YEKA SUB CITY EDUCATION OFFICE
D/WONDIRAD SECONDARY SCHOOL CLUSTER
2016 E.C FIRST SEMESTER GRADE 12 CHEMISTRY MODEL EXAMINATION

NUMBER OF ITEMS: 80 **TIME ALLOWED: 2:30 HOURS**

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS **CHEMISTRY** EXAMINATION. IN THIS EXAMINATION, THERE ARE A TOTAL OF **80 MULTIPLE CHOICE QUESTIONS THAT CANDIDATES ARE REQUIRED TO ATTEMPT.**

THERE IS ONLY ONE BEST ANSWER FOR EACH QUESTION. SELECT THE BEST ANSWER FROM THE SUGGESTED OPTIONS AND **BLACKEN** ONLY THE LETTER OF YOUR CHOICE ON THE ANSWER SHEET PROVIDED. FOLLOW THE INSTRUCTIONS ON THE ANSWER SHEET AND THE EXAMINATION PAPER CAREFULLY**.** USE ONLY **PENCIL** TO MARK YOUR ANSWERS**.**

YOUR ANSWER MARKS SHOULD BE **HEAVY AND DARK,** COVERING THE ANSWER SPACE COMPLETELY. PLEASE ERASE ALL UNNECESSARY MARKS COMPLETLLY INCLUDING ANSWERS YOU HAVE CHANGED FROM YOUR ANSWER SHEET**.**

YOU WILL BE ALLOWED TO WORK ON THE EXAM FOR **2:30 HOURS.** WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING, PUT YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTIONS.

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

1. Which of the following statement belongs to the **limitation** of Dalton's atomic theory?
   A. Atoms of the same element may have the same mass and properties
   B. Atoms can neither be create nor destroyed during a chemical reaction
   C. An element is made up of smaller particle called atom
   D. Atoms are made up of protons , neutrons and electrons
2. "The atom has a small, dense, positively charged nucleus around which electrons rotate at high speed and relatively long distance from it". This postulate is according to _____model of an atom.
   A. Bohr's B. Dalton's C. Rutherford's D. Thomson's
3. Unknown element X has a valence shell electron configuration of $3S^2 3P^5$,which of the following is **true** about element X?
   A. It belongs to a class of noble gases
   B. It belongs to group VIIA and period 3
   C. It is stable and belongs to period 7
   D. It forms a compound with others by losing electrons
4. Which properties of elements increases a cross a period in the periodic table
   A. Metallic character B. Atomic size C. Number of shell D. Electronegativity
5. Among the following chemical compounds, which one possesses hydrogen bond.
   A. CH_4 B. H_2S C. NH_3 D. $CH_3 - CH_3$
6. Someone conduct an experiment by using test tube with unknown to compounds. If he/she touches the outer surface of the test tube during the reaction progress, he/she feels hot. This indicates the reaction that takes place in the test tube is _____.
   A. endothermic reaction C. exothermic reaction
   B. combination reaction D. synthesis reaction
7. How many moles of water is required to produce 6 mole of nitric acid, according to the given reaction: $3NO_2 + H_2O \longrightarrow 2HNO_3 + NO$.
   A. 2 mole B. 3 mole C. 4 mole D. 1.5 mole
8. Water no matter where it is found, consists of hydrogen and oxygen with a percentage abundance of 11.11% and 88.89% respectively. This statement is the law of:
   A. conservations of mass C. conservation of energy
   B. multiple proportion D. definite proportion

9. Which of the following is **true** when ,6.5 grams of zinc reacts with 5 grams of hydrochloric acid according to the reaction :(Atomic mass: Zn=65, H=1, Cl=35.5)

$Zn + 2HCl \longrightarrow ZnCl_2 + H_2$

A. Zinc is an oxidizing agent
B. The limiting reactant is HCl
C. 8 gram of hydrogen is produced
D. Zn is a limited reactant

10. Which one of the following is an oxidation –reduction reaction?

A. $Cu(NO_3)_2 + AgCl \longrightarrow CuCl_2 + AgNO_3$
B. $NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O$
C. $Mg + AgNO_3 \longrightarrow Mg(NO_3)_2 + Ag$
D. $Cr_2O_7^{2-} \longrightarrow CrO_4^{2-}$

11. According to the gas law and kinetic theory of matter, which statement is generally **true**

A. Gases are compressible due to the greater distance between the particles
B. Lighter gases diffuses slower than heavy gases
C. As the temperature of the gas is double , the volume of the gas will be halved
D. The particles in solid are loosely packed and easy to compressed

12. Consider two gases "A and B" , gas "A" diffuses twice as fast as gas "B" and gas "B" has a molecular weight of 64 g/mol, what is the molecular mass of gas A?

A. 16 B. 32 C. 12 D. 44

13. Which one of the following gas laws states that the volume of a fixed amount of gas maintained at constant pressure is directly proportional to the absolute temperature of the gas?

A. Combined gas law
B. Boyle's law
C. Avogadro's law
D. Charles law

14. Oxidation of secondary alcohol yields

A. aldehyde B. carboxylic acid C. ketone D. ether

15. Given the following structure representing a certain organic molecule

$$CH_3 - CH_2 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_2 - CH_2 - CH_3}{\overset{|}{\underset{|}{C}}}} - CH = \underset{\displaystyle CH_3}{\overset{}{\underset{|}{C}}} - CH_3,$$ What is the IUPAC name's for molecule?

A. 4-ethyl -2,4-dimetyl-2-heptene
B. 4-ethyl-4,6-dimetyl -5-heptene
C. 4-ethyl-2,4-dimethyl-2-ane
D. 4-propyl-2,4-dimethyl-2-hexene

16. Which of the following is **not true** about properties of alkanes
    A. Alkanes are soluble in non-polar solvent
    B. The molecules of alkanes are held together by a weak intermolecular force
    C. Branched chain alkanes have higher boiling point than the straight chain isomer
    D. Alkanes possess structural isomerism
17. Which of the following molecule exhibits Cis-trans isomerism?
    A. 2-butene B. 3-hexane C. 1-propene D. 1-pentene
18. Which of the following is **not true** about bases , bases that
    A. have effects on indicates
    B. are substance increases OH^- in water solution
    C. can react with acidic oxide produce salt and water
    D. accepts pair of electrons from a chemical species
19. Which of the following is a macro nutrient for the plant growth?
    A. Phosphorus B. Manganese C. Zinc D. Iron
20. Which of the following is **true** about salts
    A. Slats are ionic compounds formed from the reaction of acidic oxide with water
    B. Nitrate salts are water soluble salt
    C. The positive ions of the salt is derived from the acid
    D. Salts conduct electricity in solid state
21. Which one of the following is responsible for metallic conductivity?
    A. Movement of ions
    B. Electrons held in a fixed position
    C. Ions held in a fixed position
    D. Delocalized free electrons
22. Which one of the following is a **correct** statement about electrolytic cell
    A. anode is negative, while cathode is positive
    B. chemical energy is converted to electrical energy
    C. spontaneous chemical reaction is takes place
    D. cations migrate to cathode and discharged by gaining of electrons
23. During extraction of aluminum by hall process, why a synthetic cryolite (Na_3AlF_6) is added to it, because it is
    A. used as a catalyst
    B. used to increases the purity of the extracted aluminum
    C. used to reduce the melting point of alumina (Al_2O_3)
    D. used as an electrolyte

24. The purpose of using brine in the process of tanning is to:
    A. make the skin soft
    B. dehydrate the skin and kill bacteria
    C. remove unwanted flesh from the skin
    D. remove hair from the skin
25. In the sugar industry, sulphur dioxide (SO_2) is sued as
    A. a bleaching agent
    B. a disinfectant
    C. a preservative
    D. an oxidizing agent
26. The statement "If a system at equilibrium is subjected to a stress , the system will readjust itself to reduce the effects of the stress" known as:
    A. Avogadro's principle
    B. Henery's law
    C. Le-chatelier's principle
    D. Faraday's law
27. Which of the following statement is **correctly** describes chemical reactions at equilibrium?
    A. The concentration of products and reactants are equal
    B. The change in concentration of the product and reactant is constant
    C. The reaction is exothermic
    D. The rate of forward reaction is greater than rate of backward reaction
28. Assume that the following reaction is at equilibrium, which changes will shift the equilibrium to the left? $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)} + heat$
    A. Decreasing pressure
    B. Decreasing temperature
    C. Adding catalyst
    D. Decreasing concentration of NH_3
29. In the reaction: ($2SO_2 + O_2 \rightleftharpoons 2SO_3$, $keq = 10$), What will be the concentration of O_2 , if the concentration of SO_2 is the same as that of SO_3?
    A. $[O_2] = [SO_2]$ B. $[O_2] = 0.01M$ C. $[O_2] = 100M$ D. $[O_2] = 0.1M$
30. Which one of the following organic molecules has the highest water solubility?
    A. $CH_3{-}CH_2{-}CH_2{-}CH_2 - OH$
    B. $CH_3{-}CH_2{-}CH_2{-}CH_2 - CH_2 - OH$
    C. $OH - CH_2{-}CH_2 - CH_2 - OH$
    D. $OH - CH_2{-}CH_2 - CH_2 - CH_2 - OH$
31. Commercially, liquid vegetable oils are converted to solid fats such as margarine by:
    A. hydration
    B. saponification
    C. reduction
    D. hydrogenation

32. Which of the following is the correct IUPAC name for the organic compound given below?



A. orthomethyl heptane
B. γ-methyl heptanoic acid
C. 6-methyl heptanoic acid
D. 2-methyl heptanoic acid

33. Which of the following types of compounds are the expected products from the saponifications of fats?

A. glycerol and fatty acid salt
B. glycerol and fatty acid
C. fatty acid salt and fatty acid
D. fatty acid salt and detergent

34. What is a valid rate expression for the following reaction? $N_{2(g)} + 3H_{2(g)} \longrightarrow 2NH_{3(g)}$

A. $\frac{1}{3}\Delta\frac{[H_2]}{\Delta t}$ B. $\frac{-1}{2}\Delta\frac{[NH_3]}{\Delta t}$ C. $-\Delta\frac{[N_2]}{\Delta t}$ D. $\frac{-1}{2}\Delta\frac{[H_2]}{\Delta t}$

35. If we increase the concentration of reactants, what happens to the collision between particles?

A. There are more collisions
B. There are fewer collisions
C. Collision of particles decreases and have less energy
D. Collision of particles increase and have more energy

36. Generally catalyst increase reaction rate by

A. changing the equilibrium position
B. taking part as a reactant
C. changing the heat of reaction
D. lowering the activation energy

37. At 298K, the following two gaseous equilibria involving SO_2, SO_3 *and* O_2 are established

$SO_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons SO_3, k_1$

$2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g), k_2$, which of the following is correct about the equilibrium constants

A. $k_2 = \frac{1}{k_1^2}$ B. $k_1 = k_2$ C. $k_2 = \frac{1}{k_1}$ D. $k_1 = \frac{1}{k_2^2}$

38. Which one of the following compound **doesn't** obey the octet rule?

A. CS_2 B. PCl_5 C. CH_4 D. NH_3

39. How many sigma and pi-bonds are present in the following molecule? $CH_3 - \underset{\displaystyle CH = CH_3}{\underset{|}{CH}} - C \equiv CH$

A. 12δ bonds and 2πbonds
B. 14δ bonds and 1πbonds
C. 16δ bonds and 3πbonds
D. 14δ bonds and 3πbonds

40. Which of the following is the most important type of solute –solvent interaction in a solution of ammonia in water?

A. Dispersion B. Ion-dipole C. Hydrogen bond D. Dipole-dipole

41. What is the hybridization of $CH_4, C_2H_4 and\ C_2H_2$ respectively?

A. SP^3, SP^2, SP B. SP^3d, SP^3, SP^2 C. SP, SP^2, SP^3 D. SP^3d^2, SP^3d, SP^3

42. Which of the following is **not true** about cathode rays? cathode rays

A. travel in straight lines

B. are the common constituents of all matter

C. contains particles which are positively charged

D. discovered by J.J Thomson using discharge tube experiment

43. Which one of the following electromagnetic radiations has the highest frequency?

A. X-rays B. Gamma rays C. Uv-rays D. Microwaves

44. Which of the following represents an acceptable or possible set of quantum numbers (in the order n, l, ml and ms) for an electron in an atom?

A. 3,2,0,0 B. 3,0,2, $^{+1}/_{2}$ C. 3,1,-1,$^{+1}/_{2}$ D. 3,0,2, $^{-1}/_{2}$

45. Determine the energy of the electrons when an electrons transits from n=4 to n=1?

A. -1.635×10^{-16} B. 1.635×10^{-16} C. -2.043×10^{-18} D. 2.43×10^{-18}

46. Which one of the following is **not** an intensive property?

A. Color B. Density C. Mass D. Conductivity

47. The product of 2.4×3.26 in the correct scientific figure is:

A. 7 and 2 B. 7.8 C. 7.824 D. 7.802

48. A field of chemistry that involved in separating , identifying and determining the relative amount of components in a sample of material is:

A. physical chemistry C. geochemistry

B. biochemistry D. analytical chemistry

49. Which one of the following is **correctly** matched with their SI units

A. Force =kg/ms^2 C. Energy = kg/m^2s^2

B. Pressure= kg/ms^2 D. Volume =kg/L

50. In a certain experiment NaOH solution is added from a buratte to dilute sulphuric acid in a beaker, which of the following changes will occur in the beaker?

A. concentration of hydrogen ion increases

B. POH increases

C. concentration of hydroxide ion decreases

D. PH increases

51. According to Lewis definition, a base is

A. an electron pair acceptor

B. an electron pair donor

C. proton donor

D. a substance that increase H^+ in aqueous solution

52. For the reaction shown below, which of the following is a conjugate acid-base pair?

$H_2SO_4 + N_2H_5^+ \rightleftharpoons HSO_4^- + N_2H_6^{+2}$

A. H_2SO_4 *and* $N_2H_5^+$

B. $N_2H_5^+$ *and* $N_2H_6^{2+}$

C. $N_2H_3^+$ and $N_2H_6^{+2}$

D. H_2SO_4 and SO_4^{2-}

53. What is the effect of a common ion in an electrolytic solution?

A. It has no effect on the PH of solution

B. It decreases the dissociation of a solute

C. It changes the equilibrium position to the right

D. It has no effect on equilibrium position

54. Potassium phosphate is a basic salt because it is a salt of:

A. a strong acid and a weak base and the anion of the strong acid can be hydrolyzed

B. a strong base and a weak acid and the anion of the weak acid can be hydrolyzed

C. a weak acid and a weak base and the cation of the weak base can be hydrolyzed

D. a strong base and a weak acid and the cation of the strong base can be hydrolyzed

55. The Ka of acetic acid CH_3COOH is 1.8×10^{-5} , what is the percent ionizations of 0.1M CH_3COOH

A. 1.42 B. 3.6 C. 4.2 D. 1.34

56. The point in a titration at which the number of moles of OH^- ions added to a solution is equal to the number of mole of H^+ions and the point at which color change observed respectively are

A. triple point and zero point

B. end point and equivalent point

C. equivalent point and end point

D. starting point and end point

57. Which of the following salt is acidic in nature

A. $(NH_4)_2\ SO_4$ B. Na_2CO_3 C. KF D. $Ba(NO_3)_2$

58. Which of the following is **not true**?

A. The higher the P^H value, the stronger the base

B. The lower the P^Hvalue, the weaker the acid

C. The greater H^+ Concentration will results greater degree of ionization

D. As the concentration OH^- Increases the P^{OH} will be decreased

59. Which of the following is **true** about salts formed from weak acid and weak bases?
    A. only the cation of the salt undergo hydrolysis
    B. both the cation and the anion of the salt undergo hydrolysis
    C. the type of salt formed has acidic property
    D. no hydrolysis takes place at all
60. Which one of the following pairs **can't be** mixed together to form a buffer solution?
    A. HNO3 and NH_4NO_3
    B. CH_3COOH and CH_3COONa
    C. NH3 and NH_4Cl
    D. H_3PO_4 and NaH_2PO_4
61. Which of the following base is the strongest one?
    A. NH_3, kb=1.8$\times 10^{-5}$
    B. NH_2OH, kb=1.1$\times 10^{-6}$
    C. $C_2H_5NH_2$, kb $= 4.7 \times 10^{-4}$
    D. C_5H_5N, kb $= 1.7 \times 10^{-9}$
62. If CH_3COONa is added to a solution of CH_3COOH, which of the following statement is **correct**?
    A. The dissociation of CH_3COOH decreases
    B. The P^H of a solution decreases
    C. The concentration of H^+ Increases
    D. The concentration of CH_3COO^- Decreases
63. During the titration of known volume of strong acid with strong base, there is
    A. a formation of acidic salt
    B. a sharp decreasing of P^H around the end point
    C. a low P^H at the beginning of a titration
    D. no P^H change of solution
64. The hydronium concentration of a certain acidic solution is 1×10^{-5}, what will be the hydroxide ion concentration of the solution?
    A. 1×10^{-6} B. 1×10^{-14} C. 1×10^{-9} D. 1×10^{-8}
65. The acid –base indicator methyl red has KIn of 1.0×10^{-6} . Its acidic form is red while its alkaline form is yellow. If the methyl red is added to a solution with PH=7, the color observed will be.
    A. red B. yellow C. pink D. no color observed
66. A 50ml solution of H_2SO_4 of 0.2 M is titrated with NaOH solution of unknown concentration. The end point against phenolphthalein indicator was signaled when 40. 0 ml of NaOH was added, what is the concentration of NaOH solution?
    A. 0.10M B. 0.401M C. 0.25 D. 0.50M

67. The half-cell reaction for the formation of calcium metal upon electrolysis of molten CaCl_2 is: $Ca^{2+} - 2e^- \longrightarrow Ca$, what is the mass of calcium formed upon the passage of a current of 6.0A for a period of 4.0× 10^3 second? (F=96,500 C/mol , MCa=40g/mol)

A. 4.97g B. 19.3g C. 9.60g D. 40g

68. During the electrolysis of an aqueous solution of copper sulphate using graphite electrode the reaction takes place at the anode is

A. $Cu^{2+}(aq) + 2e^- \longrightarrow Cu(s)$

B. $Cu(s) \longrightarrow Cu^{2+}(aq) + 2e^-$

C. $4OH^-(aq) \longrightarrow O_2(g) + 2H_2O(L) + 4e^-$

D. $4H^+ + O_2 + 4e^- \longrightarrow H_2O$

69. In the reaction $N_2(g) + 3H_3(g) \rightarrow 2NH_3(g)$, the rate of formation of NH_3 will be

A. the same as the rate of N_2
B. twice the rate of N_2
C. half the rate of H_2
D. the same as the rate of H_2

70. Phosphate and nitrate fertilizers washed-out of the soil and entered to neutral water systems, which caused water pollution, because they

A. raise the number of fishes in water

B. facilitate the process of depletion of oxygen which affects aquatic life

C. decrease the growth of algae in water surface

D. suppress or blocks the eutrophication phenomena in water

71. During the electrolysis of molten potassium chloride using graphite electrode the cathode reaction is

A. $2k^+ + 2e^- \longrightarrow 2k$ C. $k \longrightarrow k^+ + 1e^-$

B. $2Cl^- \longrightarrow Cl_2 + 2e^-$ D. $Cl_2 + 2e^- \longrightarrow 2Cl^-$

72. Which of the following relation express Farad's 1st law

A. $\frac{M_1}{E_1} = \frac{M_2}{E_2}$ B. $m = \frac{It}{zF}$ C. n=$\frac{It}{zF}$ D. $M = \frac{MIt}{zF}$

73. A non-spontaneous process in which a compound absorbs electrical energy and decomposed in to its elements is

A. electroplating B. solvolysis C. hydrolysis D. electrolysis

74. What is oxidation? oxidation is

A. loss of electrons and increase in oxidation number

B. gain of electrons and decrease in oxidation number

C. addition of hydrogen to a substance

D. removal of oxygen from a substance

75. Which one of the following is the oxidizing agent in the given reaction?

$H_2S + HNO_3 \longrightarrow S + NO + H_2O$

A. NO B. HNO_3 C. H_2S D. S

76. The existence of Cr_2O_3 and CrO_3 illustrates

A. The law of multiple proportion
C. The law of definite proportion
B. The law of conservation of mass
D. The law of mass action

77. $MnO_4^- + Fe^{2+} \longrightarrow Mn^{2+} + Fe^{3+}$, when the equation is balanced the coefficient of $MnO_4^-, H^+ and\ Fe^{3+}$ respectively in acidic medium is

A. 1,5,3 B. 1,2,4 C. 1,8,5 D. 2,3,4

78. One of the following is a weak electrolyte

A. Ammonia solution
C. Sodium chloride solution
B. Hydrochloric acid solution
D. potassium hydroxide solution

79. One of the following is **true** about factors related to preferential discharge

A. The more reactive metals are easy to discharge than less reactive metals
B. Cations are discharged by losing of electrons, while anions are discharge by gaining of electrons
C. Ions with the greater concentration undergo discharging preferentially than ions with lower concentration in the same solution
D. Inert electrode involves the discharging process and affects the overall electrolysis process

80. What type of solute – solvent attraction is responsible for the solubility of bromine (Br_2) in benzene (C_6H_6).

A. Ion – dipole force
C. Hydroge
B. Londan force
D. hydration energy