DIRECTIONS: THIS EXAMINATION CONTAINS A TOTAL OF **80** MULTIPLE CHOICE QUESTIONS. SELECT CAREFULLY THE BEST ANSWER AND BLACKEN ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED

TIME ALLOWED: 2 ½ HOURS

NOTICE: USE THE FOLLOWING CONSTANTS AND TABLE WHEN NECESSARY

Planck's constant,h=6.63×10^{-34} J.S

Speed of light,c=3.0×10^{8} m/s

Mass of electron, m_e=9.11×10^{-31} kg

Rydberg constant, R_H=2.18×10^{-18}J

Universal gas constant,R=0.0821 $\frac{L.atm}{mol.k}$ = 8.314$\frac{Nm}{k.mol}$

Henry's law constant for oxygen (K_H)=1.23×10^{-3} $\frac{mol}{L.atm}$

Faraday's constant (1F) =96,500 C/mol

Element	H	Li	C	N	O	F	Na	Mg	Al	P	S	Cl	K	Se	I	Cs
Z	1	3	6	7	8	9	11	12	13	15	16	17	19	34	53	55
A	1	7	12	14	16	19	23	24	27	31	32	35.5	39	79	127	133

1. Which of the following temperature scale is greater?

   A. 59 ^{0}F B. 15 ^{0}C C. 288k

   D. A,B and C are equivalent

2. Soaps are:

   A. Potassium salts of sulphonic acid.

   B. Esters of long chain fatty acids.

   C. Sodium salts of long chain fatty acids.

   D. Metallic salts of unsaturated fatty acids.

3. Which of the following branch of chemistry is usually concerned with quality control in such fields as foods, pharmaceuticals and safe water?
   A. Physical chemistry C. Analytical chemistry
   B. Bio chemistry D. Inorganic Chemistry
4. Hardening oils to convert into fats is called
   A. Esterfication C. Decarboxylation
   B. Hydrogenation D. Neutralization
5. How many significant figures are there in 010.0450?
   A. 7 B. 6 C.3 D. 4
6. A Hospital medical technician needs to prepare 750g solution that is 5.00% glucose by mass. What mass of glucose and water must be mixed to prepare the solution respectively?
   A. 712.5g and 37.5g C. 25g and 725g
   B. 5g and 745g D. 37.5 and 712.5g
7. The limitation of any scientific method is?
   A. Its rigidity .
   B. It needs large body of experimental data(result).
   C. It can't draw conclusion from limited information.
   D. All of the above
8. Which of the following is a solid –liquid solution?
   A. Brass C. Ethanol
   B. Producer gas D. Potassium nitrate aqueous solution

Question 9-10 is based on the following measurement result of the length of a copper wire by three students. The actual result of the length of the wire is 16.34cm.

Student	Trial 1	Trial 2	Trial 3	Trial 4
A	15.80	15.98	16.30	17.02
B	16.30	16.41	16.33	16.35
C	15.93	15.89	15.95	15.92

9. Which student is most precise?

A. Student C B. Student A C. Student B D. All of them

10. In which student's measurement systematic error is involved?
    A. Student A C. Student B
    B. Student C D. All of them

11. Type of solute-solvent interaction for the dissolution of NH_4F in water is:
    A. London or dispersion forces C. ion-depole forces
    B. Hydrogen bonding D. dipole-depole forceS

12. All cathode rays are the same regardless of the nature of the electrode material, residual gas and conductive wire used in cathode ray tube. This observation shows that:
    A. Cathode rays travel in straight line.
    B. Electrons are fundamental particles.
    C. Cathode rays are material particles.
    D. Cathode rays are negatively charged particles.

13. Which of the following is **wrong** statement?
    A. When a grain of a crystal X is added to a supersaturated solution its size increases.
    B. The solubility of carbodioxide gas in Coca solution is higher at 20^0c than 10^0c.
    C. When dissolving KI in water is exothermic ,KI is more dissolved at 25^0c than 75^0c. D. None of the above.

14. The atomic mass of Gallium is 70 amu. The masses of the two naturally occurring isotopes are 69amu for Ga-69 and 71 amu for Ga-71. What are the percentage abundance of Ga-69 and Ga-71 isotopes, respectively?
    A. 60.0% and 40.0% B.75%and 25% C. 50.0% and 50.0% D. 40.0%and 60.0%

15. What is the concentration of oxygen gas in a sample of Bishoftu lake water at 25^0c under oxygen's partial pressure of $2.0x10^{-2}$ atm?
    A. $2.46x10^{-5}$M B. 0.0213M C. 0.0615M D. 16.26M

16. How many photons of red light (700nm)would pass through a 140W lamp to generate1.0kJof energy?

A. $3.5x10^{21}$ B. $6.02x10^{22}$ C. $3.5x10^{18}$ D. $3.5x10^{20}$

17. The normality of a solution that contains 15.75g nitric acid (HNO_3)in 250 ml of the solution is.

A. 0.5N B. 1.0N C. $1.0x10^{-3}N$ D. $2.0x10^{-3}N$

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

A. Infrared B. Microwave C. visible D. Ultraviolet

19. A bottle of beer contains 4.5% of ethanol by volume. The density of ethanol (C_2H_5OH) is 0.79 g/cm^3).what is the molarity of ethanol?

A. 0.77M B.0.077M C. 7.70M D.5.69M

20. Which of the following is **not true** about rays emitted from radioactive elements?

A. $\propto$-practicle is positively charged particle.

B. β-practicle is a neutral particle.

C. γ -radiation is negatively charge particle.

D. All are not true except A.

21. To prepare 200ml of 0.91M dilute H_2SO_4 aqueous solution from 18.2M concentrated H_2SO_4 stock solution, what volume of stock solution is used and what volume of water is added respectively?

A. 150ml,50ml B. 10ml,190ml C. 190ml,10ml D. 50ml,150ml

22. Which one of the following transition is accompanied by emission of radiation with the longest wave length?

A. n=4 to n=2 B. n=5 to n=2 C. n=1to n=4 D. n=3 to n=5

23. What osmotic pressure is exerted by a solution that is 1.82M at 27^0c?

A. $6.6x10^3$atm B. 135atm C. 4.0atm D. 44.8atm

24. The maximum number of electrons in an orbital of an atom possessing a quantum number n=4,l=3 and m_l=0 is: A. 14 B. 2 C. 32 D. 8

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

A. Suspensions settle out on standing. B. Solutions do not scatter light.

B. Colloids do not settle out. D.Solution separated by ordinary filter paper

26. Which is **the correct** respresantion that contains 15 protons, 18 electrons and 16 neutrons.

A. $^{31}_{15}P$ B. $^{32}_{18}P^{3-}$ C. $^{31}_{15}p^{3-}$ D. $^{31}_{18}p^{3-}$

27. In the reaction : $CN^-_{(aq)} + H_2O_{(l)} \rightleftharpoons HCN(aq) + OH^-_{(aq)}$, the conjugate acid –base pairs are: A. CN^-/OH^- and H_2O/HCN C. HCN and H_2O

B. CN^-/HCN and H_2O/OH^- D. CN^-/H_2O and HCN/OH^-

28. When the atoms Na, Mg, Al, K are arranged in order of increasing ionization energy, which is the correct order?

A. Na, Mg, Al, K B. Na, K, Al, Mg C. K, Na, Al, Mg D. K, Na, Mg, Al

29. Which of the following substances can function as Lewis acid?

A. NH_3 B. BF_3 C. H_20 D. CH_4

30. Which of the following ionic compounds has the largest lattice energy?

A. LiF B. LiI C. NaF D. CsI

31. If a 0.1M solution of the solutes: NaCN,HCl,NH_4Cl and NaCl are given. What is the correct increases in the order of P^H?

A. NaCN<NH_4Cl <NaCl<HCl C.HCl<NH_4Cl<NaCl<NaCN

B. NaCl<NH_4Cl<NaCN<HCl D. HCl<NaCl<NaCN<NH_4Cl

32. What is lactice energy of silver fluoride from the following enthalphy data (*¿kj/mol¿?*

ΔH^O_f Ag(g)=284, ΔH^O_f Ag^+(g)=731,ΔH^O_f F(g)=79,

ΔH^O_f F^-(g)=-322,ΔH^O_f AgF(s)= -205

A. 937.5 B. 977 C. 1056 D. 567

33. Which of the following species is amphiprotic?

A. NO^-_3 B. CO_3^{2-} C. HS^- D. $N_2H_5^+$

34. The central atom of one of the following compound does not obey the octet rule. Identity it. A. NH_4^+ B. SO_3 C. $AlCl_3$ D. H_20

35. To a solution of 0.2M HF,a solution of 0.1M HCl is added, which statement is **true** as regarding the solution after HCl is added?

A. The dissociation extent of HF increases. C. Cl^- ion is the common ion.

B. The equilibrium shift to the left. D. The solution become buffered.

36. What is the hybridization of carbon in Cl_2CO?

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

37. Which of the following systems **cannot** be classified as a buffer system?

A. NH_3/NH_4NO_3 B. HCl/KCl C. HCOOH/HCOONa D. N_2H_4/N_2H_5K

38. How many non- bonding pairs of electrons are there on the iodine atom in IF_3?

A. Three B. Four C. Two D. One

39. If a 0.1mol/L solution of monoprotic weak acid is 10% ionized. Its dissociation constant is:

A. $1.0x10^{-3}$ B. $1.0x10^{-2}$ C. $1.1x10^{-1}$ D. $0.9x10^{-2}$

40. Which of the following **does not** contain a double bond?

A. N_2H_4 B. C_2H_4 C. NO_2 D. SO_3^{2-}

41. Which of the following gives PH<7.0 when dissolved in water?

A. NH_4NO_3 B. NaCl C. NaCN D. KF

42. When the species F_2,F_2^+,and F_2^- are arranged in increasing order of bond energies ,we will have:

A. F_2^-,F_2^+,F_2 B. F_2^-,F_2,F_2^+ C. F_2^+,F_2^-,F_2 D. F_2^+,F_2,F_2^-

43. The P^H value at equivalent point for the titration of strong base and a weak acid is:

A. 7 B. Less than7 C. Cannot be determined D. greater then 7

44. Which type of intermolecular forces exist between non polar covalent bonds?

A. Permanent dipole –permanent dipole force. C. Ion- permanent dipole force.

B. Induced dipole –induced dipole force. D. Hydrogen bonding.

45. If the bond energies for H-H,Cl-Cl and H-Cl are 436kJ/mol, 328 kJ/mol and 427kJ/mol respectively, how much heat energy is evolved when hydrogen gas and chlorine gas combine to form hydrogen chloride?

A. 337KJ B. 535KJ C. 90KJ D. 319KJ

46. What is the shape of SeF_5^- polyatomic anion?

A. See saw B. Trigonal pyramidal C. Square pyramidal D. Trigonal bi pyramidal

47. For a particular reaction,ΔH^o=-30.8KJ, ,ΔS^o=100J/K, this reaction is:

A. Spontaneous at all temperature .

B. Non spontaneous at all temperature.

C. Spontaneous at temperature below 60^0C.

D. Spontaneous at temperature above 60^0C.

48. Which one is **different** from the other in its arrangement of electron pairs?

A. H_20 B. NH_3 C. CH_4 D. None of the above

49. When 100g of aluminum metal is heated from 27^0c to 127 ^{0}c,9000J of heat is absorbed. What is the specific heat capacity of aluminum?

A. $11.11Jg^{-1}K^{-1}$ B.$0.9Jg^{-1}K^{-1}$ C. $0.225Jg^{-1}K^{-1}$ D. $0.3Jg^{-1}K^{-1}$

50. The reaction between A and B is third order in A and Zero order in B. What change occurs in the rate of the reaction if the concentration of each reactant is doubled?

A. Remain unchanged. C. 6-fold increases.

B. 4-fold increases D. 8-fold increases.

51. Which of the following thermodynamic variable is a path function?

A. Temperature B. Pressure C. Volume D. Work

52. For the reaction: A+2B 3C,

The following rate data were obtained by three successive experiments.

Experiment	Initial concentration of A(mol/L)	Initial concentration of B(mol/L)	Initial rate of formation of C(mol/L.sec)
1	1	2	5
2	1	4	20
3	3	2	15

Which of the following states the rate law of the above reaction?

A. $r=K[A]^2[B]^0$ B. $r=K[A][B]^2$ C. $r=k[A]^2[B]$ D. $r=K[A][B]^3$

53. In the reaction:$KI+H_2SO_4+H_2O_2 I_2+2H_2O+K_2SO_4$

A. No oxidation-reduction process take place.

B. The oxygen in H_2O_2 has been reduced.

C. Potassium iodide is used as oxidizing agent.

D. The sulphur has been oxidized

54. the rate of the reaction :$H_2(g)+I_2(g)$ $2HI(g)$ at 25^0c is given by rate=$1.7x10^{-18}$ $[H_2][I_2]$ and the rate of decomposition of gaseous HI to I_2 and H_2 at 25^0c and equulibium state is given by rate=$2.4x10^{-21}[HI]^2$. What is the equlbrium constant for the formation of gaseous HI from the gaseous elements at 25^0c?

A. $7.1x10^2$ B.$1.4x10^3$ C.$1.7x10^{-18}$ D.$2.4x10^{-21}$

55. Given the reaction: $MnO_4^-+NO_2^-$ $Mn^{2+}+NO_3^-$ (in basic medium) when this reaction is balanced by ion electron method the coefficients of MnO_4^-, NO_2^-,Mn^{2+} and NO_3^- respectively are:

A. 2,3,2, and 3 B.3,3,2 and 2 C.2,5,2 and 5 D. 5,5,2 and 2

56. A reaction was believed to occur by the following mechanism.

Step 1:B_2 2B, fast

Step 2 : 2B+A C+2D, slow

Step 3 : D+D B_2+E, fast

Which of the following statement is **not true** about this reaction?

A. B is a catalyst. C. Step 1 is chain initiating step.

B. D is an intermediate. D. Step 3 is a chain propagating step.

57. What is molecularity of the overall reaction in question number 56?

A. Bimolecular B. Termolecular C. Unimolecular D. Cannot be determined

58. During electrolysis of brine solution using inert electrodes.

A. The overall reaction is : $2H_2O$ $2H_2+0_2$.

B. The remaining solution would have a P^H value less than 7.

C. At the cathode the reaction takes place is :$2Na^+ + 2e^-$ 2Na

D. At the anode the reaction takes place is:$2Cl^-$ Cl_2+2e^-

59. If 25,000 coulombs of the electricity are required to deposit electrically 25gm of metal from a solution of metal ions. What is the molar mass of metal and its equivalent mass respectvelly if it is known to be monovalent?

A. 965 and 96.5 C. 965 and 965

B. 9.65and 965 D. none of these

60. Given: 2A(g) B(g)+3C(g)

When the system is at equilibrium at 25^0c the concentration are found to be:

[A]=0.20M, [B] =0.40M, [C] = 0.40M. What is the value of K_C for the reaction?

A. 6.4 B. 0.64 C. 64 D. 0.128

61. In voltaic Cells:
    A. Electrons move from the negative terminal to the positive terminal of a battery outside the cell
    B. Anode is positive and cathode is negative
    C. Reduction occurs at the anode and oxidation takes place at the cathode.
    D. Electrical energy converted to chemical energy

62. For the reaction: $N_2(g)+O_2(g)$ $2N0(g)$, $Kc=1.0x10^{-4}$ at 1200^0C what is the equilibrium concentration of NO in a vessel that contains 0.8mol/L N_2 and 0.2 mol/L 0_2?

A. $1.6x10^{-5}$M B. $2.5x10^{-4}$M C. $4.0x10^{-3}$M D. 0.40M

63. Given: E^0Ni^{2+}/Ni = - 0.25V

$E^0Fe^{2+/}Fe$ = - 0.44V

Which of the following is true ?

A. The standard potential of the cell is -0.19V

B. The spontaneous reaction takes place is

$Fe^{+2}(aq)+Ni(s)$ $Fe_{(s)}+Ni^{+2}(aq)$

C. Ni^{2+} is the weakest oxidizing agent

D. None of the above

64. Which of the following statements **<u>is true</u>** about the reaction: $N_2(g)+3H_{2(g)}$ $2NH_3(g)$ for which $Kp=1.7x10^{-3}$ at 600k and $Kp=7.8x10^{-5}$ at 700k
    A. More nitrogen will be reacted at 700k than at 600k.
    B. More ammonia will be formed at 600k than at 700k.
    C. The reaction lies more farther to the right at 700k than at 600k.

D. The position of the equilibrium remains the same at 700k and 600k.

65. In the zinc-carbon dry cell the electrolyte contains

A. 30%H_2SO_4 solution by mass
C. KOH solution
B. Paste NH_4Cl
D. Molten NaCl

66. Which of the following statements is **correctly** describe a system for which Q_C is larger than K_C?

A. The reaction can never reach equilibrium.
B. The reaction is at equilibrium.
C. The reaction must shift to the left to reach equilibrium.
D. The reaction must shift to the right to reach equilibrium.

67. The chemical formula of chalcosite mineral is:

A. Ag_2S B. FeS_2 C. CU_2S D. HgS

68. Which equation is **correctly** describe the relationship between K_p and K_c for the following reaction?

$Br_2(g)+3Cl_2(g)$ $2BrCl_3(g)$

A. $K_P=K_cx(RT)^2$
C. $K_P=K_cx(RT)$
B. $K_P=K_c\ x(RT)^{-1}$
D. $K_P=K_cx(RT)^{-2}$

69. regarding the recycling of elements in nature which of the following statement is **correct**?

A. Nitrogen fixing bacteria convert atmospheric nitrogen gas into nitrate ion.
B. Unlike nitrogen and carbon, phosphorous is not found in atmosphere in the gaseous state.
C. Green plants convert atmospheric carbondioxide and water to glucose by endothermic reaction
D. All of the above

70. Which one of the following equilibrium reaction will shift to the left if the volume of the reaction Vessel is increased?

A. $2NO_{(g)}+¿Cl_{2(g)}$ $2NOCl_{(g)}$
C. $N_{2(g)}+¿0_2(g)$ $2NO_{(g)}$
B. $Ni(CO)_{4(S)}$ $Ni_{(S)}+4CO_{(g)}$
D. $2CO_{2(g)}$ $2CO_{(g)}+O_{2(g)}$

71. In Ostwald process of production of nitric acid, the catalyst used to convert ammonia to nitric oxide is

A. Finely divided iron metal.
C. Vanadium pentaoxide
B. Finely divided platinum metal
D. Manganese dioxide.

72. Considering the following reaction.

$C(s)+H_20(g)+131KJ \quad CO(g)+H_2(g)$

Which of the following is **true** about the effect on the reaction at equilibrium?

A. Adding more carbon does not affect the value of Kc.
B. Raising the temperature decreases the value of Kc.
C. Decreasing the volume of the reaction vessel favors the forward reaction.
D. Raising the reaction temperature shift the equilibrium to the right.

73. A process of refining a metal rod containing a few impurities by drawing through an an electrical heating coil is:

A. Distillation
C. Electrolysis
B. Zone refining
D. magnetic separation

74. The structure of ∝ - bromo-α−¿ methyl propanoicacid is

A. CH_3 - CH-C-0H (O; Br)
C. CH_2-C- C-OH (Br; H)
B. CH_3- C- C-OH (CH_3O; Br)
D. CH-CH_2-C-OH (CH_3; Br; O)

75. Which of the following **is not** a condensation polymer?

A. Nylon
C. Teflon
B. Polyester
D. Bakelite

76. Which of the following is not true regarding carboxylic acids?

A. The higher acids have sharp irritating odour due to their high volatility.

B. Solubility of carboxylic acids decrease with increasing molecular mass.

C. Carboxylic acids have higher boiling points than alcohols of similar size.

D. The higher member carboxylic acids are waxy solids.

77. Vulcanized rubber is. A. Soft and stick C. oxidized readily

B. Has low tensile strength D. none of the above

78. All fats and oils are:

A. Acids C. Esters

B. Ketones D. Unsaturated hydro carbons

79. Of the following mono saccharides which one contain a ketone functional group in addition to alcohol functional group?

A. Fructose C. Galactose

B. Glucose D. Ribose

80. A type of protein which promotes the breakdown of starch to simple sugar glucose is:

A. Keratin C. Amylase

B. Feritin D. insulin