ADDIS ABABA CITY ADMINISTRATION EDUCATION BUREAU
ADDIS ABEBA
GRADE 12 Chemistry MODEL EXAMINATIONS
2015E.C/2023G.C

NUMBER OF QUESTIONS: 80 **TIME ALLOWED: - 2 :HOURS**

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS **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: 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 provided.

1. Isotopes are atoms of the same element that differ in their

A. number of protons
C. mass number
B. number of electrons
D. atomic number

2. The number of nucleons in $^{238}_{92}U$ is

A. 92
C. 146
B. 238
D. 230

3. How many electrons enter into 3d sub shell in observed configuration of an atom whose atomic number is 24?

A.5
C.2
B.4
D.3

4. In which of the following blocks of the periodic table is an element with atomic number 14 located?

A. s
C. f
B. d
D. p

5. Which of the following is the most metallic element?

A.K
C. Mg
B. Na
D. Ca

6. Which of the following substances has the least ionic character?

A. LiCl
C. $BeCl_2$
B. NaCl
D. $MgCl_2$

7. One of the following molecules is non-polar with polar bonds.

A. H_2O
C. KCl
B. NF_3
D. CCl_4

8. How many lone pairs are there in the Lewis structure of CCl_4?

A. 8 C. 9

B.12 D. 10

9. Which one of the following changes is an example of a chemical change?

A. Decomposition of copper carbonate

B. Evaporation of water

C. Melting of fat

D. Dissolving of salt in water

10. When the following reaction is correctly balanced, what would be the coefficient of HNO_3? $Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO + H_2O$

A.6 C.8

B.10 D.4

11. A types of reaction in which two or more products are formed from a single reactant is_____.

A. combination C. double displacement

B. decomposition D. single displacement

12. Given the reaction , $2KNO_3 \rightarrow 2KNO_2 + O_2$, how many moles of potassium nitrate must be decomposed to produce 9 moles of Oxygen gas?

A.2 C.9

B.3 D.18

13. The number of chloride ions in 2moles of $AlCl_3$ is

A. 3.612×10^{24} C. 3.612×10^{23}

B. 6.02×10^{24} D. 6.02×10^{23}

14. What is the oxidation number of sulphur in the molecule of $H_2S_2O_7$?

A. +2 C. +5

B. +3 D. +6

15. Which element in $NaHCO_3$ has the highest percentage by mass?

A. H C. Na

B. O D. C

16. A gas occupies a volume of 5L at 300torr.What will be the volume of gas if the pressure increases to 400torr at constant temperature?

A. 10L C. 3.75L

B. 15.5L D. 1.5l

17. If you heat 5L balloon from a temperature 5^0c to 50^0c, its new volume will be

A. 5.8L C. 2.9L

B. 10L D. 2.5L

18. Which one of the following gases has the least rate of diffusion?

A. H_2 C. CH_4

B. N_2 D. O_2

19. An alkane with 19 carbon atoms would have the formula of

A. $C_{19}H_{38}$ C. $C_{19}H_{36}$

B. $C_{19}H_{40}$ D. $C_{19}H_{37}$

20. Which one of the following is the fifth alkene member?

A. C_5H_{10} C. C_6H_{12}

B. C_5H_{12} D. C_6H_{14}

21. What is the product in the following reaction? $CH_3CCH+2HCl\rightarrow$

A. $CH_3CCl_2CH_3$ C. $CH_3CH_2CHCl_2$

B. $CH_3CHClCH_2Cl$ D. $CH_3CClCHCl$

22. Water gas is a mixture of

A. $CO+H_2O$ C. $CO+H_2$

B. $CO+N_2$ D. H_2+CH_4

23. The type of alcohol that is found in all common alcoholic beverages like'' Tella", "Areqi", "Beer" is

A. propanol C. methanol

B. butanol D. ethanol

24. Which one of the following organic compound is used to preserve dead organisms?

A. Acetone C. Acetic acid

B. Formaldehyde D. Ethanol

25. Which of the following is an acidic oxide?

A. CuO C. SO_2

B. Fe_2O_3 D. Na_2O

26. Which one of the following is used as a raw material in the production of nitric acid?

A.$NaNO_3$ C. N_2O_3

B. N_2O D. NH_3

27.All of the following salts are insoluble in water except

A.Na_2SO_3 C. $CaCO_3$

B. $BaSO_4$ D. AgCl

28. The brown ring test is used to identify the presence of

A. NO_2^- C. SO_3^{2-}

B. NO_3^- D. SO_4^{2-}

29. Which of the following are major charge carriers in electrolytic conduction?

A. Water molecules C. Cations and anions

B. Free electrons D. Neural atoms

30. Which of the following species is preferentially discharged at the anode in the electrolysis of brine?

A. OH^- C. Na^+

B. H_2O D. Cl^-

31. Which of the following natural resources is non-renewable?

A. Petroleum C. Plants

B. Water D. Animals

32. Which of the following elements is the third most abundant element in the earth's crust?

A. Silicon C. Calcium

B. Aluminium D. Iron

33. Among the following form of iron identify the purest one.

A. cast iron C. pig iron

B. steel D. wrought iron

34. Compounds that occur widely in glass, cement and ceramics are

A. Sulphates C. Silicates

B. Carbonates D. Phosphates

35. The osmotic pressure of a 0.01M aqueous solution of $CaCl_2$ is found to be 0.674 atm at 25^0C. Calculate the van't Hoff's factor, i, for the solution.($R=0.0821$ L.atm.$mol^{-1}.K^{-1}$)

A. 2.5 C. 3.9

B. 2.76 D. 2.0

36. Substance A and B are mixed to give solution. The mole of A is three times

the mole of B. What is the mole fraction of A?

A. $\frac{3}{4}$ C. $\frac{2}{3}$

B. $\frac{1}{4}$ D. $\frac{1}{2}$

37. What is the normality of 0.3M solution of $Al_2(SO_4)_3$?

A. 0.9 C. 6

B. 0.6 D. 1.8

38. When 0.018 mol of HCl is dissolved in 10 moles of water, calculate the molality of the solution? $(^{16}_{8}O)$

A. 0.5 C. 0.1

B. 18 D. 0.02

39. If 0.4 mole of A, 0.6 mole of B and 0.2 mole fraction of Benzene are mixed to give solution. What is the actual mass of Benzene? $(^{1}_{1}H, ^{12}_{6}C)$

A. 10.5 C. 8.5

B. 19.5 D. 27.5

40. What volume of 0.5M NaOH is required to neutralize completely 25mL of 1.2M H_2SO_4?

A. 12mL C. 120mL

B. 1.2mL D. 90mL

41. In the reaction: $CN^- + H_2O \rightleftharpoons HCN + OH^-$

A. H_2O is acting as an acid C. HCN is acting as a base

B. CN^- is acting as an acid D. OH^- is acting as an acid

42. What is the P^H of an aqueous solution in which $[OH^-] = 10000[H_3O^+]$?

A. 4 C. 8

B. 12 D. 9

43. The POH of an aqueous solution which is created by adding 0.5M NH_3 and

0.5M NH_4Cl (Kb NH3=1.8x10^{-5})

A. 9.23 C. 4.77

B. 10.23 D. 3.77

44. Which of the following is a property of 1.0M HCl but not a property of 1.0M CH_3COOH?

A. Turns litmus red C. Has a P^H less than 7

B. Ionizes completely D. Produces H_3O^+ in solution

45. Which of the following is basic salt?

A. NH_4NO_3 C. NaCl

B. HCOOK D. NH_4Cl

46. A gas system expands from 0.002m^3 to 0.003 m^3 against a pressure of 1atm. The work done for this system is

A.-1.013J C. -101.3J

B. 1.013J D. 101.3J

47. Given the bond energy of O=O, H-H and O-H are 495, 436 and 463$\frac{KJ}{mol}$, respectively calculate ΔH for the reaction $\frac{1}{2}O_2$ (g) +H_2 (g) →H_2O (g)

A. 150KJ C. 450KJ

B. -42.5KJ D. -242.5KJ

48. The oxidation number of phosphorous is PO_4^{-3} is:-

A. +5 C. +1

B. -3 D. -5

49. In the reaction $H_2S(aq) + I_2(aq) \rightleftharpoons S(s) + 2H^+(aq) + 2I^-(aq)$, the reducing agent is:

A. S(s) C. $2I^-$(aq)

B. I_2(aq) D. H_2S(aq)

50. Consider the standard voltaic cell, which one identifies the cathode and gives the E^0_{cell}? Given E^0_{red} (Au^{+3}/Au=1.50v, Fe^{+2}/Fe=-0.44v)

A. Fe, -0.44v
C. Au, 1.94v
B. Au,1.06v
D.Fe,1.94v

51. The products for the electrolysis of molten $CuCl_2$

A. O_2 at anode & Cl_2 at cathode
C. Cl_2 at anode & H_2 at cathode
B. Cu at anode & O_2 at cathode
D. Cl_2 at anode & Cu at cathode

52. Which is the most common ore used for the extraction of copper?

A. $CuFeS_2$
C. $CuCO_3$
B. $CuSO_4$
D. CuO

53. The conversion of nitrogen gas to nitrates by bacteria is called

A. Nitrification
C. Excretion
B. Nitrogen fixation
D. Denitrification

54. Which of the following is the most important source for the extraction of iron?

A. Hematite
C. Chalcopyrite
B. Bauxite
D. Sphalerite

55. Which of the following is NOT a natural polymer?

A. Proteins
C. Cellulose
B. Starch
D. Dacron

56. The monomer of Teflon is:

A. Butadiene
C. Tetraflouroethylene
B. Isoprene
D. 2-methyl-1, 3-butadine

57. What is the number of significant figures in 0.0030050?

A. 5
C. 7
B. 6
D. 8

58. What is the Kelvin scale corresponding to the temperature readings when the degree Celsius (°C) is identical to the degree Fahrenheit (°F)?

A. 0 K
C. 233K
B. 37K
D. 273K

59. Which one of the following is the correct relation of prefixes?

A. $1pm=10^3km$
C. $1nm=10^6cm$
B. $1pm=10^3nm$
D. $1km=10^5cm$

60. Which of the following has a largest radius?

A. Mg^{2+} C. F^{-}

B. O^{2-} D. Na^{+}

61. The energy of the hydrogen electron when the electron is placed at n=10?

A. 2.18×10^{-18}J C. 2.18×10^{-20}J

B. -2.18×10^{-20}J D. -2.18×10^{-18}J

62. Which of the following radiation has the shortest wave length?

A.Micro wave C. UV

B.IR D. Visible

63. Which atom in the ground state has three half-filled orbitals?

A. $^{31}_{15}P$ C. $^{27}_{13}Al$

B. $^{28}_{14}Si$ D. $^{7}_{3}Li$

64. As atomic number increases within a group, what happens to the electronegativity of the elements?

A. Increases, because the atomic number increases

B. Decreases, because the atomic number increases

C. Increases, because the number of energy levels increases

D. Decreases, because the atomic size increases

65. which one of the following compounds contains ionic, covalent and dative bonds between their atoms?

A.NH_4CN C.Mg_3N_2

B.KI D.CH_3OH

66. Which one of the following has the strongest intermolecular dispersion force?

A. Br_2 C. Cl_2

B. F_2 D. I_2

67. The bond order of N_2^+ is ($^{14}_{7}N$)

A. 1.5 C. 3

B. 2.5 D. 2

68. According to valence bond theory, which atomic orbitals overlap in the formation of Cl_2 ($^{35.5}_{17}Cl$)?

A.3s C.3p

B.4p D.2p

69. The number of sigma and pi-bonds is presented respectively in the molecule $CH_3-CH=CH-CH_3$ respectively.

A. 8&1 C. 8&2

B. 11&1 D. 10&2

70. Which of the following is not correctly matched the molecule and hybridization around the central atom?

A.SF_6: sp^3d C.H_2O: sp^3

B.PCl_5: sp^3d D.NH_3: sp^3

71. Using the two reaction mechanisms, the order of the reaction is

$O_3 \rightleftharpoons O_2 + O$ (Fast step)

$O_3 + O \rightarrow 2O_2$ (Slow step)

A. 2 Second order C. 1 first order

B. -1 third order D. 0 zero order

72. How does a catalyst increase the rate of a chemical reaction?

A. By shifting the equilibrium to the right
B. By lowering the activation energy
C. By shifting the equilibrium to the left
D. By increasing the activation energy

73. For the decomposition of acetaldehyde the rate expression is rate = k[acetaldehyde]$^{3/2}$. If the concentration of acetaldehyde is doubled, then the rate would increase by a factor of:

A. 5.50 C. 3.0

B. 4.83 D. 2.83

74. What is the half-life of a first order reaction with rate constant of the reaction $k=6.93\times10^{-2}s^{-1}$

A. 10s C. 0.1s

B. 100s D. 0.01s

75. The number of phase in a mixture of CH_4, C_2H_6 and C_3H_6 is

A. 2 C. 3

B. 1 D. 4

76. If the following reaction is at equilibrium, which one of the following changes will shift the equilibrium to the left?

$N_2 + 3H_2 \rightleftharpoons 2NH_3 + heat$

A. Increasing pressure C. Increasing the volume of the reaction container

B. Decreasing temperature D. Adding more N_2 and H_2

77. For the chemical equilibrium $A + 2B \rightleftharpoons 2C$ the value of equilibrium constant K is 0.1. What is the value of equilibrium constant for the following reaction? $2A + 4B \rightleftharpoons 4C$ K=?

A. 10 C. 0.1

B. 100 D. 0.01

78. Which compound is an ester?

A. CH_3COOH C. C_2H_5CHO

B. $HCOOCH_3$ D. $CH_3OC_2H_5$

79. Which of the following acid used as chemical defense for ants?

A. HCOOH

B. $CH_3(CH_2)_2COOH$

C. CH_3COOH

D. CH_3CH_2COOH

80. An alcohol produced in the manufacture of soap is

A. butanol

B. ethanol

C. glycerol

D. methanol