexane in CCl_4 ?
- A. Dipole-dipole B. Ion –dipole C. Hydrogen bonding D. London force
52. Which one of the following is correct electronic configuration of ${}_{16}S^{2-}$?
- A. $1s^2 2s^2 2p^6 3s^2 3p^6$ B. $1s^2 2s^2 2p^6 3s^2 3p^4$ C. $1s^2 2s^2 2p^6 3s^2 3p^3$ D. $1s^2 2s^2 2p^6 3p^6$
53. Which of the following is the correct relationship between the given parameter and the property of an EMR?
- A. The higher the value of the wave length of an EMR, the greater is its energy.
 B. The lower the frequency of an EMR, the higher is its wave length.
 C. The higher the value of the wave length of an EMR, the greater is its frequency.
 D. The lower the value of the frequency of an EMR, the higher is the energy of an EMR.
54. How much energy would be released as an electron is moved from the $n=4$ to the $n=3$ energy level?
- A. $2.043 \times 10^{-18} J$ B. $3.981 \times 10^{-18} J$ C. $1.050 \times 10^{-19} J$ D. $1.938 \times 10^{-19} J$
55. A piece of aluminum foil is $8.0 \times 10^{-5} m$ thick. What is its thickness in micrometer?
- A. 800 B. 8 C. 0.8 D. 80

56. One of the following is NOT a basic SI unit?

- A. mole B. kelvin C. kilogram D. Newton

57. Which one of the following is incorrect postulates Dalton's Atomic Theory?

- A. Atoms of different element are different
B. Atoms combine in small whole numbers ratio to form compounds.
C. Atoms are indivisible.
D. Elements are made up of small particles called atoms.

58. What are the possible quantum number values for an orbital in the 3d subshell?

- A. $n=3$, $l=1$ $m_l=0$ B. $n=3$, $l=0$, $m_l=1$ C. $n=3$, $l=2$, $m_l=0$ D. $n=3, l=0, m_l=0$

59. Which of the following has the lowest electronegativity?

- A. ${}_6\text{C}$ B. ${}_5\text{B}$ C. ${}_{12}\text{Mg}$ D. ${}_4\text{Be}$

60. What is the total number of valence electrons of the SO_4^{2-} ? (Atomic number O=8, S=16)

- A. 32 B. 30 C. 24 D. 36

61. Which of the following true about the atoms take part in bond formation to :

- A. Attain a stable electronic configuration C. Increase their energy
B. Increase their charge density D. Neutralize their charge

62. One of the following is the correct chemical formula of sodium oxide? (Atomic number O=8, Na=11)

- A. NaO B. Na_2O C. Na_2O_2 D. NaO_2

63. Which of the following compounds contains both ionic and covalent bonds?

- A. Cl_2O B. CO_2 C. Na_2CO_3 D. BaCl_2

64. In which of the following compounds would inter-molecular hydrogen bonding occur?

- A. CH_3CH_3 B. COCl_2 C. NH_3 D. HCl

65. If a molecular has a v-shaped or angular shape, how many non-bonding pairs of electrons are present in the valance shell of the central atom?

- A. 4 B. 2 C. 0 D. 3

66. One of the following molecule or ion contains a coordinate covalent bond?

A. NH_3 B. H_3O^+ C. H_2O D. CH_4

A. its rigidity.

C. It can't draw conclusion from limited information.

B. It needs large body of experimental data.

D. All of the above

68. Which of the following is heterogeneous mixture?

A. Brass

B. Coco-cola

C. Air

D. Blood

69. One of the following statements is true about for the rate of dissolution.

A. The solubility of a gas increase with the increase of temperature.

B. The solubility of a solid increase with increasing of temperature.

C. The surface area of solute increase with decreasing of

solubility D. All of the above

70. Which of the following is true about the concept of acid-

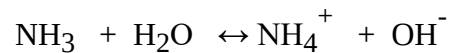
base? A. Acid is a substance accepts a proton.

B. Base is a substance accepts a pair of electrons.

C. Base is a substance that released hydroxide ion in aqueous solution.

D. All of the above

71. From the given reaction, identify the two substances that act as Bronsted-Lowry bases



A. NH_3 & OH^-

B. H_2O & NH_4^+

C. NH_4^+ & OH^-

D. OH^- & H_2O

72. One of the following is **NOT TRUE** about the strength of conjugate acid –base pairs?

A. The stronger the acid, the weaker is its conjugate base.

B. The stronger the base, the weaker is its conjugate acid.

C. The weaker the base, the weaker is its conjugate acid.

D. The weaker the base, the strong is its conjugate acid.

72. Calculate the P_{OH} the solution of the P_H is 10 at 25°C?
- A. 4 B. 10 C. 7 D. 14
73. Which one of the following measures of the strength of acids and bases in aqueous solution?
- A. Percent ionization
B. Concentration of hydrogen and hydroxide ions
C. Ionization constant
D. All of the above
74. One of the following given masses of acid constituents the corresponding equivalent of the acid.
- A. $HCl = 36.5g = 2$ equivalents. C. $H_2SO_4 = 49g = 4$ equivalents B. $H_2SO_4 = 98g = 2$ equivalents D. $H_3PO_4 = 98g = 2$ equivalents
75. The first law thermodynamics states that
- A. In absolute zero the entropy of a perfect crystal is considered to be zero.
B. Energy can be created or destroyed.
C. The total amount of energy in the universe is constant
D. The entropy of the universe increases in a spontaneous process.
76. Which one of the following is the intensive property of the system?
77. Which of the following procedures indicates a system which **CAN NOT** exchange both energy and matter with the surrounding?
- A. Cooking shiro-wet in a closed pan. C. Water boiling in an open beaker.
B. Baking injera. D. Keeping hot water in a thermostat.
78. A 466g sample of water is heated from 8.5°C to 74.6°C. Calculate amount of heat absorbed by the water in kilojoules?
- A. 4.184kJ B. 41.8kJ C. 129kJ D. 69kJ

79. The potential energy component of internal energy is a factor?

- A. Attractive and repulsive interaction between molecules
- B. Attractive interaction between electrons and nuclei within molecules.
- C. Repulsive interaction between nuclei within molecule.
- D. All of the above

80. The process in which temperature remains constant is

- | | |
|-----------------------|------------------------|
| A. Isothermal process | C. Adiabatic process |
| B. Exothermic process | D. Endothermic process |

