ARADA SUB CITY EDUCATION OFFICE CHEMISTRY MODEL EXAMINATION FOR GRADE 12

TIME ALLOWED: 2:30

GENERAL DIRECTION

THIS QUESTION PAPER CONTAINS **80 MULTIPLE CHOICE QUESTIONS**, DEAR STUDENTS ATTEMPT ALL THE ITEMS.

THERE IS ONLY **ONE BEST ANSEWR** FOR EACH ITEM, CAREFULLY SELECT THE BEST ANSWER FROM THE SUGGESTED OPTIONS AND BLACKEN ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED. YOU ARE ALLOWED TO WORK ON THE EXAMINATION FOR **2:30 HOURS**. IF YOU FINISH BEFORE TIME ALLOWED,YOU MAY GO BACK AND REVIEW. WHEN THE TIME IS CALLED YOU MUST IMMEDIATELY STOP WORKING, PUT YOUR PENCIL DOWN AND WAIT FOR FURTHER INSTRUCTIONS.

ANY FORM OF CHEATING OR ATTEMPT TO CHEAT IN THE EXAMINATION HALL RESAULT IN AN **AUTOMATIC DISMISSAL** FROM THE EXAMINATION HALL AND **CANCELLATION** OF YOUR SCORE.

PLEASE MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE SEPARATE ANSWER SHEET PROVIDED.

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

YOU MAY REFER TO THE INFORMATION BELOW WHEN YOU NEED WORK ON SOME OF THE QUESTIONS:

Gas constant, R= 8.314J/mol.k=0.0821L.atm/mol.k plank's constant=6,626 $x10^{-34J}$/s

Speed of light=3 x 10^{8}m/s rybderg constant, RH= 2.18 $x10^{-18}$J

Faraday's constant=96500C/mol

ATOMIC NUMBER(Z) AND ATOMIC WEIGHT (A)

Elements	H	He	B	C	N	O	F	Si	P	S	Cl	Ca	Cr	Ni	Cu	I	Mo	I	Ba
Z	1	2	5	6	7	8	9	14	15	16	17	20	52	27	29	53	42	53	56
A	1	4	11	12	14	16	19	28	31	32	35.5	40	24	58	63.5	127	96	127	137

1. Modern atomic theory contradicts Dalton's atomic theory in stating that:
   A. When elements combine, their atoms unite in small whole number ratio to form compound.
   B. All substances are made up of very small particles called atoms.
   C. Atoms of different elements have different properties.
   D. Atom can split into smaller particles.
2. The atomic nucleus was discovered with the help of an experiment called:_____.
   A. The deflection of cathode ray experiment.
   B. The Alpha particles scattering experiment.
   C. The discharge tube experiment.
   D. The oil drop experiment.
3. Which pair of atoms do the nuclei contain the same number of neutrons?
   A. $^{7}_{3}$Li and $^{9}_{4}$Be B $^{39}_{19}$K and $^{38}_{18}$Ar C. $^{39}_{19}$K and $^{41}_{20}$Ca $^{14}_{7}$N and $^{16}_{8}$O
4. Which experiment provide evidence that atom is mostly empty space and led to the discovery of the atomic nucleus?
   A. Millikan's oil drop experiment C. Rutherford's gold foil experiment
   B. Bohr's hydrogen atom experiment D. Thomson's cathode ray tube experiment
5. An element has electron configuration of $[Kr]5s^{2}4d^{4}$. To which group and period respectively does the element belong in the Modern periodic table ?
   A. Group IVB and period 4 C. Group VB and period 6
   B. Group IIB and period 5 D. Group VIB and period 5
6. The characteristic similarities of elements in the same period is:
   A. They all have the same electron configuration
   B. They all have the same valence electrons
   C. They all have the same number of energy level
   D. They all have similar chemical properties

7. Which One of the following statement is not true about Mendeleev's periodic table?
   A. Arranged elements in order of increasing atomic masses
   B. It was proposed in 1869 and predicted many new elements
   C. Wrong order of atomic masses would be observed
   D. The position of isotopes and noble gases are available
8. According to modern periodic law,the periodic properties of elements are periodic functions of their_____.
   A. Atomic sizes B. Atomic numbers C. Atomic masses D. Mass numbers.
9. An element "A" is found in group IIIA and an element "B" is found in group VIA. The compound formed with these two elements will have the formula:
   A. A_2B_6 B. A_6B_2 C. A_2B_3 D. A_3B_2
10. The atomic number of elements Na, Cl ,Al and K are 11, 17.13 and 19 respectively . Which of the following statement is not true ?
    A. The ionization potential of K is smaller than that of Na
    B. The electron affinity of Cl is smaller than that of Al
    C. Chlorine has the highest effective nuclear charge than that of K
    D. The metallic character of K is greater than that of Na
11. Out of the elements $_7N$,$_{11}Na$, $_{17}Cl$, and $_{15}P$:
    A. N ,Na and P are found in the same period
    B. Cl and N have the same number of energy level
    C. N and P are found in the same group
    D. Na and Cl are found in the same group
12. Which of the following is not the advantages of periodic classification of elements in studying chemistry?
    A. It helps to predict physical and chemical properties, reactivities, and types of compound form.
    B. It clearly show trends in properties of elements across a periods and down the groups.
    C. It simplifies the study of elements by grouping those with similar chemical behavior.
    D. It arranges isotopes of an element in different location.
13. What are the real cause of chemical bonding?
    A. Increasing the potential energy of unstable atoms
    B. Complete the transfer of electrons from one atom to another.
    C. Attending stable electron configurations.
    D. Sharing electrons between atom of different elements.
14. Which one of the following is the the characteristics of most ionic compounds?
    A. They are generally liquid or gases at ordinary temperature.
    B. They conduct electric current when in molten or aqueous solution.
    C. They have relatively low melting and boiling points.
    D. They are soluble in non polar solvents

15. Covalent bonds are typically formed between atoms with:
    A. High ionization energy and high electron negativity
    B. Low ionization energy and high electron negativity
    C. High ionization energy and low electron negativity
    D. low ionization energy and low electron negativity
16. which one of the following compounds represent atoms bonded covalently?
    1. N_2O_2 2. NH_3 3. $MgBr_2$ 4. BaO 5. SO_3
    A. 1,3 and 5 B. 1,2 and 5 C. 3 and 4 D. 1,2 and 3
17. A type of chemical bonding that results from the mutual attraction between positively charged metal nuclei and the surrounding freely moving sea of electrons is named as:
    A. Covalent B. dative C. ionic D. Metallic
18. What type of intermolecular force is responsible for high boiling of water?
    A. Dipole-dipole interaction C. London or dispersion forces
    B. Hydrogen bonding D. covalent bonding
19. The correct balanced chemical equation for the reaction :
    Phosphorus + oxygen $\longrightarrow$ phosphorus(V) oxide is:
    A. $P_4 + 5O_2 \longrightarrow P_4O_{10}$ C. $5P + O_2 \longrightarrow P_5O_2$
    B. $P_5 + O_2 \longrightarrow P_2O_5$ D. $2P + O_2 \longrightarrow 2PO$
20. Chemical equation must be balanced to satisfy which one of the following law?
    A. Conservation of energy C. Conservation of mass
    B. Definite proportion D. multiple proportion
21. Which one of the following is an example of a single displacement reaction?
    A. $CaO(s) + SiO_2 \longrightarrow CaSiO_3(s)$
    B. $2NaHCO_3(aq) \longrightarrow Na_2CO_3(s) + CO_2(g) + 2H_2O(l)$
    C. $2KI(aq) + F_2(g) \longrightarrow 2KF(aq) + I_2(g)$
    D. $H_2SO_4(aq) + 2KOH(aq) \longrightarrow K_2SO_4(aq) + 2H_2O(l)$
22. Which of the following statements is correct?
A. The oxidizing agent is always oxidized in oxidation and reduction reaction

B. The reducing agent is always reduced in oxidation and reduction reaction

C. The oxidizing agent in oxidation and reduction reaction always loses electrons

D. A reducing agent in oxidation and reduction reaction always loses electrons

23. Calculate the formula mass of hydrated sodium carbonate ($Na_2CO_3.10H_2O$) (atomic mass of Na=23 C=12 O=16 H=1)
    A. 326 B. 286 C. 274 D. 142
24. Calculate the mass of calcium carbide that is needed to produce $2000cm^3$ of acetylene according to the following equation. $CaCl_2 + 2HCl \longrightarrow C_2H_2 + Ca(OH)_2$
    A. 222g B. 9.91g C. 111g D. 22.4g

25. If 48 grams of magnesium is heated in 96 grams of oxygen . How many moles of the excess reactant is left unreacted as shown in the reaction below? (At. Mass: Mg=24 O=16)

$2Mg(s) + O_2(g) \longrightarrow 2MgO(s)$

A. 5moles B. 1moles C. 4moles D. 3moles

26. If 15 g of SO_2 is actually formed from the reaction of 12g of O_2 with sufficient sulfur .what is the percent yield of SO_2? (At.mass: S=32 O =16)

A. 25% B. 90% C. 75% D. 50%

27. Which solute particles dispersed in water are increasing in size in a mixture?

A. Suspension, Colloid . solution C. Colloid . solution. Suspension

B. Solution . Suspension, Colloid D. solution. Colloid. suspension

28. How can you best increase the solubility of a gases in liquid?

A. Increasing both the temperature and the pressure

B. decreasing both the temperature and the pressure

C. Increasing the temperature and decreasing the pressure

D. decreasing the temperature and increasing the pressure

29. In which of the following case will the dissolution of sugar be the most rapid?

A. Powdered sugar in cold water C. powdered sugar in hot water

B. Sugar crystal in hot water D. sugar crystal in cold water

30. The solubility of NaCl in water at 20^oc is 40g in 100g of water. A solution that contain 20 g of NaCl in 50g of water at 20^oc is _____.

A. Unsaturted C. Super saturated

B. Saturated D. Diluted

31. How many grams of glucose($C_6H_{12}O_6$) must be dissolved in 660g of ethanol (C_2H_5OH) to prepare a 4.40×10^{-4} molality of solution?

A. 0.560g B. 0.0522g C. 2.430g D. 3.661g

32. A. solution is said to be in equilibrium if and only if:

A. It forms suspension

B. It dissolve more solutes

C. It's rate of dissolution is equal to the rate of crystallization

D. Solute –solvent interaction is less than that of solute –solute interaction

33. What is the concentration of sodium hydroxide required to react completely with equal volume of 0.5M of phosphoric acid solution? If 0.25L of H_3PO_4 is used?

$H_3PO_{4(aq)} + 3KOH_{(aq)} \longrightarrow K_3PO_4 + 3H_2O$

A. 0.375M B. 0.125M C. 1.5M D. 2.5M

34. What is the mass percentage of methanol in a solution prepared by adding 32g of methanol to 18g of water?

A. 16% B. 64% C. 50% D. 32%

35. A compound formed when an acidic oxide react with a basic oxide is;
    A. Acid B. Salt C. Base D . Oxide
36. Which of the following statement is true about oxide?
    A. All basic oxide are metallic oxide
    B. Amphoteric oxides are basic oxide
    C. All non-metalic oxides are acidic oxide
    D. Oxides are ternary compounds
37. What is the concentration of hydrogen ions in 0.0001 M NaOH Aqueous Solution?
    A. 2.0×10^{-4} M B. 1.0×10^{-10} M C. 1.0×10^{-8} M D. 1.0×10^{-14}M
38. Which one of the following acid is used as electrolyte in a car battery?
    A. Hydrochloric acid C. Sulphuric acid
    B. Nitric acid D. Phosphoric acid
39. The idea of atoms as the smallest particles of substances was proposed by:
    A. James Chadwick C. Ernest Rutherford
    B. John Dalton D. J.J Thomson
40. A Sample of water taken from ice, rain or ocean has the same ration by mass of hydrogen and oxygen . This chemical fact explain the law of ;
    A. Mass action C. Definite proportion
    B. Conservation of mass D. Multiple proportion
41. All cathode rays are the same regardless of the nature of material used as electrode with in the discharge tube. This observation indicates that:
    A. Cathode rays are energetic
    B. Cathode rays travel in a straight line
    C. Cathode rays are electrically charged
    D. Cathode rays are building block of all matter.
42. Calculate RAM for naturally occurring Mg if the isotope distribution is 78.99% ^{24}Mg, 10.00% ^{25}Mg and 11.01% ^{26}Mg; accurate masses are 23.99, 24.99 and 25.98 respectively.
    A. 26.51 B. 24.31 C. 22.41 D. 25.35
43. Which of the following electron transitions requires the smallest energy to be absorbed by the hydrogen atom?
    A. from n = 1 to n = 2 C. from n = 3 to n = 4
    B. from n = 2 to n = 3 D. from n = 4 to n = 5
44. The normal human eye responds to visible light of wavelength ranging from about 390nm to 710nm. What is the frequency range of the human eye?
    A. 7.7×10^{14}Hz to 4.2×10^{14}Hz C. 1.3×10^{-15}Hz to 2.4×10^{-15}Hz
    B. 4.2×10^{14}Hz to 7.7×10^{14}Hz D. 2.4×10^{-15}Hz to 1.3×10^{15}Hz

45. Which of the following statements is TRUE?
    A. Ultraviolet light has longer wavelength than visible light
    B. The energy of radiation decreases as the wavelength decreases
    C. The frequency of radiation increases as the wavelength decreases
    D. Wave number of an electromagnetic radiation increases as wavelength increases
46. Which of the following set of quantum numbers is permissible?

    A. n=3,l=3,ml=-2,ms=-1/2 C. n=2, l=0, ml=0, ms=+1/2

    B. n=2, l=0, ml=-1, ms=+1/2 D. n=0, l=0, ml=1 ms=-1/2

47. An element has electron configuration of $[Kr]5s^2 4d^{10} 5p^5$. To which group and period respectively does the element belong in the Modern periodic table?
    C. Group IVA and period 4 C. Group VA and period 7
    D. Groop IIA and period 5 D. Group VIIA and period 5
48. In which of the following set of species is arranged in order of decreasing ionic radius?

    A. k, Ca, P, S, Cl C. S, Cl, K, Ca, P

    B. Cl, S, P, Ca, K D. K, Ca, Cl, S, P

49. Which one of the following ionic compound has the highest lattice energy?

    A. NaCl B. NaBr C. NaF D. NaI

50. Which of the following compound contain ionic , covalent and coordinate covalent bond all in one?

    A. KCl B. $MgCO_3$ C. NH_4Cl D. HCOOH

51. Which of the following molecule is polar covalent molecule?
    A. CO_2 B. CCl_4 C. PCl_5 D. NH_3
52. The species in the following set do not include which one of the following geometry?

    $SiCl_4$, BrF_4^-, SF_6, NO_3^-

    A. Octahedral B. tetrahedral C. Trigonal pyramidal D. Square planar

53. The type of hybridization of the central atom in ClF_3 and SF_6 are __and __respectively?
    A. SP^3d and SP^3 B. SP^3d and sp^3d^2 C. SP^3 and SP^3d D. SP^2 and SP^3d^2
54. Which of the following statement is incorrect?
    A. A Molecule may be non polar , although all the bonds in it are polar
    B. If a molecule BF_3 is non polar, the orbital's on B are sp^3 hybridized
    C. In a crystal ammonium bromide there are ionic and covalent bond
    D. In ammonium ion NH_4^+, all the bond lengths are identical
55. In which of the following molecules the dispersion or London force is the most constant?
    A. CH_3Cl and CO B. Ar and CCl_4 C. H_2O and NH_3 D. HCl and $CHCl_3$

56. As atoms bonded to each other, they:

A. Decrease their potential energy, thus creating less stable arrangement of matter.

B. Decrease their potential energy, thus creating more stable arrangement of matter.

C. Increase their potential energy, thus creating less stable arrangement of matter.

D. Increase their potential energy, thus creating more stable arrangement of matter.

57. Metalic bonding is formed between :

A. Elements of low electronegativities C. Electrons of high electronegativities

B. Elements of small atomic sizes D. Elements of high electron affinities

58. Which of the following molecule or ion is least stable?

A. CN B. CN^- C. O^2 D. F_2

59. According to molecular orbital theory which one of the following is paramagnetic?

A. NO B. F_2 C. NO^+ D. Be_2

60. Identify the wrong statement from the following alternatives:

A. F_2 molecule is diamagnetic

B. The bond order of N_2 is 3

C. The bond energy of CN^- is less than that of O_2

D. The bond length of F_2 is greater than that of N_2

61. Molecules are held together in a crystal by:

A. Hydrogen bonds C. Electrostatic attraction

B. Van der Waal's attraction D. dipole-dipole attraction

62. At high temperatures the particles of a gas:

A. Move slower and hit the walls of their container less often.

B. Move faster and hit the walls of their container more frequently

C. Move faster and hit the walls of their container less frequently

D. Don't move at all and don't hit the walls of their container.

63. According to the kinetic-molecular theory, particles of a gas

A. Attract each other but they do not collide

B. Repel each other and they collide

C. Neither attract nor repel each other but they collide

D. Neither attract nor repel each other and they do not collide

64. Which one of the following statements is NOT true about acids?

A Bronsted- Lowry acid is a proton donor

B. Lewis acid is an electrons pair donor

C. Lewis acid is an electron pair acceptor

D. Arrhenius acid furnishes hydronium ion in aqueous solution.

65. Which of the following is the conjugate acid of hydrogen phosphate ion, (HPO_4^{2-})?
A. H_3PO_4 B. PO_4^{3-} C. $H_2PO_4^-$ D. HPO_4^{2-}

66. What is the P^H of a 5 x 10^{-6} M solution of $Ba(OH)_2$?

A. 9 B. 11 C. 12 D. 10

67. A 1.0M solution of a weak acid is found to dissociate by only 1.4%. Which of the following acid is it likely to be:

A. HNO_2 Ka = 6.91 x 10^{-4} C. HF Ka = 7.2 x 10^{-4}

B. HCOOH Ka = 1.96 x 10^{-4} D. CH_3COOH Ka = 1.82 x 10^{-5}

68. If KOCl is added to a solution of HOCl , which of the following statements is true?

A. The pH of the solution will increase B. The pH of the solution will decrease

C. The equilibrium will not be affected D. The pH will remain the same

69. Buffer solution have consistent acidity and alkalinity because:

A. They have fixed value of pH

B. They have excess of H^+ or OH^- ions

C. The acids and alkalies are shielded from attack by other ions

D. They gives unionized acids or bases on the reaction with added acid or base.

70. Which of the following salts will yield a basic solution on dissolution in water?
A. a salt of weak acid and weak base C. a salt of strong acid and strong base
B. a salt of weak acid and strong base D. a salt of strong acid and weak base

71. What molarity of 50ml H_2SO_4 is required to neutralize 200mL of 0.5M NaOH?

A. 1M B. 4N C. 2M D. 0.5M

72. Which of the following titration will have an equivalent point of PH less than 7?

A. Strong acid with weak base C. Strong acid with strong base

B. Weak acid with weak base D. weak acid with strong base

73. For the reaction : $H_2S + HNO_3 \longrightarrow S + NO + H_2O$ what is the coefficient H_2S and NO respectively after balancing redox reaction by oxidation number method?

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

74. Consider the following oxidation – reduction reaction equation:
$2H_2O_{(l)} + Al_{(s)} + MnO^-_{4\,(aq)} \rightarrow Al(OH)^-_4(aq) + MnO_2(s)$ What are the reducing and the oxidizing agents in this reaction?

A. $Al_{(s)}$ is the reducing agent and H_2O is the oxidizing agent
B. $Al_{(s)}$ is the oxidizing agent and H_2O is the reducing agent
C. $Al_{(s)}$ is the oxidizing agent and $MnO^-_4(aq)$ is the reducing agent
D. $Al_{(s)}$ is the reducing agent and $MnO^-_4(aq)$ is the oxidizing agent

75. The anode reaction is the same in all of the following electrolysis process except:

A. Electrolysis of dilute NaCl solution C. Electrolysis of brine solution

B. Electrolysis of conc. HCl solution D. Electrolysis of molten $MgCl_2$

76. Which of the following conduct electricity with out undergoing any chemical change?

A. Potassium chloride solution C. Molten magnesium chloride

B. Hydrochloric acid solution D. Copper metal

77. Two cells are connected in series. One cell contains Ag_2SO_4 and the other cell contains $Al(NO_3)_3$. If 12g of Al is deposited on one cells, how many grams of Ag is deposited on the other cell? (Atomic mass of Ag = 108g/mole and Al=27g/mole)

A. 144g B. 24g C. 12g D. 36g

78. The two standard electrode potentials involved in the nickel-cadmium rechargeable cell are given below. Calculate the $\Delta G°$ of the cell. (F=96500C)

$NiO_2(s) + 2H_2S(l) + 2e^- \longrightarrow Ni(OH)_2(s) + 2OH^-$ $E° = +0.49V$

$Cd(OH)_2(s) + 2e^- \longrightarrow Cd(s) + 2OH^-(aq)$ $E° = -0.76\ V$

A. -184.6KJ B. -153.0KJ C. -241.3KJ D. -206.8KJ

79. Which of the following is not the characteristic of Chemical industries ?

A. Consume large quantities of energy during manufacturing process.

B. Use safe operation method during manufacturing process

C. Test their product during and after manufacturing

D. providing transport services to customers

80. In the production of ammonia. Which condition would increase the yield of ammonia according to this reaction. $N_{2(g)} + 3H_{2(g)} \longleftrightarrow 2NH_{3(g)}$ ΔH=-92.2KJ/mol

A. High temperature and low pressure C. Low temperature and high pressure

B. High temperature and high pressure D. Low temperature and low pressure