DEPARTMENT OF CHEMISTRY UNIVERSITY OF CALABAR CHEMISTRY PAST QUESTIONS COMBINITION 1995-2020

1. In a measurement significant figures include
a) All digits except zero that are measured
b) All digits except zero that are not measured
c) All zeros at the beginning of a number
d) All digits in a number

2. The numbers 0.027500 has how many significant figures
a) 2
b) 3
c) 5
d) 6

3. Which of the following is FALSE about electrolytic conduction?
a) The simultaneous migration of ions in opposite directions constitute electrolytic current
b) Electrolytic conduction is affected by temperature
c) Cations migrate towards the negative electrode
d) Electrons are the carriers of electric current

4. Which of the following is true about a galvanic cell?
a) Oxidation occurs at the anode
b) Reduction occurs at the anode
c) Electric potential flows through the cell from anode to the cathode
d) Salt bridge neutralizes the effects of oxidation in galvanic cell.

5. The constant for the equilibrium establishes between a slightly soluble salt and its ions in solution is described as
a) Equilibrium constant
b) Solubility product constant
c) Chemical constant
d) Acidic constant

6. In what concept is the relative strength of an acid defined as its relative tendency to lose/donate a proton to water
a) Bronsted-Lowry
b) Arrhenius
c) Lewis
d) Einstein

7. The reaction $H_2 + I_2 \rightleftharpoons 2HI$ is at equilibrium at 298K. One mole of N_2 gas is introduced in the reaction chamber at constant temperature and constant volume. At this:
a) State of equilibrium will remain unaffected
b) More of HI will be obtained
c) Equilibrium constant will change
d) More of HI dissociate

8. If equilibrium constant for the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ at 298K is 2.54, the value of equilibrium constant for the reaction $\frac{1}{2} N_2 + \frac{3}{2} H_2 \rightleftharpoons NH_3$ will be
a) 0.395
b) 5.08
c) 3.18
d) 1.59

9. The equilibrium constant for the reaction $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$ at 523K is 0.04. If the value of R = 8.314JK^{-1}, then ΔG^o for the reaction will be
a) +0.13KJ
b) +5KJ
c) +13.9KJ
d) -13.9KJ

10. A mixture of noble gases consisting of 5.50g He and 15.0g Neon was placed in a cylinder at 1atm pressure, what is the partial pressure of Helium in the mixture [He = 4.0g; Ne = 20.0g]
a) 0.157atm
b) 0.53atm
c) 0.65atm
d) 0.75atm

11. It has been shown that gases exhibit marked deviation from ideal behaviour especially at
a) High pressure and temperature
b) Low pressure and temperature
c) High pressure and low temperature
d) Low pressure and high temperature

12. Assuming that a gas X is an ideal gas, if 22.4g of X occupies 11.2dm³, at s.t.p how many moles of X are in the system
a) 0.5 moles
b) 2.0 moles
c) 44.8moles
d) none of the above
(GMV = 22.4dm³)

13. The first law of thermodynamics can be written mathematically as
a) $\Delta U = q + w$
b) $\Delta U = q - w$
c) $q = \Delta U - H$
d) $W = q + \Delta U$

14. The thermodynamics parameters that does not change in unique manner for spontaneous reactions is __?
a) Entropy
b) Internal energy
c) Gibbs free energy
d) Enthalpy

15. The quantity of heat which must be supplied to decompose a compound is equal to the heat evolved when the compound is formed. This is the ____ law?
a) Laplace
b) Hess
c) 1st law of thermodynamics
d) 2nd law of thermodynamics

16. A solid body which absorbs and emits all the frequencies of the electromagnetic radiation (from radio – frequency to gamma ray region) is called
a) White body
b) Black body
c) Red body
d) Radiating body

17. The emission of electrons from the surface of a metal when the metal is irradiated by UV-light gives rise to
a) Photo electric effect
b) Compton effect
c) Zeeman effect
d) Stark effect

18. A metal surface with an energy of 2.0eV interacts with blue light with wavelength of 400nm. Calculate the kinetic energy of the photoelectrons given that
1eV = 1.602×10^{-19}J,
h= 6.626×10^{-39}J,
C= 2.998×10^{8}m/s
a) 3.1eV
b) 1.1eV
c) 2.25eV
d) 1.77eV

19. The discovery of radioactivity is credited to
a) Henry Becquerel
b) Evangelistica Torricelli
c) Joseph Priestly
d) John Dalton

20. When iodine fumes cools and becomes iodine solid directly, the process is called?
a) Sublimation
b) decomposition
c) solidification
d) fusion

21. One of these is an extensive property of matter
a) Density
b) melting point
c) Thermal conductivity
d) mass

22. _____ was the first to observe the positive charged rays which were called?
a) Eugen Goldstein & Canal rays
b) Perrin & Cathode rays
c) James Chadwick & canal rays
d) J. J. Thompson & Protons

23. _____is the experiment that proved the existence of electrons
a) Rutherford's gold then foil experiment
b) Milikan oil drop experiment
c) Crooke's cathode ray tube experiment
d) Chadwick's nuclear reaction experiment

24. Give the standard notation for electron
a) 11e
b) 01e
c) 0+1e
d) 10e

25. _____is the process that leads to the transformation of one set of a chemical substance to a new one
a) Activity series
b) Chemical reaction
c) electrochemical series
d) Spectrochemical series

26. A type of chemical reaction in which the same compound is simultaneously reduced and oxidized is known as
a) Combination reaction

b) Disproportionation reaction
c) Single displacement
d) Double displacement

27. The oxidation number of hydrogen in LiH is
a) -1
b) +1
c) 1
d) +2

28. One of these is the major cause of periodicity
a) Electronic configuration
b) Ionization energy
c) Metallic character
d) Electron affinity

29. The modern periodic classification is based on
a) Atomic weight
b) Melting point
c) Atomic number
d) Isotopy

30. One of these is not a device for measuring nuclear reaction
a) Smoke detector
b) Geiger counter
c) Scintillation counter
d) Semiconductor detector

31. The relative loss in the mass of any given atom can be accounted for by
a) Mass number
b) Binding energy
c) Nuclear reaction
d) Alpha particle

32. Which of these will determine nuclear reaction in any given atom
a) n/p ratio
b) mass number
c) bombardment
d) all of the above

33. The unit of third order rate constant is
a) mol l^{-1} s^{-1}
b) mol^{-2} l^2 s^{-1}
c) $mol^{-1}l^{-1}$ s
d) none of the above

34. Rotation of physical light is
a) Chemical method
b) Physical method
c) All of the above
d) None of the above

35. The rate equation, $[A] = [A]_o e^{-kt}$ represents
a) Zero order reaction
b) First order reaction
c) None of the above
d) Second order reaction

36. Which of these is not true of oxidation number?
(a) oxidation numbers have no exact physical meaning
(b) all elements in the periodic table have more than oxidation number
(c) oxidation number help keep tract of electrons in chemical reaction
(d) oxidation numbers can be assigned to each atom in a molecule or ionic compound according to specific set of rule

37. Electrovalent bonds are formed between
(a) a metal and a non-metal
(b) two metals
(c) two non-metals
(d) all of the above

38. In general, the increase in the rate of reaction is due to the
(a) Decrease in temperature
(b) increase in fraction of molecule with sufficient energy
(c) Decrease in ΔG
(d) Decrease in ΔS

39. The effect of changes on equilibrium position can be quantitatively analyzed by applying
(a) Law of mass action
(b) Law of conservation of mass
(c) Le Chartelier's principle
(d) Dalton's atomic theory

40. Vapour pressure of solid increases with increase in
(a) Temperature
(b) Concentration
(c) Boiling
(d) Melting Point

41. A nuclei located above the stability belt must undergo _____ to achieve stability
(a) positron emission and electron capture
(b) Neutron capture and beta emission
(c) Beta emission only
(d) Positron emission only

42. A chemical bond is _____
(a) Force of attraction existing between two atoms
(b) Force of attraction within an atom
(c) Force of repulsion within an atom
(d) All of the above

From the questions below, select the appropriate answer from the following gas laws; (a) Charles (b) Gay Lussacs (c) Boyles (d) Avogadro

43. In which of the gas laws do you have an inverse relationship between volume and pressure

44. In which of the gas laws is volume directly proportional to the number of moles?

45. In which of the gas laws, is condition of constant pressure applied?

46. The factors affecting the state of equilibrium exclude
(a) catalyst
(b) concentration
(c) temperature
(d) pressure

47. Which of these is not a measureable property of matter
(a) volume
(b) mass
(c) density
(d) alloys

48. Some transition metal reacts with hot water or steam to produce_____
(a) element
(b) compound
(c) an oxide
(d) water gas

49. Any material which is composed of more than one substance physically combine together is called
(a) mixture
(b) solution
(c) mater
(d) element

50. Which is not a redox reaction?
(a) $2FeCl_2 + Cl_2 \longrightarrow 2FeCl_3$
(b) $Zn + 2Hcl \longrightarrow ZnCl_2 + H_2$
(c) $CuO + H_2 \longrightarrow Cu + H_2O$
(d) $Ca^{2+} + 2F^- \longrightarrow ZnCl_2 - CaF_2$

51. The radioactive K-40 isotopes decays to Ar-40 with a half-life of 1.2×10^9 years. Calculate the age of a sample of moon rock found to contain 16%K-40 and 84% Ar by mass
(a) 2.87×10^9 years
(b) 2.97×10^9 years
(c) 3.17×10^9 years
(d) 3.01×10^9 years

52. Usually a catalyst increases the rate of reaction by providing a reaction pathway with
(a) Lower activation energy
(b) Higher activation Energy
(c) constant activation energy
(d) none of the above

53. The factors that utter the state of equilibrium are
(a) concentration, pressure and temperature
(b) concentration, volume and temperature
(c) pressure, catalyst and volume
(d) catalyst, volume and temperature

54. One of these is not true
(a) ΔG cannot be changed by a catalyst
(b) a catalyst cannot modify the equilibrium of reaction
(c) a catalyst cannot initiate a reaction
(d) a catalyst cannot change the activation energy of a reaction between none gaseous reactant

55. Calculate the nuclear binding energy in Joules and the binding energy per nucleon of the $1735Cl$ isotope. (Atomic mass = 34.95952)
(a) 35.288995amu
(b) 38.544885amu
(c) 40.288995amu
(d) 36.34amu

56. How many hours will it take to produce 25.0g of chromium from a solution of $CrCl_3$ by a current of 2.75A.
(a) 15.5hrs
(b) 13.4hrs
(c) 14.06hrs
(d) 9.2hrs

57. Water has high boiling point because of
(a) the present of oxygen atoms
(b) it is a universal solvent
(c) the present of hydrogen bonding between its molecules
(d) none of the above

58. One of these is not a factor affecting solubility
(a) Nature of the solute and solvent
(b) temperature
(c) pressure
(d) catalyst

59. The expression $\frac{moleofasolute}{kilogramofsolvent}$ is
(a) Molality
(b) molarity
(c) density
(d) Entropy change

60. The principal quantum number "n" determines
(a) the spin orientation of an electron
(b) the size of the orbital and energy of the electron
(c) the shape of the orbital
(d) none of the above

61. When n = 4, l = 3, M_1=3. Which atomic orbital is represented?
(a) 4s
(b) 4p
(c) 4d
(d) 4f

62. How many moles are contained in 74g of Mg $(NO_3)_2$.
(a) 1.5mol
(b) 0.5mol
(c) 2mol
(d) 2.5mol

63. The tendency of atoms to accept or share electrons to attain the electronic configuration of noble gases.
(a) ionization energy
(b) electron affinity
(c) coordinate bond
(d) electronegativity

64. The splitting of a large nucleus into two smaller nuclei including neutrons is
(a) radioactivity
(b) nuclear fission
(c) nuclear fusion
(d) nuclear transmutation

65. Beta emission involves
(a) the emission of a positron from the decaying
(b) the emission of a photon with a single wavelength from an excited nucleus
(c) the emission of a high speed electron from the decaying nucleus
(d) the emission of a $24H$ nuclide from the decaying nucleus

66. In an electrolytic cell, reduction process occurs at the_____ while oxidation occurs at the _____ respectively
(a) Anode and Cathode
(b) cathode and electrode
(c) compound and Electrolyte
(d) cathode and anode

67. The net chemical change that takes place in an electrolytic cell is called
(a) chemical reaction
(b) nuclear reaction
(c) oxidation reaction
(d) cell reaction

68. Deuterium is regarded as _____
(a) Heavy water
(b) Light water
(c) water gas
(d) Brine

69. Which of these isotopes of hydrogen is radioactive in nature?
(a) proton
(b) deuterium
(c) tritium
(d) all of the above

70. Fluorides is added to water to prevent_____ particularly amongst children
(a) bone cancer
(b) blindness
(c) skin cancer
(d) tooth decay

71. What is the radius of the first Bohr's orbit (r_1)
a) 0.5292Å
b) 1.0584Å
c) 2.1168Å
d) 4.7628Å

72. Which of the following is not a wave parameter?
a) Wavelength
b) Frequency
c) Wave number
d) Photons

73. The space around the nucleus with the highest probability (>95%) of locating an electron is called
a) Orbital
b) Wave function
c) Electron density
d) Quantum number

74. The mathematical expression of de-Broglie hypothesis is
a) $\lambda = \frac{h}{mv}$
b) $\lambda = {}^{c}/_{v}$
c) $mvr = \frac{nh}{2\pi}$
d) $\Delta x.\Delta p \geq \frac{h}{4\pi}$

75. What atomic orbitals are represented by the following combinations of quantum number? (i) n=4, l=3 and m_i=3,
(ii) n=2, l=0 and m_i=0
a) (i) =4f, (ii)=2s
b) (i)=4d, (ii)=2p
c) (i)=4s, (ii)=2f
d) (i)=4p, (ii)=2s

76. Correction of errors in chemical analysis involve all except:
a) Analysis of standard samples
b) Independent or parallel analysis
c) Blank determination
d) Standard deviation

77. Failure to distinguish between two shades of colour is ____type of error?
a) Random
b) Systematic
c) Indeterminate
d) None of the above

78. Suppose the true value of chloride content of sample is 24.36mg and the observed value is 24.27mg. Calculate the absolute error?
a) -0.009mg
b) 0.09mg
c) -0.09mg
d) +0.009mg

79. _____is referred to as the process where reactants are transferred into products
a) Reactants
b) Limiting reactants
c) Products
d) Chemical reactions

80. Electrochemistry is the branch of chemistry that studies the relationship between
a) Potential and gravitational energies
b) Chemical and gravitational energies
c) Electrical and kinetic energies
d) Kinetic and potential energies

81. Electrochemistry seeks to explain the following ___of electrochemical reactions except?
a) The kinetics
b) The thermodynamics
c) The mechanism
d) The electrification

82. Solutions that contain ions and therefore conduct electricity are known as
a) Salt solution
b) Electrolytes
c) Aqueous solutions
d) Electrolyte solutions

83. What is cell notation for the cell reaction, $Zn_{(s)} + Cu^{2+}{}_{(aq)} \rightleftharpoons Zn^{2+}{}_{(aq)} + Cu_{(s)}$ given that the reduction of copper is the cathode
a) $Zn_{(s)}/Cu^{2+}{}_{(aq)}// Zn^{2+}{}_{(aq)}/Cu_{(s)}$
b) $Zn^{2+}{}_{(aq)}/Cu_{(s)}// Zn_{(s)}/Cu^{2+}{}_{(aq)}$
c) $Zn_{(s)}/Zn^{2+}{}_{(aq)}// Cu^{2+}{}_{(aq)}/ Cu_{(s)}$
d) $Cu^{2+}{}_{(aq)}/ Cu_{(s)}// Zn_{(s)}/Zn^{2+}{}_{(aq)}$

84. Which of the following is not part of Dalton's atomic theory?
a) Matter is made up of tiny particles called atoms
b) During a chemical reaction, atoms are rearranged
c) During a nuclear reaction, atoms split apart
d) All atoms of a specific element are the same

85. Atoms is:
a) The smallest particle in the nucleus
b) The major component of an acid
c) The basic building block of matter
d) A particle not larger than the proton

86. The nucleus of an atom contains
a) Clouds of gases and many other substances
b) Neutrons and protons
c) Electrons and protons

d) Protons and similar other particles

87. A process that occurs without exchange of heat is called
a) Isothermal process
b) Isobaric process
c) Adiabatic process
d) Isochoric process

88. The properties of a system which depend on the total quantity of matter is _____
a) Extensive
b) Open system
c) Closed system
d) Intensive

89. One of these is not a state function
a) Internal energy
b) Temperature
c) Enthalpy
d) Entropy

90. In the equation $aA + bB \rightarrow products$, the rate is given as Rate = $[A]^x[B]^y$. The order of the reaction is
a) $ax + by$
b) a+b
c) x+y
d) $ax \times by$

91. What is cell notation for the cell reaction, $Zn_{(s)} + Cu^{2+}{}_{(aq)} \rightleftharpoons Zn^{2+}{}_{(aq)} + Cu_{(s)}$ given that the reduction of copper is the cathode
a) $Zn_{(s)}/Cu^{2+}{}_{(aq)}// Zn^{2+}{}_{(aq)}/Cu_{(s)}$
b) $Zn^{2+}{}_{(aq)}/Cu_{(s)}// Zn_{(s)}/Cu^{2+}{}_{(aq)}$
c) $Zn_{(s)}/Zn^{2+}{}_{(aq)}// Cu^{2+}{}_{(aq)}/ Cu_{(s)}$
d) $Cu^{2+}{}_{(aq)}/ Cu_{(s)}// Zn_{(s)}/Zn^{2+}{}_{(aq)}$

92. Which of the following is not part of Dalton's atomic theory?
a) Matter is made up of tiny particles called atoms
b) During a chemical reaction, atoms are rearranged
c) During a nuclear reaction, atoms split apart
d) All atoms of a specific element are the same

93. In a chemical reaction, a catalyst increases the rate of a reaction by
a) Lowering the activation energy
b) Increasing the activation energy
c) Increasing the free energy
d) None of the above

94. Determine the oxidation state of manganese in MnO_4^-
a) +7
b) +4
c) +2
d) +3

95. What is the role of Sulphur in the reaction $K_2Cr_2O_7 + H_2O + 3s \rightarrow 3SO_2 + 4KOH + 2CrO_3$
a) Reducing agent
b) Oxidizing agent
c) Lewis acid
d) Lewis base

96. The product of combination of proton and an electron is _____
a) Nucleon
b) Neutron
c) Neutrino
d) Neurons

97. Given the reaction ${}^{A}_{Z}X \rightarrow {}^{A}_{Z-1}Y + V$, what is V?
a) Alpha
b) Beta
c) Gamma
d) Position

98. What is the primary emission after k-electron capture?
a) Alpha
b) Beta
c) Gamma
d) X-ray

99. The ideal gas law is exactly obeyed when
a) PV/nRT=0
b) PV/nRT=1
c) PV/nRT=>1
d) PV/nRT=<1

100. The pressure of 760mmHg is equivalent to
a) 76 torr
b) 1atm
c) 1pa
d) 1.8 pa

101. The body temperature of a student in the UNICAL Health Center was measured as 310.04k. What is the temperature in Fahrenheit.
a) 36.89°F
b) 32°F
c) 98.4°F
d) 100.4°F

102. A gas that perfectly obeys the laws of gases that show real dispersive tendencies is called
a) A perfect gas
b) A partial gas
c) An ideal gas
d) A real gas

103. Kc for the dissociation of water $H_2O \rightleftharpoons H_{2(g)} + {}^{1}/_{2}O_{2(g)}$ at 1000°C.
Given Kp=1.77x10^{-6}atm at R=0.0821Latm mol^{-1}k^{-1} is
a) 1.69x10^{-8}
b) 1.77x10^{-6}
c) 1.73x10^{-7}
d) 1.81x10^{-5}

104. The equilibrium constant expression for $CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(s)}$ is
a) [CaO]
b) $P(CO_2)$
c) $P(CaO)(CO_2)$
d) $\frac{[CO_2][CaO]}{[CaCO_3]}$

105. Kc for the reaction $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$ is 4.00 at 50°C. Calculate the equilibrium concentration of H_2O and CO_2 if the initial concentration of both reactants is 0.3M.
a) 0.1M and 0.3M
b) 0.1M and 0.2M
c) 0.2M and 0.1M
d) 0.3M and 0.2M

106. Water will react with carbon to form water gas if _____
(a) the reaction takes place in water
(b) carbon is present in the form of coke
(c) carbon is present in powdered form
(d) the reaction take place in a non-aqueous solvent

107. The minimum energy required by reactant to undergo reaction is called_____
(a) chemical energy
(b) activation energy
(c) solvation energy
(d) kinetic energy

108. A reaction is spontaneous when _____
(a) ΔH is negative, ΔS is positive, ΔG is negative
(b) ΔH is positive, ΔS is positive, ΔG is negative
(c) ΔH is negative, ΔS is negative, ΔG is negative
(d) ΔH is positive, ΔS is negative, ΔG is positive

109. The expression PV = nRT is called
(a) general gas law
(b) idea gas equation of state
(c) Daltons law
(d) Raoult's law

110. For chemical equilibrium to be attained, which of the following is true.
(a) reactants must be gasses
(b) products must be gasses
(c) products must decompose
(d) reaction must be reversible

111. Energy derived from attractive forces acting between molecule is called
(a) potential energy
(b) kinetic energy
(c) translational energy
(d) rotational energy

112. The unit of rate of reaction is _____
(a) *Mole LS^{-1}*
(b) *Mole L^{-1}S^{-1}*
(c) *Mole L^{2}S*
(d) *L Mole^{-1}Sec^{-1}*

113. _____ reduces the rate of chemical reaction of reducing the activation energy
(a) temperature
(b) pressure
(c) concentration
(d) catalyst

114. The mathematical expression for Boyle's law and Charles law
(a) $V \propto p1(TConst) \& V \propto T(PConst)$
(b) $V \propto T(PConst) \& V \propto p1(PConst)$
(c) $V \propto \frac{1}{p}(Tconst) \& V \propto \frac{\sqrt{1}}{T}$
(d) $V = T(PConst) \& V = T\ (PConst)$

115. The volume of a gas is 500cm^3 at a temperature of 27°C. Find its temperature in K, when the volume is suddenly increased to 1000cm^3 pressure remaining constant.
(a) 700K
(b) 690K
(c) 600K
(d) 750K

116. Hydrogen chloride is formed by _____
(a) metallic bonding
(b) covalent bond
(c) coordinate bonding
(d) ionic bonding

117. Ionic bonds are formed between _____
(a) metals and non-metals
(b) two metallic atoms

(c) two non-metals atoms
(d) all of the above

118. Ionic compounds _____
(a) are very soluble in organic compound
(b) are non-soluble in water
(c) have high melting and boiling point
(d) all of the above

119. The following statements describe isotopes of elements except _____
(a) the atoms are exactly alike
(b) the atoms are atoms of same element
(c) they have the same chemical properties
(d) they have the same number of protons

120. A chemical equilibrium can only be achieved in closed system
(a) true
(b) false
(c) all of the above
(d) none of the above

121. A chemical bond is _____
(a) force of attraction existing between two atoms
(b) force of attraction within an atom
(c) force of repulsion within an atom
(d) none of the above

122. _____ molecules have the highest kinetic energy
(a) gaseous
(b) liquid
(c) solid
(d) water

123. Water has high boiling point because _____
(a) it is an ionic compound
(b) the presence of hydrogen bonding between the molecules
(C)
(d) it is formed through metallic bonding

124. According the law of mass action, the rate of chemical reaction is proportional to the product of _____
(a) the reactant
(b) concentration of the reactant
(c) the concentration of the product
(d) none of the above

125. The passage of current 0.2A for 25min deposited 0.36g of copper from a $CuSO_4$ solution. Calculate the molar mass of copper
(a) 63.5g
(b) 60.3g
(c) 61.76g
(d) 62.3g

126. Chemical reactions are accompanied by energy changes
(a) false
(b) true
(c) none of the above
(d) sometimes

127. A certain volume of hydrogen gas was collected over water at 6^0C exerted a pressure 76.5mmHg. what is the partial pressure of hydrogen gas at 6^0C if the saturated vapour pressure of water (SVP) at 6^0C is 7mmHg?
(a) 755mmHg
(b) 758mmHg
(c) 765mmHg
(d) 750mmHg

128. A certain amount of gas occupies $5.0dm^3$ at 2 atm and 10^0C. calculate the number of moles of the present (Take R = $0.082atmdm^3K^{-1}mol^{-1}$)
(a) 0.6mols
(b) 0.56mols
(c) 0.43mols
(d) 0.80mols

129. All the following atomic particles are nuleons except _____
(a) electron
(b) proton
(c) neutron
(d) positron

130. Oxidation is a process involving _____
(a) loss of electrons
(b) gain of electron
(c) loss of protons
(d) gain of protons

131. The three fundamental particles of an atom are _____
(a) protons, neutrons and electrons
(b) alpha, beta and gamma
(c) protons, neutrino and mesons
(d) electrons, antineutrino and neutrons

132. The physical combination of two or more substances with properties relate to those of other components but without definite composition is called
(a) mixture
(b) compound
(c) molecule
(d) substance

133. Cl-35 and Cl-37 are the only naturally occurring chlorine isotopes. The percentage distribution which accounts or the atomic weight of 35.5 is
(a) Cl-35 = 75% and Cl-37=25%
(b) Cl-35 = 65% and Cl-37=35%
(c) Cl-35 = 85% and Cl-37=15%
(d) Cl-35 = 40% and Cl-37=50%

134. 10g is exploded with 100g of 0_2 forming $Si0_2$. How many grams of $Si0_2$ are formed?
(a) 24.1g
(b) 88.6g
(c) 011.4g
(d) 100g

135. Electrolytic conduction is made possible by the disassociation of the electrolyte into ____
(a) solution
(b) crystal
(c) ions
(d) all of the above

136. In the electrolysis of aqueous Na^+Cl^- solution _____ is liberated at the anode.
(a) sodium
(b) water
(c) chlorine
(d) oxygen

137. If the value of the azimuthal (l) quantum number is 3. The permitted values of the magnetic quantum number m are ____
(a) +3, +2, +1, 0, -1, -2, -3
(b) +1, +1, 0,-1, -2
(c) +1, 0, -1
(d) 7

138. The Latin name from which the symbol of the chemical element sodium is derived from is
(a) Natrium
(b) Na
(c) Kalium
(d) Aurium

139. Atom of element undergo bonding in order to_____
(a) attainoctate and duplet state
(b) form compound
(c) undergo reaction
(d) none of the above

140. _____ is an example of intensive properties
(a) mass
(b) volume
(c) density
(d) pressure

141. If the half-life of $^{27}_{12}Mg$ is 9.50min, calculate the decay constant.
a) 0.729 min^{-1}
b) 0.0729 min^{-1}
c) 0.729s
d) 0.729day^{-1}

142. Identify X in the following nuclear equation
$^{235}_{92}U + ^{1}_{0}n \rightarrow ^{99}_{40}Zr + ^{135}_{52}Sr + 2X$
a) $^{0}_{-1}e$
b) $^{0}_{1}e$
c) $^{1}_{0}n$
d) $^{4}_{2}He$

143. The units of the rate of reaction is
a) mol l^{-1} S^{-1}
b) mol lS^{-1}
c) mol^{-1} lS
d) None of the above

144. The particulate level of matter is in the range
a) $1 \times 10^{0} - 1 \times 10^{-3}m$
b) $1 \times 10^{-4} - 1 \times 10^{-6}m$
c) $1 \times 10^{-7} - 1 \times 10^{-12}m$
d) None of the above

145. The values of the shielding constant (s) and the effective nuclear charge (Z*) for the 3d electron in copper (Cu) are respectively _____and _____?
a) S = 21.15 Z* = 7.85
b) S = 31.15 Z* = 6.15
c) S = 7.85 Z* = 21.15
d) S = 11.15 Z* = 6.15

146. The number of lone pairs and bond pairs of electrons on oxygen atom in a molecule of water are _____and _____are respectively
a) 1, 2
b) 2, 1
c) 2,2
d) 3,3

147. What is the correct significant figure in the number 8000.0
a) 1
b) 4
c) 5

d) none of the above

148. The mathematical expression of the first law of thermodynamics are_____
a) $\Delta U = q + w$
b) $q = \Delta U - w$
c) $\Delta U = q + P\Delta U$
d) *Allof theabove*

149. The two thermodynamics functions obtained from the first law of thermodynamics are _____and _____
a) Enthalpy and entropy
b) Internal energy and enthalpy
c) Gibbs free energy and entropy
d) None of the above

150. One of these is not a reliable criteria for determining the spontaneity of a reaction
a) Internal energy
b) Entropy
c) Gibbs free energy
d) Enthalpy

151. Arrange the following in order of increasing ionic radii
Mg^{2+}, Al^{3+} and Na^{+}
a) $Al^{3+} < Mg^{2+} < Na^{+}$
b) $Al^{3+} < Na^{+} < Mg^{2+}$
c) $Na^{+} < Mg^{2+} < Al^{3+}$
d) $Mg^{2+} < Al^{3+} < Na^{+}$

152. Which of the following is FALSE about a salt bridge in a galvanic cell?
a) It separates the two compartments
b) It allows migration of ions that maintains the electrical neutrality of the solution
c) It contains solutions whose ions will not react with other ions in the cell
d) It allows immigration of electrons that maintains ionic in neutrality of the solution

153. The law that states that mass of gas at constant temperature and pressure is
a) Boyles law
b) Gay-Lussac's law
c) Avogadro's law
d) None of the above

154. Assuming that a gas X is an ideal gas, if 22.4g of X occupies $11.2dm^3$ at s.t.p. how many moles of X are in the system?
a) 0.5moles
b) 5.0moles
c) 2.0moles
d) 0.2moles

155. A $10dm^3$ flask contains CH_4, H_2 and N_2 in the ratio 0.2:0.3:0.4moles respectively at 25°C. What is the partial pressure of hydrogen gas in the mixture in atm
(R=$0.0821dm^3atm/mol/k$)
a) 0.489atm
b) 0.979atm
c) 2.20atm
d) 0.734atm

156. Which statement is true?
a) Decreased volume drives the reaction in the direction of fewer number of molecules
b) A rise in temperature of an exothermic reaction favours the formation of product
c) Increasing the concentration of the reactants shifts the equilibrium position to the left
d) A catalyst only enhances the rate of the forward reaction

157. In a spontaneous reaction, K is
a) Small
b) Large
c) Constant
d) Dynamic

158. A very large value of equilibrium constant indicates that:
a) The equilibrium is affected by temperature
b) The equilibrium lies much to the left
c) The reaction proceeds far toward completion
d) $\Delta G^{\circ} > 0$ for the equilibrium mixture

159. Calculate the energy change per mole of an electron undergoing transition from level n=2 to level n=1
(Given that h=6.626×10^{-34}Js,
$N_A = 6.023 \times 10^{23}$)
a) $984.2KJmol^{-1}$
b) $163.4\ KJmol^{-1}$
c) $246.6\ KJmol^{-1}$
d) $121.5\ KJmol^{-1}$

160. A first order reaction is 50% completed in 1.26×10^{14}s. How much time would it take for 100% completion?
a) 2.52×10^{28}s
b) 1.26×10^{7}s
c) 1.33×10^{15}s
d) Infinite

161. What is the order of reaction whose rate constant has the same unit as the rate of reaction?
a) First order

b) Zero order
c) Second order
d) None of the above

162. The role of a catalyst is to change
a) Gibbs free energy of reaction
b) Enthalpy of reaction
c) Activation energy of reaction
d) Equilibrium constant of reaction

163. The result of an analysis has a mean value of 20.27g with standard deviation of 0.012g. Calculate the coefficient of variation (CV).
a) 0.59g
b) 0.059g
c) 0.95g
d) None of the above

164. Which of the following under-listed parameters is not used in expressing precision?
a) Range
b) Variance
c) Chi-square
d) Standard deviation

165. In an electrolytic cell, the positive ions migrate towards the _____while the negative ions migrate towards the _____
a) i=cathode, ii=Anode
b) i=Anode, ii=cathode
c) i=Electrode, ii=cathode
d) i=Anode, ii=Electrode

166. Which of the following equations does not define molar conductivity?
a) $m = \frac{dU_m}{RA}$
b) $m = \frac{k}{c}$
c) $m = kV_m$
d) $m = \frac{lc}{RA}$

167. The chemical interaction where two or more simple chemical species combine to yield complex species is known as?
a) Analysis
b) Catalysis
c) Polymerization
d) Synthesis

168. The fundamental products of neutralization reaction is/are?
a) Salt
b) Acid and base
c) Salt and water
d) Base

169. _____reaction will occur when $[A^+][B^-] > K_{sp}$ of AB
a) Electrovalent
b) Crystallization
c) Precipitation
d) Neutralization

170. Rutherford's alpha scattering experiment led to the postulation of
a) The plum-pudding model of the atom
b) The nuclear model of the atom
c) Existence of electrons
d) Existence of orbitals

171. A pure substance
a) Has a sharp melting and boiling point
b) Is heterogeneous
c) Is chemogeneous
d) All of the above

172. Which of these statements is/are not correct concerning Bohr's postulate
a) The electron has a definite energy characteristics of the orbit in which it is moving
b) When the electron moves in the same orbit, it does no change its energy
c) The electron can take all the possible orbits
d) The electron exist only in certain spherical orbits called shells or energy levels

173. The mathematical expression of de-Broglie hypothesis is
a) $\lambda = \frac{h}{mV}$
b) $\lambda = {}^{c}/_{v}$
c) $mvr = \frac{nh}{2\pi}$
d) $\Delta x . \Delta p \geq \frac{h}{4\pi}$

174. The phenomenon of removal of electrons from the surface of a metal when irradiated by UV light is called?
a) Photoelectric effect
b) Zeeman effect
c) Compton effect
d) Stark effect

175. What atomic orbitals are represented by the following combinations of quantum numbers. (i) n=4, l=3 and m_l=3, (ii) n=2, l=0 and m_l=0
a) (i) =4f, (ii)=2s
b) (i)=4d, (ii)=2p
c) (i)=4s, (ii)=2f
d) (i)=4p, (ii)=2s

176. For first order reaction
(a) $t\frac{1}{2} \infty a_0$
(b) $t\frac{1}{2} \infty a_0^2$
(c) $t\frac{1}{2} \infty \frac{1}{k_1}$
(d) none of the above

177. Which of the statement of Boyles law?
(a) $V \infty P$
(b) $V \infty \frac{1}{T}$
(c) $V \infty T$
(d) None of the above

178. The 4s orbital is filled before the 3d orbital, this follows
(a) Pauli's exclusion principle
(b) Hund's rules
(c) Aufbas principle
(d) Bohr's models

179. For a zero order reaction
(a) $t_{\frac{1}{2}} \infty a_o$
(b) $t_{\frac{1}{2}} \infty \frac{1}{a_o}$
(c) None of the above
(d) all of the above

180. Activation energy is
(a) always positive
(b) always negative
(c) can be positive or negative
(d) all of the above

181. Which of the following is a typical thermochemical equation?
(a) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$
(b) $2H_2O_{(g)} \rightarrow 2H_{2(g)} + O_{2(g)}$
(c) All of the above
(d) $2H_2O_{(g)} \rightarrow 2H_{2(g)} + O_{2(g)}$; $\Delta H = +xkj$

182. Which of the following is a characteristics of chemical equilibrium?
(a) the equilibrium state is a compromise between two opposing tendency
(b) chemical equilibrium is static
(c) a catalyst can alter the position of equilibrium
(d) attainment of equilibrium is not spontaneous

183. Which of the following represents the rate law?
(a) Rate $\infty \{A\}^x \{B\}^Y$
(b) Rate $\infty \{A\}^{x/y} \{B\}^{X/Y}$
(c) Rate = $K_{x+y} \{A\}^2 \{B\}^{Y/3}$
(d) None of the above

184. Universal gas constant R has value of _____
(a) 8.31kg
(b) 8.314J/mol
(c) 8.314J/mol/K
(d) None of the above

185. NaOH is a by-product in the electrolysis of _____
(a) Molten NaCl
(b) Aqueous NaCl
(c) Molten Na_2SO_4
(d) none of the above

186. Pick the odd one out
(a) molarity
(b) concentration
(c) specific gravity
(d) electron affinity

187. _____ is not an iron present in aqueous solution of KOH
(a) K^+
(b) OH^-
(c) H^-
(d) H_2O

188. A standard solution is a solution of _____
(a) pure salt
(b) high concentration
(c) known concentration
(d) known chemical species

189. _____ is not a component of an electrolytic cell
(a) electrode
(b) electrolyte solution
(c) salt bridge
(d) external circuit

190. Avogadro law state that
(a) $V \infty \frac{1}{n}$
(b) $V \infty n$
(c) $n \infty \frac{1}{v}$
(d) none of the above

191. The chemical formula of the compound oxygen is _____
(a) O_2
(b) O
(c) O^{2-}
(d) O^{2+}

192. The factors affecting the state of equilibrium exclude
(a) concentration

(b) catalyst
(c) temperature
(d) pressure

193. Arrhenius equation is
(a) $A = Ke^{-3t}$
(b) $A = Ke^{-e/t}$
(c) $A = e^{-k/r}$
(d) none of the above

194. What type of solution obeys Raoult's Law?
(a) concentration
(b) Real
(c) ideal
(d) perfect

195. The energy liberated when an election is added to neutral atom in a gaseous state is referred to as
(a) ionization energy
(b) electron affinity
(c) electronegativity
(d) electropositivity

196. Which of the following radiation can be emitted by the reaction $4399Tc \rightarrow 4399Tc$?
(a) $10n$
(b) $11H$
(c) $24H$
(d) $00Y$

197. The mathematic expression for Raoult's law is given as
(a) $P = P^oX$
(b) $\Delta P = PX$
(c) $\Delta P = P^oX$
(d) $P^o = PX$

198. Which type of nuclides are likely to decay by alpha emission?
(a) those with atomic number less than 83
(b) those with mass number less than 83
(c) those with atomic number greater than 83
(d)

199. The name of the philosopher that coined the word atom is _____
(a) Anaxogoras
(b) Pythagoras
(c) Aristotle
(d) Democritus

200. What is the basic/fundamental reason why atom react?
(a) to form ions
(b) to attain the configuration of inert gases
(c) to neutralized valency
(d) to generate enthalpy change

201. Which of these is not a solution?
(a) air
(b) sea
(c) water
(d) an alloy
(e) none of these

202. The unit of the first order rate constant is the ____
(a) $\frac{1}{2}$
(b) $\frac{1}{s^2}$
(c) $Mol\ L^{-1}s^{-1}$
(d) None of the above
(d) None of the above

203. Alpha particles may be described by
(a) proton
(b) hydrogen nucleus
(c)Helium nucleus
(d) halogen

204. The reaction; $AgNO_{3(aq)} + NaCl_{(aq)} \rightarrow AgCl_s + NaNo_{3(aq)}$ is commonly used in the lab to prove the validity of
(a) conservation of mass
(b) definite proportions
(c) multiple proportion
(d) reciprocal proportions

205. Which of the following does not define oxidation?
(a) loss of electron
(b) increase in oxidation number
(c) gain in electron
(d) addition of oxygen

206. Which of these is not a property of a compound formed, when a metal reacts with a non-metal?
(a) strong bond
(b) vandal Waals
(c) Good electrolyte
(d) solubility in polar solvent

207. The sixth electron of carbon occupies
(a) P_x orbital
(b) P_y-Orbital
(c) P_z-Orbital
(d) d_x Orbital

208. The oxidation number of elements in a free state is
(a) free
(b) zero
(c) one

(d) oxidation

209. _____ is formed by atoms off equal electronegativity
(a) coordinate bond
(b) polar covalent bond
(c) non-polar covalent bond
(d) electrostatic force

210. The existence of an element with the same atomic number but different mass number is referred to as
(a) element
(b) isotopy
(c) allotropy
(d) radioactivity

211. The wavelength λ in an atomic spectrum corresponds to a frequency ν by the equation_____

212. There are four types of atomic orbitals, list them?_____, _____, _____ and _____

213. Give the mathematical expression for the Kohlrausch's law of independent ionic mobility? _____

214. List the components of a Galvanic cell?_____, _____, _____ and _____

215. Two information which equilibrium constant provides us with are _____and _____

216. 0.10M H_2 and 0.10M I_2 was made to react in a flask at a certain temperature. At equilibrium the concentration of I_2 dropped to 0.01M. Calculate Kc for this reaction at this temperature?

217. A system may be classified using matter and energy interactions as _____, _____and _____

218. Volume and mass are _____ properties while density and temperature are _____ properties of a system

219. J.J. Thompson's expression for charge/mass ratio_____ and the force due to magnetic field is given as

220. Two main features of Rutherford's atomic model are _____and _____?

221. _____is the kinetic equation of state?

222. The numeric value of Avogadro's number is_____?

223. If ΔC is the change in concentration of the relevant substance during the time Δt, the rate of the reactant will be_____?

224. The unit of a termolecular rate constant is_____?

225. The energy required by an atom to accept electron(s) is called _____and the resultant species will be _____in size than the parent atom.

226. Solid particles formed as a solution cools is called _____while that formed when two solutions are mixed is known as_____?

227. The principal determinant of the stability of any nucleus is_____?

228. Complete the following equation:
$^{59}_{27}Co + {}^{1}_{0}n \rightarrow {}^{56}_{25}Mn + X$

229. The two types of errors encountered in chemical analysis are _____and ____

230. The scientific notation ∞ represents____?

231. The characteristics of atomic spectrum are
a) The spectrum is a line spectrum
b) The intensity of spectra lines decreases as frequency increases
c) The distances between two successive lines decreases as the frequency increases
d) All of the above

232. What is the maximum number of electrons in an orbital that has the following quantum, n = 2, l = 1
a) 2
b) 6
c) 10
d) 14

233. Which of the following factors does not influence the emf of a galvanic cell?
a) Type of reactions that occur at the electrode
b) Concentration of the reactant and products
c) Temperature of the system

d) Composition of the salt bridge

234. What is the molar conductivity of 1.0mol/dm³KCl solution at 25°C and 1atm if its conductivity at these conditions is 1.0Scm⁻¹?
a) 1.0Scm²mol⁻¹
b) 10.0Scm²mol⁻¹
c) 100.0Scm²mol⁻¹
d) 1000.0Scm²mol⁻¹

235. Chemical equilibrium
a) Only occurs in irreversible reactions
b) Is not static
c) Is established when the rates of the forward and backward reactions are equal at a non-constant temperature
d) Can be established more quickly in the presence and absence of a catalyst

236. Changes in _____will change the equilibrium concentration of reactants and products
a) Presence and temperature
b) Pressure and nature of catalyst
c) Temperature and concentration
d) Volume and concentration

237. A process in which there is no exchange of heat i.e. dq = 0 is called a/an
a) Isobaric process
b) Adiabatic process
c) Isochoric process
d) Adiachotic process

238. _____law states that the quantity of heat which must be supplied to decompose a compound in equal to the heat evolve when the compound is formed
a) Laplace
b) Hess
c) Thermodynamics
d) Kinetics

239. Heterogeneous and homogeneous mixtures can be exemplified by
a) Seawater and air
b) Smog and iron ore
c) Black and coffee
d) Smog and seawater

240. The nuclear change of an atom is the same as
a) Mass number/atomic number
b) Mass number/proton number
c) Atomic number/electron number
d) Proton number/electron number

241. R in the equation PV=nRT is known as
a) Proportionality constant
b) Gas constant
c) A and B
d) B only

242. If the atomic mass of helium is 4g and the molar mass of methane is 16g/mol. The ratio of the diffusion rate of helium to methane is
a) 2.0
b) 4.0
c) 0.5
d) None of the above

243. Which of the following statements is correct about first order reactions?
a) $t_{1/2} \propto \frac{0.693}{k}$
b) $t_{1/2} \propto \frac{0.369}{k}$
c) $t_{1/2} \propto \frac{0.22\ \ln 5}{k}$
d) None of the above

244. The rate law is expressed as
a) Rate $\times [A]^a[B]^b$
b) Rate $\times [A]^{x/2}[B]^{y/2}$
c) Rate $\times K_{x,y}[A]^x[B]^y$
d) None of the above

245. The reaction whereby there is increase in the oxidation state of the reacting species is known as _____reaction
a) Species
b) Oxidation
c) Reduction
d) Electrolytic

246. Which product of the reaction between a strong base and a strong acid makes the reaction a neutralization reaction?
a) Salt
b) Water
c) Salt and water
d) pH of 7

247. all radioactive decays obey _____ order kinetics?
a) First
b) Second
c) Third
d) Fourth

248. _____is the study of reactions involving changes in atomic nuclei
a) Electrochemistry
b) Physical chemistry

c) Inorganic chemistry
d) Nuclear chemistry

249. What is the correct significant figure in the number 0.0670?
a) 5
b) 4
c) 3
d) 2

250. The result of an analysis has a mean value of 24.27mg with standard deviation of 0.012mg. What is the relative standard deviation?
a) 4.50
b) 4.59
c) 4.94
d) 4.93

251. The option of this question paper is
(a) Uwah
(b) Okafor
(c) Ikpi
(d) Bassey

252. The oxidation number of phosphorous in $H_4P_2O_7$ is
(a) +1
(b) +3
(c) +5
(d) +10

253. Which is/are redox reaction(s)?
(i) $Cl_2 + 2OH^- \rightarrow Cl^- + ClO^- + H_2O$
(ii) $NH_3 + H^+ \rightarrow NH_4^+$
(iii) $2FeCl_2 + Cl_2 \rightarrow 2FeCl_3$
(a) i
(b) i and ii
(c) i and iii
(d) iii

254. Nuclei with------ numbers of nucleons are generally more stable than those with ------- numbers of nucleons
(a) odd, even
(b) even, odd
(c) large, small
(d) small, large

255. The development of the atomic bomb is an application of
(a) radioactivity
(b) thermal reactions
(c) nuclear fusion
(d) nuclear fission

256. The freezing point of a solution of 0.25g of benzoic acid in 100g of benzene was observed to be 5.232°C and that of pure benzene to be 5.478°C. What is the molecular weight of benzoic acid in the solution? $K_r = 4.90°c/m$
(a) 49.8g
(b) 2.5g
(c) 243.1g
(d) 0.1255g

257. The vapour pressure of a liquid always..... with temperature
(a) remains constant
(b) decreases
(c) increases
(d) evaporates

258. 405K in Celsius is ------
(a) -132°C
(b) 132°C
(c) 678°C
(d)-678°C

259. What is the volume of 2.5 moles of oxygen at S.T.P? [GMV = 22.4dm³]
(a) 80dm³ at STP
(b) 22.4 dm³ at STP
(c) 44.8 dm³ at STP
(d) 56.0 dm³ at STP

260. An endothermic reaction can occur spontaneously if the process leads to
(a) a more disordered state
(b) a more random state
(c) A and B
(d) none of the above

261. A reaction is spontaneous if.....
(a) $\Delta H = 0$
(b) ΔH = negative
(c) ΔH = positive
(d) none of the above

262. Which of the following factors does not affect the rate of a chemical reaction?
(a) concentration of reactants
(b) temperature
(c) surface area of contact
(d) pressure

263. When the rate of a reaction is independent of the concentration of a particular reactant, the reaction is said to be
(a) zero order
(b) first order
(c) half order
(d) none of the above

264. One of these is not true
(a) ΔG cannot be changed by a catalyst
(b) a catalyst cannot modify the equilibrium of a reaction
(c) a catalyst cannot initiate a reaction
(d) a catalyst cannot change the activation energy of a reaction between non gaseous reactants

265. Choice of suitable electrode depends on
(a) chemical reactivity between the electrode and the electrolyte
(b) chemical reactivity between the anode and the cathode
(c) the power of the source of electricity
(d) the state of the electrolyte

266. In an electrolytic cell, the electrode that attracts an anion is called
(a) an electrode
(b) a cathode
(c) an anode
(d) an oxidation reaction

267. The source of electricity in an electrolysis circuit is
(a) the electrolyte
(b) the electrode
(c) the battery
(d) The electrolyte solution

268. The products of the electrolysis of aqueous NaCl solution are
(a) Na and Cl_2
(b) Na_2 and Cl_2 and H_2
(c) Cl_2 and H_2
(d) Cl_2, H_2 and HCl

269. The factors that alters the state of equilibrium are
(a) concentration, pressure, temperature
(b) concentration, volume, temperature
(c) pressure, catalyst, volume
(d) catalyst, volume, temperature

270. In the decomposition of $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$; the reaction will attain dynamic equilibrium only
(a) when the reaction is in an open system
(b) when the reaction is in a closed system
(c) when the reaction is catalyzed
(d) when the reaction is heated strongly

271. A substitute that dissolves in a solvent to form a solution is called a ---------
(a) solvent
(b) solution
(c) solute
(d) solid

272. Water has a bond angle of------
(a) $104^0\ 50^l$
(b) 96nm
(c) $105^0\ 40^l$
(d) normal angle

273. Transition metals react with hot water to form—
(a)Hydroxides
(b) oxides
(c) super oxides
(d) peroxides

274. The weak force of attraction arising from the momentary imbalance in the charge distribution preparation is called
(a) metallic bond
(b) van der waals forces
(c) hydrogen bond
(d) electrovalent bond

275. A bond which involves unequal sharing of electrons between participating atoms is called—
(a) ionic bond
(b) covalent bond
(c) dative bond
(d) hydrogen bond

276. A -------- solution contains more of a solute than is contained in the saturated solution
(a) super saturated
(b) saturated
(c) unsaturated
(d) standard

277. Carbon reacts with steam when it is white hot to form----------

278. One of these is not a property of the gaseous state
(a) volume is variable
(b) particles are far apart from one another
(c) particles only vibrate in place
(d) takes the shape of the container

279. One of these is not a pure substances
(a) elements
(b) compounds
(c) sugar
(d) fog

280. The melting point of a substance is a--------
(a) physical property
(b) chemical property

(c) physical change
(d) physical change

281. During the process of deposition
(a) liquid changes to solid
(b) solid changes to gas
(c) gas changes to solid
(d) liquid changes to gas

282. The molecular formula of a nickel perchlorate is
(a) $NiClO_4$
(b) $Ni(ClO_4)_2$
(c) $NiCl_2$
(d) Ni_2ClO_4

283. Isotopes are atoms of the same elements with differing numbers of
(a) protons
(b) neutrons
(c) electrons
(d) charges

284. The alkali metals belong to------ of the periodic table
(a) main-group
(b) transition metals
(c) inner transition elements
(d) horizontal row or period

285. Amagat's law of partial volume is given at constant ___ and ____

286. How many significant figures does 0.02670 and 338.0 have? ____ and ____

287. Analysis of chloride content of a sample yielded the following results: mean ($\bar{x}$) 24.27mg and standard deviation 0.012mg. what is the relative standard deviation (RSD) _____and coefficient of variance (CV)?

288. The rate law statement is _____?

289. The order of a chemical reaction is defined as ___?

290. A 2L Dumas bulb contains in moles of nitrogen at 0.5atm at T kelvin. On addition of 0.01moles of oxygen, it is necessary to cool the bulb to a temperature of 10°C in order to maintain the same temperature. Calculate n and T.

291. The agreement between the numerical values of two or more measurements that have been obtained in the same fashion is known as?

292. Classify reading a burette as 15.63 instead of the correct value of 15.65 as determinate or indeterminate error?

293. Solid particles formed as a solution cools is called _____while that formed when two solutions are mixed is called_____

294. Which product of the reaction between a strong base and strong acid makes the reaction a neutralization reaction?

295. The chemical reaction whereby there are changes in the oxidation numbers of the reacting species is known as?

296. The bits of information you obtain from your research project are called?

297. A physical property of matter whose magnitude is independent of the amount of materials is termed?

298. What was the remarkable success of Bohr's theory?

299. For an electron undergoing transition from level n=2 to n=1;
i) Calculate the wavelength of this electronic transition in meters
ii) Calculate the energy in Joules per mole associated with this transition?_____

300. What is the relative rate of diffusion of nitrogen compared to that of oxygen at the same temperature?

301. The ____function for determining the spontaneity of chemical reactions are enthalpy, _____ and _____?

302. Chemical thermodynamics deals with _____interactions in a chemical reaction while thermochemistry deals with _____changes.

303. The Gibbs free energy ΔG for a reaction is 40KJ/mol, while that of $\Delta H$is 16KJ/mol, ΔS for the reaction at 25°C is?

304. The larger Ka, the greater the concentration of _____ions due to ionization?

305. Chemical equilibrium value varies with only?

306. The rate of a chemical reaction can be represented _____or _____?

307. Give the highlight of the contribution of LOUIS DE-BROGUE to the understanding of modern structure of atom?

308. If the value of azimuthal quantum number is 3, what are the permitted values of the magnetic quantum number, M_l?

309. Given that the molar conductivities at infinite dilution of $NaSO_4$ and SO_4^{2-} are 259 and 109 SCm^2mol^{-1} respectively. Calculate the molar conductivity at infinite dilution of Na^+

310. Give the cell notation for the galvanic cell with the following cell reaction

$$Zn_{(s)} + Cu^{2+}{}_{(aq)} \rightarrow Zn^{2+}{}_{(aq)} + Cu_{(s)}$$

311. A voltaic cell consist of _____, _____, _____and_____

312. _____and _____are the two laws explained by Dalton's atomic theory and the first above states thus_____?

313. The cathode rays possess these properties

i) _____

ii) _____

314. The two main features of Rutherford's atomic model are _____and_____

315. Complete the following nuclear equation and identify X

$$^{59}_{27}Co + ^{1}_{0}n \rightarrow ^{56}_{25}Mn + X$$

316. _____and _____are particulate type of radiation while _____is electromagnetic radiation

317. The zero order reaction is _____

318. The rate of a chemical reaction of the form $A \rightarrow B$ is expressed mathematically as

___

319. The option of this paper is
(a) Ita
(b) Etiuma
(c) Okafor
(d) Eno

320. Which type of nuclides are likely to decay by alpha emission
(a) those with atomic number less than 83
(b) those with mass number less than 83
(c) those with atomic number greater than 83
(d) those with mass number greater than 83

321. Which of these NOT a property of the compound formed when a metal reacts with a non-metal?
(a) strong bond
(b) van der Waal's
(c) good electrolyte
(d) solubility in polar solvents

322. The mathematical expression for Raoult's law is given as
(a) $P = P^0X$
(b) $\Delta P = PX$
(c) $\Delta P = P^0X$
(d) $P^0 = PX$

323. Pick the odd one out
(a) Concentration
(b) Molarity
(c) Specific gravity
(d) Election affinity

324. For the order reaction
(a) $t_{½}a_o$
(b) $t_{½}\ a_o^2$
(c) $t_{½}\ 1/k_1$
(d) None of the above

325. Which of the following does not define oxidation?
(a) Loss of electron
(d) Increase in oxidation number
(c) gain in electrons
(d) addition of oxygen

326. For a zero law state that
(a)t ½ a_o
(b) t ½ $1/a_o$
(c) none of the above
(d) all of the above

327. Avogadro's law state that
(a) $V \propto 1/n$
(b) $V \propto n$
(c) $N \propto 1/v$
(d) None of the above

328. A standard solution is a solution of----?

(a) pure salt
(b) High concentration
(c) known concentration
(d) known chemical species

329. ------- is not a component of an electrolysis is cell
(a) Electrode
(b) Electrolyte solution
(c) salt bridge
(d) external circuit

330. Universal gas constant R has value of
(a) 8.314kg
(b) 8.314J/mol
(c) 8.314J/mol/K
(d) None of the above

331. The units of the first order rate constant is----
(a) 1/s
(b) $1/s^2$
(c) mol $1^{-1}s^{-1}$
(d) None of the above

332. Activation energy is
(a) always positive
(b) always negative
(c) can be positive or negative
(d) none of the above

333. Which of the following represents the rate law
(a) Rate $[A]^x[B]^y$
(b) Rate $[A]^{x/y}[B]^{y/x}$
(c) Rate = $K_{x+y}[A]^2[Y]^{y/3}$
(d) None of the above

334. The name of the philosopher that coined the word ATOM is ----------
(a) Anaxogoras
(b) Pythagoras
(c) Aristotle
(d) Democritus

335. Which of these IS NOT a solution
(a) Air
(b) sea eater
(c) an alloy
(d) none of these

336. The reaction: $AgNO_{3(aq)} + NaCl_{(aq)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$ is commonly used in the lab to proof the validity of the law of---
(a) conservation of mass
(b) Definite proportions
(c) Multiple proportions
(d) Reciprocal proportions

337. What is the basic/fundamental reasons why atoms react?
(a) to form ions
(b) to attain configuration of inert gas
(c) to neutralize valency
(d) to generate enthalpy change

338. The sixth electrons of carbon occupies
(a) P_x-orbital
(b) P_y-orbital
(c) P_z-orbital
(d) D_x-orbital

339. Which is the statement of Boyle's law
(a) V P
(b) V 1/T
(c) V T
(d) None of the above

340. The chemical formula of the compound oxygen is
(a) O_2
(b) O
(c) O^{2-}
(d) O^{2+}

341. The factors affecting the state of equilibrium exclude
(a) concentration
(b) catalyst
(c) Temperature
(d) Pressure

342. The energy librated when an electro is added to a neutral atom in a gaseous state is referred to as
(a) ionization energy
(b) Electron affinity
(c) Electronegativity
(d) Electropositivity

343. Which of the following is a typical thermochemical equations?
(a) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$
(b) $2H_2O_{(g)} \rightarrow 2H_{2(g)} + O_{2(g)}$
(c) All of the above
(d) $2H_2O_{(g)} \rightarrow 2H_{2(g)} + O_{2(g)}$; $\Delta H = +xkj$

344. NaOH is a by-product in the electrolysis of---
(a) Molten NaCl
(b) Aqueous NaCl
(c) Molten Na_2SO_4
(d) Aqueous Na_2SO_4

345. Arrhenius equation is

(a) $A = ke^{-Et}$
(b) $A = ke^{-E/t}$
(c) $A = e^{-k/R}$
(d) None of the above

346. ---------- is not an ion present in aqueous solution of KOH
(a) K^+
(b) OH^-
(c) H^+
(d) H_2O

347. What type of solution obeys Raoults law?
(a) Concentrated
(b) Real
(c) Ideal
(d) Perfect

348. The 4s orbital is filled before the 3d-orbital, this follows:
(a) Pauli's Exclusion principle
(b) Hund's Rule
(c) Aufbau principle
(d) Bohr's model

349. Which of the following radiations can be emitted by the reaction $^{99}_{43}Tc\ ^{99}_{43}Tc$
(a) ^0_1n
(b) ^1_1H
(c) ^4_2He
(d) ^0_0Y

350. For a reaction: aA + bB = cC + dD, the law of mass action can be expressed as
(a)K = [A][B]/[C][D]
(b) K = [C][D]/[A][B]
(c) K = [A]a[B]b/[C]^c[D]^d
(d) K = [C]^c[B]^d/[A]^a[B]^b

351. Alpha particles may best be described by a
(a) Proton
(b) Hydrogen nucleus
(c) Helium nucleus
(d) Halogen nucleus

352. Which of the following is a characteristics of chemical equilibrium
(a) The equilibrium state is a compromise between two opposing tendencies
(b) chemical equilibrium is statics
(c) a catalyst can alter the position of equilibrium
(d) attainment of equilibrium is non-spontaneous

353. The oxidation number of elements in a free state is
(a) free
(b) zero
(c) one
(d) oxidation

354. Pick the odd one out
(a) Molality
(b) Molarity
(c) Specific gravity
(d) None of the above

355. For a chemical species to form a dative covalent bond in MUST possess
(a) Valence electrons
(b) Lone pair of electrons
(c) pie electrons
(d) Electron spilt spectra

356. A cation is --------- in size than the parent atom
(a) same
(b) smaller
(c) Bigger
(d) Ionic

357. $A + B \rightarrow A^- + B^+$ the energy needed to obtain A^- is called-----
(a) Electron affinity
(b) Lattice energy
(c) Ionization energy
(d) Activation energy

358. Which of these given species has the SMALLEST RADIUS
(a) Al
(b) Al^{3+}
(c) Cl
(d) Cl^-

359. Ordinarily H2O would have been gaseous but for the presence of -------
(a) Hydrogen bond
(b) Molecular orbital
(c) 105^0 angle
(d) Distorted Geometry

360. NaOH is a by-product in the electrolysis of-----
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(c) Molten Na_2SO_4
(d) Aqueous Na_2SO_4

361. ------- is not a component of an electrolysis cell
(a) Electrode
(b) Electrolyte solution
(c) Salt bridge
(d) External circuit

362. Calculate the partial pressure of water vapour over a solution containing 68.4g of sucrose in 1000g of water at 20°C. Vapour pressure of water at 200C is 2.315.
(a) 2307Nm²
(b) 2.307Nm^{-2}
(c) 23.30Nm^{-2}
(d) 0.2307Nm^{-2}

363. If the vapour pressure of water at 200C is 2.315. Calculate the partial pressure of water vapour over a solution containing 68.4g of sucrose ($C_{12}H_{22}O_{11}$) in 1000g of water at 20°C.
(a) 23.07KNM^{-2}
(b) 2.307NM^{-2}
(c) 4.61KNm^{-2}
(d) 230.7Nm^{-2}

364. Strontium-90, $^{90}_{58}Sr$, is a nucleus in α-radioactive fallouts. It decays to yttrium-90 with a half-life of 28 years. What fraction of strontium 90 will remain after 84 years?
(a) ½
(b) ¼
(c) 1/8
(d) 1/16

365. List the ions that are oxidized in the following reactions:
$2KMnO_4 + 10FeSO_4 + 8H_2SO_4 \rightarrow 2MnSO_4 + 5Fe_2(SO_4)_3 + K_2SO_4 + 8H_2O$
(a) K^+, Mn^{2+}, Fe^{3+}
(b) Fe^{2+},
(c) Mn^{7+}, Fe^{2+}
(d)

366. Calculate the oxidation number of nitrogen in HNO3 and NH_3
(a) +3 and +1
(b) +5 and -3
(c) +5 and +3
(d) -5 and +1

367. The name of the philosopher that coined the word ATOM is--------
(a) Anaxogoras
(b) Pythagoras
(c) Aristotle
(d) Democritus

368. The reaction:
$AgNO_{3(aq)} + NaCl_{(aq)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$
is commonly used in the lab to proof validity of the law of----------
(a) conservation of mass
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372. The chemical formula of the compound oxygen is
(a) O_2
(b) O
(c) O^{2-}
(d) O^{2+}

373. The units of the first-order rate constant are-----?
(a) 1/s
(b) 1/s²
(c) moll^{-1}s^{-1}
(d) none of the above

374. For first order reaction
(a) $t_{1/2} \propto a_o$
(b) $t_{1/2} \propto 1/a_o^2$
(c) none of the above
(d) All of the above

375. For a zero-order reaction
(a) $t_{1/1} \propto a_o$
(b) $t_{1/2} \propto 1/a_o^2$
(c) none of the above
(d) all of the above

376. Which of the following represents the rate law
(a) Rate $[A]^x[B]^y$
(b) Rate $[A]^{x/y}[B]^{y/x}$
(c) none of the above
(d) all of the above

377. Boyle's law state that

(a) $V \propto P$
(b) $V \propto 1/P$
(c) All of the above
(d) $V \propto P^2$
(where V = volume and P = pressure)

378. Avogadro's law equation than
(A) $V \propto 1/n$
(b) $V \propto n$
(c) $V \propto n^2$
(d) None of the above
(where V is volume and n number of moles)

379. The universal gas law equation is
(A) $PV = nRT$
(b) $PV = 1/3mc^2$ (for 1 mol of a gas)
(c) All of the above
(d) None of the above

380. The study of enthalpy of a reaction is called
(a) Enthalpy chemistry
(b) Thermoreaction
(c) Thermochemistry
(d) None of the above

381. For a reaction A B, rate is defined as
(a) $-d[A]/dt$
(b) $+d[B]/dt$
(c) $-d[B]/dt$
(d) $+d[B]^2/dt$

382. For a reaction of the form
$aA + bB \rightarrow cC + dD$, the rate law is
(a) Rate $[A]^a[B]^b$
(b) Rate $[A]^c[B]^d$
(c) Rate $[A]^x[B]^y$
(d) Rate $[A]^{x/a}[B]^{y/b}$

383. The factors affecting the state of equilibrium exclude
(a) concentration
(b) catalyst
(c) Temperature
(d) Pressure

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(b) chemical equilibrium is static
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(d) attainment of equilibrium is non-spontaneous

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(b) Aqueous NaCl
(c) Molten Na_2SO_4
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(a) Electrode
(b) Electrolyte Solution
(c) Salt Bridge
(d) External Circuit

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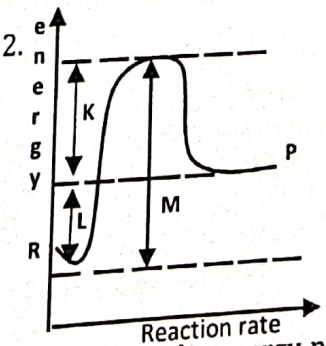
(b) OH^-
(c) H^+
(d) H_2O

388. For a reaction: $aA + bB \rightarrow cC + dD$ the law of mass action can be expressed as
(a) $K = [A][B]/[C][D]$
(b) $K = [C][D]/[A][B]$
(c) $K = [A]^a[B]^b/[C]^c[D]^d$
(d) $K = [C]^c[D]^d/[A]^a[B]^b$

389. Kp for the equilibrium at 1273°C for $2CO_{(g)} + O_{2(g)} \rightleftharpoons 2CO_{2(g)}$. If Kc is 2.24×10^{22} at the same temperature is
a) 1.76×10^{20}
b) 2.84×10^{24}
c) 2.34×10^{24}
d) 2.14×10^{20}

390. Define the term photoelectric effect?

391. The carrier of current in electronic conductor is _____and electrolytic conductor is _____?

392. 

The graph gives the energy profile of a reacting system. Which of the energies represent the activation energy of the reaction?
a) K
b) L
c) M
d) M-L

393. Which of the following factors do not influence the emf of an electrolytic cell?
a) Temperature
b) Salt bridge
c) Type of electrode reaction
d) Concentration of reactants

394. For 1mole of an ideal gas 1/RT equals
a) PV
b) nPV
c) PV/n
d) 1/PV

The total pressure exerted by a mixture of two gases A and B is 76.20cmHg. The number of moles of the two gases is 0.0075 and 0.0040 respectively.

395. Calculate the partial pressure of gas A

396. Calculate the partial pressure of gas B

397. In thermochemical equations of reactions _____ of reactants and products and _____ must be stated.

398. The splitting of energy levels in the presence of magnetic field is called_____ while splitting in electric field is called?_____

399. Chemistry transverse all spheres of life EXCEPT?
a) Agriculture
b) Technology
c) Construction
d) None of the above

400. Which of the following is not a reason why electrolytic conduction is affected by temperature?
a) Increase in temperature increases the saturation rate of the solution
b) Increase in temperature increases the kinetic energy of the ions
c) Increase in temperature decreases the viscosity of the solvent
d) Increase in temperature increases the rate of migration of the ions.

401. One of these does not affect the rate of a chemical reaction?
a) Catalyst
b) Temperature
c) Pressure
d) Elasticity

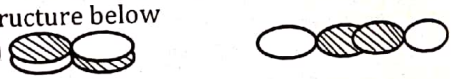
402. The graphical representation of Boyles law can be described as
a) Isobar
b) Isotherm
c) Isochore
d) Isosphere

403. In thermodynamic equilibrium
a) $\Delta G < 0$
b) $\Delta G > 0$
c) $\Delta H = \Delta S$
d) $\Delta H = T\Delta S$

404. Only a change in _____will change the value of the equilibrium constant for a particular reaction?

405. The mathematical expression of de-Broglie hypothesis is
a) $\lambda = \frac{h}{mV}$
b) $\lambda = {}^{c}/_{v}$
c) mvr = $\frac{nh}{2\pi}$
d) $\Delta x.\Delta p \geq \frac{h}{4\pi}$

406. Name the resultant bond(s) in the structure below
i) ii)



407. All the following are physical changes except?
a) Fusion
b) Sublimation
c) Vapourization
d) Combustion

408. Which of the following law was confirmed by Gay-Lussac in 1802?
a) Boyles law
b) Charles law
c) Graham's law
d) Avogadro's law

409. The integrated rate equation for a first order reaction is given as_____?

410. Laplace and Hess laws are based on
a) 2nd law of thermodynamics
b) 1st law of thermodynamics
c) Zeroth law of thermodynamics
d) None of the above

411. The molar conductivity of 0.1mol/dm³ aqueous NaCl solution at 303k and 1atm if

its conductivity at these conditions is $0.13cm^{-1}$

a) $1.0Scm^2mol^{-1}$
b) $10\ Scm^2mol^{-1}$
c) $100\ Scm^2mol^{-1}$
d) $1000\ Scm^2mol^{-1}$

412. What atomic orbitals are represented by the following combinations of quantum numbers?

i) $n = 4, l = 0$ and $m_l = 3$
ii) $n = 2, l = 0$ and $m_l \equiv 0$

413. Which of these statements is/are not correct concerning Bohr's postulate.

a) The electron has a definite energy characteristics of the orbit in which it is moving
b) When the electron moves in the same orbit, it does not change its energy
c) The electron can take all the possible orbits
d) The electron exists only in certain spherical orbits called shells or energy levels

414. What is the cell notation for the cell reaction

$$Zn_{(s)} + Cu^{2+}{}_{(aq)} \rightarrow Zn^{2+}{}_{(aq)} + Cu_{(s)}$$

415. The major contribution of Hess law is ___?

416. All is true except?

a) The equilibrium constant (Kc or Kp) is dimensionless quantity
b) The equilibrium constant helps in predicting the direction of a reaction
c) A catalyst has no effect on the equilibrium constant but affects the equilibrium concentrations of the reacting species
d) Chemists are concerned with dynamic equilibrium between phases and between reacting substances

417. The equilibrium constant Kp expression for $2CuSO_4 \rightleftharpoons 2CaO_{(s)} + 2SO_{2(g)} + O_{2(g)}$ is? _____

418. In the expression $\ln k = -Ea/Rt + \ln A$, the activation energy can be obtained by_____

419. If Q<K, the reaction will proceed from _____ to _____ to achieve equilibrium?

420. The remarkable feature(s) of the equilibrium element is the presence of _____

421. A compound X decomposes to form products and the reaction is first order. The rate constant for the reaction at 25°C is $0.4550sec^{-1}$. What is the half-life of X at that temperature?

a) 1.54sec
b) 0.693sec
c) 0.3119sec
d) $4.62 \times 10^{-2}min^{-1}$

422. The most effective thermodynamics for determining the spontaneity of a chemical reaction is

a) ΔE
b) ΔG
c) ΔH
d) ΔS

423. Isotopic abundance of an element is a factor of variation in the number of _____

424. Energy effects seeks to answer the question

(a) why do chemical reactions occur
(b) how fast can the reaction go
(c) are the ions involved in the reaction
(d) are the opposite reaction speed the same

425. A chemical bond is

(a) force of attraction existing between two atoms
(b) force of attraction within an atom
(c) force of repulsion within an atom
(d) all of the above

426. Using the oxidation state method, the balanced red equation of the oxidation of sulphur by nitric acid given the skeletal equation as $S + HNO_3 \rightarrow SO_2 + NO$ is:

(a) $3S + 4HNO_3 \rightarrow 3SO_2 + 4NO + 2H_2O$
(b) $3S + 3HNO_3 \rightarrow 3SO_2 + 3NO + 3/2H_2$
(c) $2S + 4HNO_3 + 2H_2 \rightarrow 2SO_2 + 4NO + 4H_2O$
(d) $2S + 3HNO_3\ 2SO_2 + 3NO + 3/2H_2 + O_2$

427. H_2O will react carbon to form water gas if

(a) the reaction takes place in H2O
(b) carbon is present in the form of coke
(c) Carbon in present a powder form
(d) the reaction takes place in a non-aqueous solvent

428. The characteristics of chemical equilibrium include the following except,

(a) attainment of equilibrium is spontaneous
(b) chemical equilibrium is dynamic

(c) the position of equilibrium is the same irrespective of the direction from which it is reached
(d) equilibrium state is between two parallel tendencies

429. NaOH is a byproduct in the electrolysis of
(a) Molten NaCl
(b) Aqueous $CuSO_4$
(c) Molten $CuSO_4$
(d) Aqueous NaCl

430. Rain water during thunderstorm contains dilute
(a) nitric acid
(b) hydrochloric acid
(c) sulphuric acid
(d) acid rain

431. The science of chemistry developed from observation made about the nature and behaviour of different kinds of matter is collectively called
(a) observation
(b)properties
(c) scientific methods
(d) chemical change

432. In the thorium decay series, thorium-232 loses a total of 6 alpha particles and 4 beta particles in a10-stage process. What is the mass number and atomic number of the final isotopes produced?
(a) 208, 74
(b) 228, 89
(c) 228, 87
(d) 208, 82

433. Hydrogen bonding is formed by
(a) metallic bonding
(b) covalent bonding
(c) co-ordinate bonding
(d) electrovalent bonding

434. If the attractive forces in a sold are small, the vapour pressure of the solid will be
(a) high
(b) low
(c) immeasurable
(d) in equilibrium

435. What is the formula of the compound corresponding to the combination of PO^{3-}_4 and Mg^{2+}?
(a) $Mg_3(PO_4)_2$
(b) Mg_2PO_3
(c) $Mg_2(PO_4)_3$
(d) $Mg_3(PO_4)_3$

436. Which of these is not true of oxidation number?
(a) oxidation number have no exact physical meaning
(b) all elements in the periodic table have more than one oxidation number
(c) oxidation numbers helps keep track of electrons in chemical reaction
(d) oxidation number can be assigned to each atom in a molecule or ionic compound according to a specific set of rules

437. A bottle of commercial ammonium hydroxides is labeled 28.0% w/w with specific gravity of 0.899g/ml. what is the molarity of ammonia?
(a) 14.80M
(b) 14.00M
(c) 14.87M
(d) 13.96M

438. At equilibrium
(a) $\Delta H > T\Delta S$
(b) $\Delta H = T\Delta S$
(c) $T\Delta S > \Delta H$
(d) $\Delta G \neq 0$

439. Hydrogen bonding is formed by
(a) metallic bonding
(b) covalent bonding
(c) co-ordinate bonding
(d) electrovalent bonding

440. A typical electrolysis circuit contains the following except
(a) a source of electricity
(b) electrode
(c) electrolyte solution
(d) salt bridge

For questions below, select the appropriate answer from the following gas laws:

441. In which of the gas law do you have an inverse relationship between volume and pressure

442. In which of the gas laws is volume directly proportional to the number of moles

443. In which of the gas laws is the condition of constant pressure applied

444. What is the maximum number of electrons to be accommodated in 2p orbitals?
(a) 4

(b) 6
(c) 10
(d) 14

445. Which atomic orbital is represented by the following combination of quantum number values; n = 3, l = 1 and m_l = +1
(a) 3p
(b) 2s
(c) 2d
(d) 3s

446. Which the following are isotopes:
I. Atoms of the same element having different number of electrons
II. Atoms of an element having different numbers of neutrons
III. $^{40}_{19}K$ and $^{40}_{20}Ca$
IV. $^{90}_{38}Sr$, $^{88}_{38}Sr$, $^{78}_{38}Sr$
(a) I, II, III, & IV
(b) II and IV
(c) II, III and IV
(d) IV only

447. Usually a catalyst increases the rate of reaction by providing a reaction pathway with
(a) lower activation energy
(b) higher activation energy
(c) lower enthalpy
(d) higher enthalpy

448. The radioactive K-40 isotopes decay to Ar-40 with a half-life of 1.20 x 10^9 years. Calculate the age of a sample of moon rock found to contain 16% K-40 and 84% Ar by Mass.
(a) 2.87 x 10^9yrs
(b) 2.97 x 10^9yrs
(c) 3.17 x 10^9yrs
(d) 3.01 x 10^8yrs

449. Which is not a redox reaction?
(a) $2FeCl_2 + Cl_2 \rightarrow 2FeCl_3$
(b) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
(c) $CuO + H_2 \rightarrow Cu + H_2O$
(d) $Ca^{2+} + 2F^- \rightarrow CaF_2$

450. Which of these is not an example of a measurable property of matter
(a) volume
(b) mass
(c) density
(d) alloys

451. Any material which is composed of more than one substances physically combined together is called
(a) mixture
(b) solution
(c) matter
(d) an element

452. The effects of changes on equilibrium position can be quantitatively analyzed by applying
(a) Law of mass action
(b) Law of conversion of mass
(c) Le Chaterlier's principle
(d) Daltons Atomic theory

453. Some transition metals react with hot water or steam to produce
(a) element
(b) compound
(c) an oxide
(d) water gas

454. The factor affecting the state of equilibrium exclude
(a) catalyst
(b) concentration
(c) temperature
(d) pressure

455. Vapour pressure of a solid increases with increase in
(a) Temperature
(b) concentration
(c) Boiling point
(d) Melting point

456. A nuclei located above the stability belt must undergo------- to achieve stability
(a) positron emission and electron capture
(b) neutron capture and beta emission
(c) beta emission only
(d) positron emission only

457. Electrovalent bonds are formed between
(a) a metal and a non-mental
(b) two metals
(c) two-non metals
(d) all of the above

458. In general, the increase in the rate of reaction is due to
(a) decrease in temperature
(b) increase in fraction of molecules with sufficient energy
(c) decrease in ΔG
(d) decrease in ΔS

459. Ionic bonding involves
(a) exchange of electrons
(b) transfer of electrons

(c) sharing of electrons
(d) combination of electrons

460. The ideal gas equations is
(a) PV = nRT
(b) PV = $\frac{1}{3}$mnc^{-2}
(c) all of the above
(d) none of the above

461. In balancing the redox reaction;
$MnO_4^-{}_{(aq)} + 8H^+{}_{(aq)} + X \rightarrow Mn^{2+}(aq) + 4H_2O_{(l)}$,
the value of X is given as
(a) $10e^-$
(b) $2e^-$
(c) $5e^-$
(d) $4e^-$

462. Any material which is composed of more than one substance physically combined together is called
(a)mixture
(b) solution
(c) matter
(d) an element

463. Radioactivity is expressed in terms of
(a) rate of radioactive absorption
(b) rate of radioactive stability
(c) position of element in periodic table
(d) half life

464. For the reaction;
$2SO_2 + O_2 \rightarrow 2SO_3$
$K = 1.0 \times 10^9$litre mol^{-1}: this implies that;
(a) the equilibrium concentrations of SO_2 and O_2 are small
(b) the equilibrium concentrations of SO_2 and O_2 are large
(c) the equilibrium concentration of SO_3 is small
(d) none of the above

465. Oxidation reaction may be defined as follows except
(a) oxidation reaction is one in which electrons is lost
(b) oxidation reaction is one in which there is an increase in oxidation number
(c) oxidation reaction is one in which oxygen is gained
(d) oxidation reaction is one in which hydrogen is gained

466. Which of these is not an example of measurable properties of matter
(a) volume
(b) mass
(c) density
(d) alloys

467. Dative bonding is a form of
(a) ionic bonding
(b) covalent bonding
(c) electrovalent bonding
(d) metallic bonding

468. Boyles's law states that
(a) $P \alpha V$
(b) $P \alpha V^2$
(c) $P \alpha 1/V^2$
(d) $P \alpha 1/V$

469. Electrolysis can be used in the
(a) extraction of metals
(b) electroplating
(c) all of the above
(d) none of the above

470. How many moles are contained in 74g of $Mg(NO_3)_2$?
(a) 0.5mol
(b) 1.0mol
(c) 1.5mol
(d) 0.75mol

471. For the reaction; $A_2 + B_2$ 2AB the rate of the forward reaction is given as:
(a) $r_f = K_f[AB]^2$
(b) $r_f = K_f[A_2][B_2]$
(c) $r_f = K_f[A]^2[B]^2$
(d) $r_f = K_f[A_2B_2]$

472. What is the mass of copper deposited when a current of 2.0 amperes is passed through a copper electrolyte for 2 hours
(Cu = 64g, 1 Faraday = 96500 coulomb)
(a) 4.78g
(b) 9.56g
(c) 6.40g
(d) 12.80g

473. The density of CO_2 at s.t.p is
(a) 1.99g/l
(b) 1.96cm^3
(c) 1.96g/l
(d) 1.99cm^3

474. Water is formed as a result of
(a) covalent bonding
(b) electrovalent bonding
(c) ionic bonding
(d) position bonding

475. The space around the nucleus with the highest probability of locating an electron in an atom is called
(a) orbital

(b) wave function
(c) electron cloud
(d) element

476. The equation $^{238}_{92}U \rightarrow ^{234}_{90}Th + ^{4}_{2}He$ represents
(a) gamma bombardment
(b) beta decay
(c) alpha decay
(d) artificial radioactivity

477. For an exothermic reaction,
(a) heat is absorbed
(b) heat is adsorbed
(c) all of the above
(d) heat is evolved

478. Temporary hardness of water can be caused by the presence in water of
(a) calcium bicarbonate
(b) calcium carbonate
(c) magnesium carbonate
(d) calciumsulphate

479. Water reacts with group 1 elements to give
(a) halogens
(b) halides
(c) alkaline solutions
(d) alcohols

480. A large quantum of energy is derivable form
(a) nuclear fusion using positrons
(b) nuclear fusion using neutrons
(c) nuclear fission using neutrons
(d) nuclear fission using positrons

481. Which atomic orbital is represented by the following combinations of quantum number values n = 2, I = 0 and $m_1 = 0$
(a) 2p
(b) 2s
(c) 2d
(d) 3s

482. Where does oxidation occur?
(a) at the cathode
(b) in the electrolyte
(c) at the half electrode
(d) at the anode

483. The equation $^{238}_{92}U \rightarrow ^{234}_{90}Th + ^{4}_{2}He$ represents
(a) gamma bombardment
(b) beta decay
(c) alpha decay
(d) artificial radioactivity

484. The unit of first order reaction is
(a) $mol^{-1}s^{-1}$
(b) s^{-1}
(c) mol^{-1}
(d) $moll^{-1}s^{2}$

485. The science of chemistry developed from observations made about the nature and behaviour of different kinds of matter is collectively called
(a) observation
(b) properties
(c) scientific methods
(d) chemical change

486. What happens if the temperature of the system;
$2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}$; $\Delta H = -x$ KJmol^{-1}
is decreased
(a) the reaction favours backward reaction
(b) the reaction favours forward reaction
(c) the reaction attains equilibrium fast
(d) the reaction favours both forward and backward reactions

487. Ionic compounds are very soluble in
(a) water
(b) benzene
(c) ethers
(d) crude oil

488. All catalysts
(a) increase the rate of a reaction
(b) decrease the rate of a reaction
(c) alter the rate of a reaction
(d) none of the above

489. The Latin name from which the symbol for silver is derived is:
(a) Kalium
(b) Cuprum
(c) Argentum
(d) Stannum

490. In the decomposition of
$CaCO_3(s) \rightarrow CaCO(s) + CO_2(g)$;
the reaction will attain equilibrium only
(a) when the reaction is in open system
(b) when the reaction is heated strongly
(c) when the reaction is in a closed system
(d) when the reaction is catalyzed

491. Covalent compounds react very slowly in
(a) water
(b) organic solvents
(c) halogenic solutions
(d) benzene

492. From the reaction,
$2I^-_{(aq)} + 2Fe^{3+}_{(aq)} \rightarrow I_{2(s)} + Fe^{2+}_{(aq)}$, which is the reducing agent
(a) I^-
(b) $2Fe^{3+}$
(c) I_2
(d) $2Fe^{2+}$

493. Given that
P_r= total pressure,
P_i = individual pressure and
X_i = mole fraction,
Dalton's law of partial pressure states that
(a) $P_r = \Sigma P_i$
(b) $P_T = x_i P_i$
(c) $P_T = x_i / P_i$
(d) $x_i = P_i / P^2_T$

494. How many hours will it take to produce 25.0g of Cr from a solution of $CrCl_3$ by a current of 2.75A?
(a) 13.06Hrs
(b) 12.06Hrs
(c) 14.06Hrs
(d) 15.06Hrs

495. A chemical equilibrium can only be achieved in a close system
(a) true
(b) false
(c) all of the above
(d) none of the above

496. A chemical bond is-----
(a) force of attraction existing between two atoms
(b) force of attraction within an atom
(c) force of repulsion within an atom
(d) none

497. ---- molecules have the highest kinetic energy
(a) gaseous
(b) liquid
(c) solids
(d) water

498. Water has high boiling point because-----
(a) it is ionic compound
(b) the presence of hydrogen bonding between the molecules
(c) it is covalent compound
(d) it is formed through metallic bonding

499. Water will react with carbon to form water gas if-----
(a) the reaction takes place in water
(b) carbon is present in the form of coke
(c) carbon is present in powdered form
(d) the reaction takes place in a non aqueous solvent

500. For chemical equilibrium to be attained, which of the following is true?
(a) reactants must be gases
(b) products must be gases
(c) products must decompose
(d) reaction must be reversible

501. Energy derived from attractive forces acting between molecules is called
(a) potential energy
(b) kinetic energy
(c) transitional energy
(d) rotational energy

502. The unit of rate of reaction is----------
(a) moles
(b) $mol^{-1}s^{-1}$
(c) mole
(d) $Lmole^{-1}Sec^{-1}$

503. ---------- reduces the rate of chemical reaction by reducing the activation energy
(a) temperature
(b) pressure
(c) concentration
(d) catalyst

504. Atoms of elements undergo bonding in order to--------
(a) attainoctate and duplet
(b) form compounds
(c) undergo reaction
(d) none of the above

505. Ionic bonds are formed between------
(a) metals and non metals
(b) two metal atoms
(c) twonon metal atoms
(d) all of the above

506. Ionic compound -------
(a) very soluble in organic compound
(b) are not soluble in water
(c) have high melting and bonding points
(d) all of the above

507. Hydrogen chloride is formed by------
(a) melting bonding
(b) covalent bonding
(c) coordinate bonding
(d) ionic bonding

508. According to the law of mass action, the rate of a chemical reaction is proportional to the product of--------
(a) the reactants
(b) concentration of the reactants
(c) concentration of the products
(d) none of the above

509. The minimum energy required by reactants to undergo reaction is called-------
(a) chemical energy
(b) activation energy
(c) salvation energy
(d) kinetic energy

510. A reaction is spontaneous when------
(a) ΔH is negative, ΔS is positive ΔG is negative
(b) ΔH is positive, ΔS is positive
(c) ΔG is positive ΔH is negative, ΔS is negative
(d) ΔH is positive, ΔS is negative, ΔG is positive

511. The expression PV = nRT is called-------
(a) the general gas law
(b) the ideal gas equation of state
(c) Dalton's Law
(d) Raoult's Law

512. All of the following atomic particles are nucleons except----------
(a) electron
(b) protons
(c) neutrons
(d) positrons

513. Oxidation is a process involving------
(a) loss of electrons
(b) gain of electrons
(c) loss of protons
(d) Gain of protons

514. The three fundamental particles of an atom are------
(a) protons, neutrons and electrons
(b) alpha, beta and gamma
(c) protons, neutrons and mesons
(d) electrons, antineutrino and neutrons

515. The physical combination of two or more substances with properties to those of their components but without definite concentration is called------
(a) mixture
(b) compound
(c) molecules
(d) substances

516. Cl-35 and Cl-37 as the only naturally occurring chlorine isotopes. The percentage distribution which accounts or the atomic weight of 35.5 is
(a) Cl-35 = 75% and Cl-37 = 25%
(b) Cl-35 = 65% and Cl-37 = 35%
(c) Cl-35 = 85% and Cl-37 = 15%
(d) Cl-35 = 40% and Cl-37 = 60%

517. 10g of Si dust is exploded with 100g of O_2, forming SiO_2. How many grams of SiO_2 are formed?
(a) 21.4g
(b) 88.6g
(c)11.4g
(d) 100g

518. Electrolytic conduction is made possible by the dissociation of the electrolyte into------
(a) solution
(b) crystals
(c) ions
(d) all of the above

519. The following statements describes Isotopes of elements except--------
(a) the atoms are exactly alike
(b) the atoms are atoms of the same element
(c) they have the same chemical prorogues
(d) they have the same number of protons

520. The volume of a gas is 500cm³ at a temperature of 27°C. find its temperature in K when the volume is suddenly increased to 1000cm³. Pressure remaining constant
(a) 700°k
(b) 690°k
(c) 600°k
(d) 750°K

521. In the electrolysis of aqueous NaCl solution---------- is liberated at the anode
(a) sodium
(b) water
(c) chlorine
(d) oxygen

522. The passage of current of 0.5A for 25mins deposited 0.36g of Cu from a $CuSO_4$ solution. Calculate the molar mass of Cu.
(a) 63.5g
(b) 60.3g
(c) 61.7g
(d) 62.3g

523. Chemical reactions are accompanied by energy changes
(a) false
(b) true
(c) none of the above

(d) sometimes

524. A certain volume of hydrogen gas was collected over at 6^0c exerted a pressure of 765mmHg. What is the partial pressure of hydrogen gas 6^0c if the saturated vapour pressure of water (SVP) at 6^0c is 7mmHg?
(a) 755mmHg
(b) 758mmHg
(c) 765mmHg
(d) 750mmHg

525. A certain amount of gas occupies 5.0dm^3 at 2atm and 10^0c. Calculate the number of moles of the present (Take R = 0.082 at $mdm^3K^{-1}mol^{-1}$)
(a) 0.61mols
(b) 0.56mols
(c) 0.43mols
(d) 0.40mols

526. If the value of Azimuthally quantum number is 3. The permitted values of the magnetic quantum number m are------
(a) +3 +2 +1, 0 -1, -2, -3
(b) +1, +1, 0 -1, -2
(c) +1, 0, -1
(d) 7

527. The Latin name from which the symbol for the chemical element sodium is derived from
(a) Natrium
(b) Na
(c) Kalium
(d) Auruim

528. Absolute temperature is a theoretical temperature characterized by a complete absence of heat and equivalent to exactly.....
(a) 298°C
(b) 273°C
(c) 25°C
(d) -273°C

529. A gas X has a relative rate of diffusion 15 to 20 when compared to nitrogen. Calculate the relative molecular mass of the gas X
(a) 28
(b) 225
(c) 400
(d) 50

530. Which of the following gases will effuse slowest; SO_2, Cl_2, O_2 and Ar
(a) SO_2,
(b) Cl_2,
(c) O_2
(d) Ar

531. Equal volumes of all gases at the same temperature and pressure contain the same number of particles. This is a statement of which law?
(a) Charles law
(b) Boyle's law
(c) Graham's law
(d) Avogadro's law

532. Equilibrium constant value changes with?
(a) Catalyst
(b) Temperature
(c) Concentration
(d) volume

533. Hydrogen iodide was prepared from 0.10 moles each of hydrogen and iodine. At equilibrium, the concentrations of hydrogen and iodine each dropped to 0.020 moles. Equilibrium constant (Kc) for this reaction is?
(a) 64
(b) 400
(c) 16
(d) 32

534. At equilibrium, a decrease in pressure in the reaction between hydrogen and iodine to give hydrogen iodine will cause equilibrium to
(a) shift right
(b) shift left
(c) remain the same
(d) none of the above

535. The reaction between nitrogen and hydrogen is exothermic at equilibrium a decrease in temperature will make equilibrium constant
(a) decrease
(b) increase
(c) remain the same
(d) none of the above

536. The p-v work done when a system containing a gas expands from 1.0L to 2.0L against a constant external pressure of 10am
(a) -10Latm
(b) +10Latm
(c) 20Latm
(d) 120Latm

537. Under what condition will a reaction whose ΔH is negative and ΔS is positive be spontaneous
(a) ΔG will always be negative
(b) ΔG will always be positive
(c) ΔG will always be zero
(d) none of the above

538. Heat can be transferred in a closed system but not
(a) matter
(b) pressure
(c) mass
(d) temperature

539. A thermodynamic function, independent of path but determined by the state of a system is called
(a) Adiabatic function
(b) State function
(c) Isolated system
(d) Isobaric system

540. Radioactive isotopes can effectively be applied in all the following areas except
(a) chemical analysis
(b) medicine
(c) Agriculture
(d) data handling

541. The rate-constant of a certain reaction is $1.54 \times 10^{-3}s^{-1}$. Calculate its half-life
(a) 20s
(b) 1.542
(c) 450s
(d) none of the above

542. For zero- order reaction
(a) $t_{½} \alpha 1/[A]^0$
(b) $t_{½} \alpha [A]^0$
(c) All of the above
(d) None of the above

543. Arrhenius equation is
(a) $K = Ae^{-E/RT}$
(b) $K = Ae^{-E/R}$
(c) $K = Ee^{-E/RT}$
(d) none of the above

544. The mathematical relationship between the loss in mass during the transformation of proton and neutron into a nucleus and the binding energy is
(a) $E = mc^2$
(b) $E = \Delta mC^2$
(c) $E = \Delta m\Delta C^2$
(d) $E = \Delta m\Delta C$

545. A radioisotopes of carbon ($^{11}_{6}C$) will delay by
(a) α-decay
(b) positron emission
(c) Negatron emission
(d) α radiation

546. Which of the following properties is not associated with the stability of a radioactive element?
(a) Half-life
(b) N/P ratio
(c) Binding energy
(d) Mass number

547. Radioactive isotopes can effectively be applied in all the following areas except
(a) chemical analysis
(b) medicine
(c) Agriculture
(d) data handling

548. What experiment led to the discovery of the sub particles in atoms?
(a) Milikan oil experiment
(b) Mass spectrometry
(c) cathode ray tube experiment
(d) Hund's rule

549. Heat can be transferred in a closed system but not
(a) matter
(b) pressure

(c) mass
(d) temperature

550. A thermodynamic function, independent of path but determined by the state of a system is called
(a) Adiabatic function
(b) State function
(c) Isolated system
(d) Isobaric system

CHEMISTRY SOLUTION

1. Option A All digits except zero that are measured
2. Option C 5
3. Option D
4. Option A oxidation occurs at the anode
5. Option B solubility product constant
6. Option A Bronsted – lowry
7. Option A remain unaffected
8. Option D 1.59
9. Option C +13.9KJ
10. Option C 0.65 atm
11. Option D Low pressure and high temperature
12. Option B 2.0 moles
13. Option B $\Delta U = q - w$
14. Option D Enthalpy
15. Option A Laplace Law
16. Option B Blackbody
17. Option A photoelectric effect
18. Option A Henry Becquerel
19. Option B Deposition
20. Option D Mass
21. Option A Eugen Goldstein &Cannal rays
22. Option C Crooker's cathode ray tube experiment
23. Option B
24. Option B
25. Option B
26. Option B Disproportionation reaction
27. Option A -1
28. Option A Electronic configuration
29. Option C Atomic number
30. Option A smoke detector
31. Option B Binding energy
32. Option D All of the above
33. Option B $mol^{-2}l^{2}S^{-1}$
34. Option B
35. Option B First order reaction
36. Option B All elements in the periodic table have more than one oxidation number
37. Option A A metal and a non-metal
38. Option B Increase in fraction of molecule with sufficient energy
39. Option C Le Chartelier's principle
40. Option A Temperature
41. Option C Beta emission only
42. Option A Force of attraction existing between two atoms
43. Option C Boyles
44. Option D Avogadro
45. Option A Charles
46. Option A Catalyst
47. Option D Alloys
48. Option C An oxide
49. Option A Mixture

50. Option D $Ca^{2+} + 2F^{-} \rightarrow Z_nCl_2 + CaF_2$
51. Option C 3.17×10^9 years
52. Option A Lower activation energy
53. Option A Concentration, pressure and temperature
54. Option B A catalyst cannot modify the equilibrium of reaction
55. Option A 35.288995amu
56. Option C 14.06hrs
57. Option C The presence of hydrogen bonding between its molecules
58. Option D Catalyst
59. Option A Molality
60. Option B The size of the orbital and energy of the election
61. Option C 4d
62. Option B 0.5mol
63. Option D Electro-negativity
64. Option B Nuclear fission
65. Option C The emission of a high speed electron from the decaying nucleus
66. Option D Cathode and anode
67. Option D Cell reaction
68. Option A Heavy water
69. Option C Tritium
70. Option D Tooth decay
71. Option A $0.5292\mathring{A}$
72. Option D Photons
73. Option A orbitals
74. Option A $\lambda = \frac{h}{mV}$
75. Option A 4F, 2s
76. Option D standard deviation
77. Option B systematic error
78. Option C - 0.09mg
79. Option D chemical reactions
80. Option C electrical and chemical energy
81. Option D The electrification
82. Option D Electrolyte solutions
83. Option $Zn_{(s)}/Zn^{2+}{}_{(aq)}//Cu^{2+}{}_{(aq)}/Cu_{(s)}$
84. Option C
85. Option C Atom is the basic building block of matter
86. Option B Neutrons and protons
87. Option C Adiabatic process
88. Option A Extensive property
89. Option B Temperature
90. Option C x + y
91. Option $Zn_{(s)}/Zn^{2+}{}_{(aq)}//Cu^{2+}{}_{(aq)}/Cu_{(s)}$
92. Option C
93. Option A Lowering the activation energy
94. Option A +7
95. Option A Reducing agent
96. Option B Neutron
97. Option D Positron
98. Option D X-ray
99. Option B $\frac{PV}{nRT} = 1$
100. Option B 1 atm
101. Option C 98.4°F
102. Option D Real gas
103. Option C 1.73×10^{-7}
104. Option B $p(CO_2)$
105. Option C (0.2M and 0.1M)
106. Option B Carbon present in the form of coke
107. Option B Activation energy
108. Option A ΔH is negative, ΔS is positive, ΔG is negative
109. Option B Ideal gas equation of state
110. Option D Reaction must be reversible
111. Option A Potential energy
112. Option B $mol\ l^{-1}S^{-1}$
113. Option D Catalyst
114. Option A $V \propto {}^1/_p$ (T constant) and $V \propto T$ (P constant)
115. Option C 600K
116. Option B Covalent bond
117. Option A Metal and non metals
118. Option C Have high melting and boiling point
119. Option A The atoms are exactly alike
120. Option A True
121. Option A Force of attraction existing between two atoms
122. Option A Gaseous
123. Option B The presence of hydrogen boiling between the molecules
124. Option B Concentration of the reactant
125. Option A 63.5g
126. Option B True
127. Option B 785mmHg
128. Option C 0.43moles
129. Option A Electrons
130. Option A Loss of electrons
131. Option A Protons, neutrons and electrons
132. Option A Mixture
133. Option A $Cl - 35 = 75\%$ and $Cl - 37 = 25\%$
134. Option B 88.6g
135. Option C Ions
136. Option C Chlorine
137. Option D 7
138. Option A Natrium
139. Option A Attain octate and duplet state
140. Option C Density
141. Option B $0.072min^{-1}$
142. Option C ${}_1{}_0n$
143. Option A $moll^{-1}S^{-1}$
144. Option B
145. Option C S = 7.85, $Z^x = 21.15$

146. Option B 2, 1
147. Option C 5
148. $\Delta U = q - P\Delta V$
149. Option B Internal energy and enthalpy
150. Option D Enthalpy
151. Option A $Al^{3+} < Mg^{2+} < Na^{+}$
152. Option C
153. Option C Avogadro's law
154. Option A 0.5moles
155. Option D 0.734atm
156. Option A
157. Option B
158. Option C
159. Option A $984.2KJmol^{-1}$
160. Option D Infinite
161. Option B Zero order reaction
162. Option C
163. Option B 0.059g
164. Option C Chi-square
165. Option A
166. Option A $m = \frac{IV_TA}{KA}$
167. Option D
168. Option C
169. Option C precipitation
170. Option B
171. Option D
172. Option C
173. Option A $\lambda = \frac{h}{mV}$
174. Option A Photosynthetic effect
175. Option A 4f, 2s
176. Option D None of the above
177. Option D None of the above
178. Option C Aufbau's principle
179. Option A $t_{1/2} \propto a_o$
180. Option C Can be positive or negative
181. Option D $2H_2O_{(g)} \rightarrow 2H_{2(g)} + O_{2(g)}$; $\Delta H = xkj$
182. Option A The equilibrium state is a compromise between two opposing tendency.
183. Option A Rate $\propto [A]^x[B]^y$
184. Option C 8.314KJ/mol/k
185. Option B Aqueous NaCl
186. Option D Electron affinity
187. Option D H_2O
188. Option D Known chemical species
189. Option C Salt bridge
190. Option B $V \propto \cap$
191. Option A O_2
192. Option B Catalyst
193. Option D None of the above
194. Option C Ideal
195. Option B Electron affinity
196. Option D $P = P^oX$
197. Option A Those with atomic number greater than 83
198. Option C Democritus
199. Option D To attain the configuration of inert gases
200. Option B None of these
201. Option D $1/S$ (frequency/Hetz)
202. Option A Helium nucleus
203. Option C Conservation of mass
204. Option A Increase in oxidation number
205. Option B
206. Option B Vander waals
207. Option B Py – Orbital
208. Option B Zero
209. Option C Non-polar covalent bond
210. Option B Isotopy
211. $v = \frac{c}{\lambda}$
212. $s, p, d and f orbitals$
213. $\Lambda_m MA = \Lambda_m M^{+} + \Lambda_m A^{-}$
214. Anode, cathode, salt bridge, external circuit
215. (i) it predicts the direction of the reaction
(ii) calculate the equilibrium concentration
216. 324
217. Open, closed and isolated
218. (i) Extensive properties
(ii) Intensive properties
219. (i) $q/m = \frac{V}{H_r}$
(ii) $\frac{mV^2}{r} = HeV$
220. (i) Most of the mass and all the positive charge of an atom are centered in a very small region called Nucleus
(ii) The magnitude of the charge on the nucleus is different for different atoms
221. $PV = \frac{1}{3}mnC_A^{\ 2}$
222. $6.022 \times 10^{23} mol^{-1}$
223. Rate $= \frac{-\Delta C}{\Delta t}$
224. $mol^{-2}L^2S^{-1}$
225. $(i) Electron affinity$
(ii) Larger
226. (i) Crystal (ii) Precipitate
227. Neutron to proton ratio
228. ^4_2He
229. (i) systematic (ii) Random error
230. Infinite dilution
231. Option D (All of the above)
232. Option B 6
233. Option D
234. Option D $1000.0Scm^2mol^{-1}$
235. Option B Not static

236. Option D
237. Option B
238. Option A — Adiabatic
239. Option A — Laplace law
240. Proton number/ Atomic number — Sea water and air
241. Option C
242. Option A — 2.0
243. Option A — $\frac{0.693}{K}$
244. Option A — Rate $\alpha[A]^a[B]^b$
245. Option B
246. Option B
247. Option A — First
248. Option D
249. Option C
250. 0.494
251. Option
252. Option C — +5
253. Option D — (iii)
254. Option B — Even, odd
255. Option D — Nuclear fission
256. Option A — 49.8g
257. Option C — Increases
258. Option B — 132°C
259. Option D — $56.0dm^3$ at STP
260. Option C — A and B
261. Option B — ΔH = negative
262. Option D — Pressure
263. Option A — Zero order
264. Option B — A catalyst cannot modify the equilibrium of a reaction
265. Option A — Chemical reactivity between the electrode and the electrolyte
266. Option C — An anode
267. Option C — The battery
268. Option D — Cl_2, H_2 and HCl
269. Option A — Concentration, pressure, temperature
270. Option B — When the reaction is in a closed system
271. Option C — Solute
272. Option A — $104^o\ 50^1$
273. Option A — Hydroxides
274. Option B — Van der Waals forces
275. Option C — Dative bond
276. Option A — Super saturated
277. Water gas
278. Option C — Particles only vibrate in place
279. Option D — Fog
280. Option A — Physical property
281. Option C — Gas changes to solid
282. Option B — Ni $(ClO_4)_2$
283. Option B — Neutrons
284. Option A — Main-group
285. Temperature and pressure
286. 4 s.f, 4 s.f
287. (i) 0.494 (ii) 0.0494
288. Rate law is the mathematical expression of rate in terms of concentration of the reactants appearing in the rate equation
289. The sum of the exponents of the concentration terms appearing in the rate law
290. (i) 0.033 moles (ii) 370K
291. Precision
292. Determinate error
293. (i) crystals (ii) precipitate
294. Water
295. Oxidation
296. Data
297. Intensive property
298. It could explain the spectrum of hydrogen and hydrogen like atoms
299. (i) 1.2157×10^{-7}m (ii) 984.2KJmol^{-1}
300. 1:1
301. (i) state function (ii) internal energy and (iii) Entropy
302. (i) spontaneity (ii) Heat
303. – 80.5J/k
304. Mobile
305. Change in temperature
306. Linearly or non- linearly
307. Duality of light
(i) Light as a wave
(ii) Light as a particle
308. M_1 = (-3, -2, -1, 0, 1, 2, 3)
309. 75 Scm^{2}mol^{-1}
310. $Zn_{(s)}/Zn^{2+}{}_{(aq)}//Cu^{2+}{}_{(aq)}/Cu_{(s)}$
311. (i) the anode
(ii) The cathode
(iii) A salt bridge
(iv) Half cells
312. (i) law of concentration of mass
(ii) law of definite proportions
313. (i) They are deflected both electric and magnetic field
(ii) they cause many substances to fluorescence
314. (i) most of the mass and all the positive charge of an atom are entered in a very small region called nucleus
(ii) the magnitude of the charge on the nucleus is different for different atoms
315. $^4{}_2He$
316. (i) particulate radiations are
(a) alpha particles
(b) beta particles
(ii) Electromagnetic radiation
(a) X – radiation
317. When the rate the reaction is independent of the concentration of the reactant
318. Rate = $\frac{-d[A]}{dt}$
319. Option

320. Option C — Those with atomic number greater than 83
321. Option B — Vander Waals
322. Option A — $P = P^oX$
323. Option D — Electron affinity
324. Option A — $t_{1/2} \propto a_o$
325. Option C — Gain in electrons
326. Option A — $t_{1/2} \propto a_o$
327. Option B — $V \propto \cap$
328. Option C — Known concentration
329. Option C — Salt bridge
330. Option C — 8.314J/mol/k
331. Option A — $1/s$
332. Option C — Can be positive or negative
333. Option A — Rate $\propto [A]^x[B]^y$
334. Option D — Democritus
335. Option D — None of the these
336. Option A — Conservation of mass
337. Option B — To attain configuration of inert gas
338. Option B — P_y – orbital
339. Option D — None of the above
340. Option A — O_2
341. Option B — Catalyst
342. Option B — Electron affinity
343. Option D — $2H_2O_{(g)} \rightarrow 2H_{2(g)} + O_{29(g)}$; $\Delta H = +xkj$
344. Option B — Aqueous $NaCl$
345. Option D — None of the above
346. Option D — H_2O
347. Option C — Ideal
348. Option C — Aufbal principle
349. Option D — ${}^{o}_{o}Y$
350. Option D — $k = \frac{[C]^c[D]^d}{[A]^a[B]^b}$
351. Option C — Helium nucleus
352. Option A — The equilibrium state is a compromise between two opposing tendencies
353. Option B — Zero
354. Option D — None of the above
355. Option B — None pair of electrons
356. Option B — Smaller
357. Option A — Electron affinity
358. Option B — Al^{3+}
359. Option A — Hydrogen bond
360. Option B — Aqueous $NaCl$
361. Option C — Salt bridge
362. Option B — $2.307Nm^{-2}$
363. Option B — $2.307Nm^{-2}$
364. Option C — $1/8$
365. Option A — K^+, Mn^{2+}, Fe^{3+}
366. Option D — +5 and +1
367. Option D — Democritus
368. Option A — Conservation of mass
369. Option B — P_y – orbital
370. Option C — Aufbau's principle
371. Option B — Electro affinity
372. Option A — O_2
373. Option A — $1/s$
374. Option C — None of the above
375. Option A — $t_{1/2} \propto a_o$
376. Option A — Rate $\propto [A]^x[B]^y$
377. Option B — $V \propto 1/p$
378. Option B — $V \propto \cap$
379. Option C — All of the above
380. Option C — Thermo chemistry
381. Option A — $-d[A]/dt$
382. Option A — Rate $\propto [A]^a[B]^b$
383. Option B — Catalyst
384. Option A — The equilibrium state is a compromise between two opposing tendencies
385. Option B — Aqueous $NaCl$
386. Option C — Salt bridge
387. Option D — H_2O
388. Option D — $k = \frac{[C]^c[D]^d}{[A]^a[B]^b}$
389. Option A — 1.76×10^{20}
390. This is the phenomenon whereby electrons are ejected from the surface of a metal when irradiate by U-V light
391. (i) electrons (ii) ions
392. Option C
393. Option B
394. Option D — $\frac{I}{PV}$
395. 49. 70cmHg
396. 26. 5cmHg
397. (i) physical state (ii) Enthalpy change
398. (i) Zeeman's effect (ii) Stark's effect
399. Option D
400. Option C
401. Option D — Elasticity
402. Option B — isotherm
403. Option D — $\Delta H = T\Delta S$
404. Temperature
405. Option A — $\lambda = \frac{h}{mV}$
406. (i) Electrovalent (ii) covalent
407. Option D — combustion
408. Option B — Charles Law
409. $a = a_o e^{-kt}$
410. Option B — 1st law of thermodynamics
411. Option D — $1000Scm^2mol^{-1}$
412. (i) 4f (ii) 2s
413. Option C
414. $Zn_{(s)}/Zn^{2+}_{(aq)}//Cu^{2+}_{(aq)}/Cu_{(s)}$
415. That thermolecular equations can be added, subtracted, multiplied and divided as ordinary numbers
416. No answer

417. $Kp = (PSO_2)^2 (PO_2)$
418. Ea = - (slope) x R
419. Left to right
420. (i) variable oxidation state
(ii) formation of complex ions
(iii) coloured compounds etc.,
421. Option A 1.54sec
422. Option B ΔG
423. Neutrons
424. Option B how fast can the reaction go
425. Option A force of attraction existing between two atoms
426. Option C $2S + 4HNO_3 + 2H_2 \rightarrow 2SO_2 + 4NO + 4H_2O$
427. Option B Carbon is present in the form of coke
428. Option D Equilibrium state is between two parallel tendencies
429. Option D Aqueous Nacl
430. Option A Litric acid
431. Option C scientific method
432. Option D 208, 82
433. Option B Covalent bonding
434. Option A High
435. Option A $Mg_3(PO_4)_2$
436. Option B All elements in the periodic table have more than one oxidation number
437. Option A 14.80M
438. Option B $\Delta H = T\Delta S$
439. Option Covalent bonding
440. Option D Salt bridge
441. Boyle's law
442. Avogadro's law
443. Charles's law
444. Option B 6
445. Option A 3P
446. Option B
447. Option B lower activation energy
448. Option C $3.17 \times 10^9 yrs$
449. Option D $Ca^{2+} + 2f \rightarrow Caf_2$
450. Option D Alloys
451. Option A Mixture
452. Option C le Chaterlier's principle
453. Option C An oxide
454. Option A Catalyst
455. Option A Temperature
456. Option C Beta emission only
457. Option A A metal and a non-metals
458. Option B Increase infraction of molecules without efficient energy
459. Option B Transfer of elements
460. Option C All of the above
461. Option C se-
462. Option A Mixture
463. Option D Half life
464. Option A The equilibrium concentrations SO_2 and O_2 are small
465.
466. Option D Alloys
467. Option B Covalent bonding
468. Option D $P \times \frac{1}{v}$
469. Option C All of the above
470. Option A 0.5mol
471. Option A $r_f = k_f[AB]^2$
472. Option A 4.78g
473. Option C 1.96g/c
474. Option A Covalent bonding
475. Option A Orbial
476. Option Alpha decay
477. Option D Heat is evolved
478. Option Calcium bicarbonate
479. Option C alkaline solutions
480. Option C Nuclear fission using neutrons
481. Option A 2P
482. Option D At the anode
483. Option C Alpha decay
484. Option C S^{-1}
485. Option C Scientific methods
486. Option B The reaction favours the forward reaction.
487. Option A Water
488. Option C After the rate of a reaction
489. Option C Argentum
490. Option C when the reaction is closed system.
491. Option A Water
492. Option A I^-
493. Option D $X_i = Pi/P_T^2$
494. Option C 14.06 Hrs
495. Option A True
496. Option A force of attraction existing between two atoms
497. Option A Gaseous
498. Option B The presence of hydrogen bonding between the molecules.
499. Option B Carbon is presence in the form of coke
500. Option D reaction must be reserve
501. Option A Potential energy
502. Option B $mol\ l^{-1}S^{-1}$
503. Option D catalyst
504. Option A Attain octane and duplet
505. Option A Metals and non metals
506. Option C Have high melting and boiling points.
507. Option B
508. Option B concentrations of the reactants
509. Option B Activation energy
510. Option A
ΔH *is negative,* Δs *is positive* ΔG *is negative*
511. Option B The ideal gas equation of state
512. Option A Electron
513. Option A Loss of electrons
514. Option A Protons, neutrons and electrons

515. Option A Mixture
516. Option A $cl - 35 = 75\%\ and\ cl - 37 = 25\%$
517. Option B 88.6g
518. Option C Tons
519. Option A The atoms are exactly alike
520. Option A 700^0K
521. Option C Chlorine
522. Option A 63.5g
523. Option B True
524. Option B 758 mmHg
525. Option C 0.43mols
526. Option D 7
527. Option A Natrium
528. Option D - 223^oC or 0K
529. Option D 50
530. Option B Cl_2
531. Option B Avogadro's law
532. Option B Temperature
533. Option A 64
534. Option C Remain the same
535. Option B Increase
536. Option A -10 Latm
537. Option A ΔG will always be negative
538. Option A Matter
539. Option B State function
540. Option D
541. Option C 450s
542. Option B $t\,^1/_2\ \alpha\ [A_0]^0$
543. Option B $k = Ae^{-Ea/Rt}$
544. Option B $E = \Delta MC^2$
545. Option B Position emission
546. Option C Binding energy
547. Option D Data handling
548. Option C Cathode ray tube experiment.
549. Option A Matter
550. Option B State function