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B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2010.

Third Semester

Chemistry — Main

Non major Elective

CHEMISTRY FOR COMPETITIVE
EXAMINATION — I

(For those who joined in July 2008 onwards)

Time : Three hours

Maximum : 75 marks

UNIT I

MATTER

1. A pure substance which contains only one type of atoms is called
 - (a) Element
 - (b) Compound
 - (c) Solid
 - (d) A liquid.
2. Which one of the following is not an element?
 - (a) Diamond
 - (b) Graphite
 - (c) Silica
 - (d) Oxygen.

3. Which one is a physical change?
- (a) Burning of S in air
 - (b) Burning of C in air
 - (c) Conversion of white phosphorus to red phosphorus
 - (d) Corrosion of metals.
4. A mixture of iron fillings and carbon can be separated by
- (a) Filtration
 - (b) Distillation
 - (c) Magnetic separation
 - (d) None.
5. A mixture of benzene and toluene can be separated by
- (a) Filtration
 - (b) Crystallisation
 - (c) Distillation
 - (d) Evaporation.
6. Pebbles in rice is separated by
- (a) Sieving
 - (b) Hand picking
 - (c) Sublimation
 - (d) None.
7. Identify the metallic element from the following
- (a) Carbon
 - (b) Boron
 - (c) Sodium
 - (d) Phosphorus.

8. If the volume and absolute temperature of a gas is doubled, then the pressure would
- (a) Be doubled
 - (b) Become half
 - (c) Remain unchanged
 - (d) Become four times.
9. The rate of diffusion of a gas depends upon
- (a) Its equivalent weight
 - (b) Its density
 - (c) Its atomicity
 - (d) Its valency.
10. It is impossible to liquefy a gas
- (a) Above critical temperature
 - (b) Below critical temperature
 - (c) If it is ideal
 - (d) If it is non-ideal.
11. Real gases will approach the behaviour of ideal gases at
- (a) Low temperature and low pressure
 - (b) Low temperature and high pressure
 - (c) High temperature and high pressure
 - (d) High temperature and low pressure.

12. Bragg's equation is

- (a) $n = 2\lambda d \sin \phi$ (b) $\lambda = 2nd \sin \phi$
(c) $n\lambda = 2d \sin \phi$ (d) $d = \lambda \sin \phi$

13. Which one of the following forces bind together the carbon atoms in diamond

- (a) Ionic (b) Covalent
(c) Vander waals (d) Dipolar.

14. CCl_4 is an example of

- (a) Ionic liquid (b) H-bonded liquid
(c) Molecular liquid (d) None of these.

15. A liquid drop assumes a spherical shape because

- (a) A sphere has maximum surface area
(b) A sphere has minimum surface area
(c) Sphere is symmetrical in shape
(d) None of these.

16. A manifestation of surface tension is

- (a) Rise of liquid in a capillary tube
(b) Spherical shape of liquid drop
(c) Upward movement of water in soils
(d) All the above.

17. The increase of temperature causes

- (a) A decrease in viscosity of the liquid
(b) An increase in viscosity of the liquid
(c) No effect on the viscosity of the liquid
(d) Only slight increase in the viscosity of the liquid.

18. One among the following is known as quick silver

- (a) Silver nitrate (b) Silver chloride
(c) Shining silver (d) Mercury.

19. Tear gas is chemically known as

- (a) Carbonyl chloride (b) Benzoyl chloride
(c) Acetyl chloride (d) Nitro chloroform.

20. A metal which finds exclusive application as semiconductor is

- (a) Au (b) Ge
(c) Pt (d) Ag.

21. The substances are arranged in the decreasing order of their hardness choose the correct one

- (a) Diamond > B_4C > SiC > Steel
(b) Steel > SiC > B_4C > Diamond
(c) Diamond > SiC > Steel > B_4C
(d) Diamond > Steel > SiC > B_4C .

22. Which of the following pairs are the constituents of enzymes

- (a) K & Na (b) Cu & Zn
(c) Fe & Mn (d) Mg & Mn.

23. Sodium cannot be stored under

- (a) Benzene (b) Kerosene
(c) Alcohol (d) Toluene.

24. The commonly used desiccant is

- (a) NaCl (b) CaCl_2
(c) MgCl_2 (d) AlCl_3 .

25. Photographic films have an essential ingredient of

- (a) AgNO_3 (b) AgBr
(c) AgCl (d) AgI.

26. Volatile metals are

- (a) Fe, Co, Ni (b) Cu, Ag, Au
(c) Ca, Mg, Be (d) Zn, Cd, Hg.

27. Sapphire is a mineral of

- (a) Cu (b) Al
(c) Zn (d) Mg.

28. Which element catches fire on exposure to air

- (a) Na (b) Ca
(c) K (d) All the above.

29. Bleaching action of sulphur dioxide is due to

- (a) Reduction (b) Oxidation
(c) Hydrolysis (d) Acidic character.

30. Colour of solid iodine is

- (a) Reddish brown (b) Violet
(c) Yellowish green (d) Steel grey.

UNIT II

STRUCTURE OF ATOM

31. Cathode rays have

- (a) Mass only
(b) Charge only
(c) No mass and no charge
(d) Mass and charge.

32. Rutherford's scattering experiments led to the discovery of
- (a) Nucleus
 - (b) Presence of neutrons in the nucleus
 - (c) Both (a) and (b)
 - (d) Revolving nature of electron around the nucleus.
33. Neutrons are present in all atoms except
- (a) He
 - (b) C
 - (c) H
 - (d) Na.
34. Bohr's model of atom is based upon
- (a) Heisenberg's uncertainty principle
 - (b) de Broglie concept of dual character of matter
 - (c) Schrodinger wave equation
 - (d) Planck's quantum theory.
35. Which of the following transitions of electrons in the hydrogen atom will emit maximum energy?
- (a) $n_5 \rightarrow n_4$
 - (b) $n_4 \rightarrow n_3$
 - (c) $n_3 \rightarrow n_2$
 - (d) All will emit same energy.

36. Which of the following represents de Broglie relation
- (a) $mv = hc / \lambda$
 - (b) $mv = g / \lambda$
 - (c) $mv = \lambda / h$
 - (d) $\lambda = h / m v c$
37. No two electrons in an atom can have
- (a) The same principal quantum number
 - (b) The same azimuthal quantum numbers
 - (c) The same magnetic quantum numbers
 - (d) An identical set of quantum numbers.
38. The correct order of increasing energies of the orbitals is
- (a) 3s, 3p, 3d, 4s and 4p
 - (b) 3s, 3p, 4s, 4p and 3d
 - (c) 3s, 3p, 4s, 3d and 4p
 - (d) 3s, 3p, 3d, 4p and 4s.
39. Consider the electronic configuration $1s^2 2s^2 2p_x^2$
- (a) It violates Aufbau principle
 - (b) It violates Hund's rule
 - (c) It is correct
 - (d) It violates Pauli's exclusion principle.

40. Which one of the following shows the correct electronic configuration of the outermost shell in inert gases
- (a) ns^2np^6 (b) ns^2np^5
(c) ns^2np^4 (d) ns^2np^3 .
41. The number of unpaired electrons in chromium ($Z = 24$) is
- (a) 4 (b) 3
(c) 6 (d) 5.
42. Which of the following is not related to the other three?
- (a) Positron (b) Electron
(c) Neutron (d) Cyclotron.
43. The number of neutrons in the element ${}^9_4\text{Be}$ is
- (a) 4 (b) 5
(c) 9 (d) 13.
44. When the value of $n = 2$ m can have
- (a) One value (b) Three values
(c) Four values (d) Seven values.

45. The present atomic scale is based on
- (a) C^{12} (b) O^{16}
(c) H^1 (d) C^{13} .
46. Which is correct regarding p-orbitals
- (a) They are spherical
(b) They have strong directional character
(c) They have no directional character
(d) They are five fold degenerate.
47. The hydride ion H^- is isoelectronic with
- (a) H^+ (b) He^+
(c) He (d) Be .
48. The maximum number of electrons that can be in d-orbital is
- (a) 10 (b) 8
(c) 6 (d) 4.
49. The correct value of Avogadro number is
- (a) 6.023×10^{21} (b) 6.023×10^{22}
(c) 6.023×10^{23} (d) 6.023×10^{24} .

50. Equal volumes of different gases at any definite temperature and pressure have
(a) Equal densities (b) Equal masses
(c) Equal atoms (d) Equal molecules.
51. Zinc and mercury do not show variable valency like d-block elements because
(a) They are soft
(b) Their d-shells are complete
(c) They have only two electrons in the outermost shell
(d) Their d-shells are incomplete.
52. The shape of the s orbital is
(a) Pyramidal (b) Dumb-bell
(c) Spherical (d) Tetrahedral.
53. The probability of finding the electron in nodal plane is
(a) 25% (b) 50%
(c) Zero (d) 100%.
54. Magic number is related to
(a) Stability of the nucleus
(b) Number of neutrons
(c) Number of protons
(d) Number of positrons.

55. Degenerate orbitals have
(a) Equal energy
(b) Equal work function
(c) Equal work function but different energy
(d) Equal energy and equal work function.
56. The number of anode rays depends upon
(a) Nature of electrode
(b) Nature of discharging tube
(c) Nature of residual gases
(d) All of these.
57. Davisson and Germer experiments showed that
(a) β -particles are electrons
(b) Electrons come from nucleus
(c) Electrons show wave nature
(d) None of the above.
58. The heaviest particle is
(a) Meson (b) Neutron
(c) Electron (d) Proton.

59. The radiations have high penetrating power and not being affected by electric or magnetic field is
 (a) Gamma rays (b) β -rays
 (c) α -rays (d) Neutrons.
60. Many elements have non integral atomic masses because
 (a) They have isotopes
 (b) Their isotopes have non integral masses
 (c) Their isotopes have different masses
 (d) The constitutional neutrons, protons and electrons combine to give fractional masses.

UNIT III

CLASSIFICATION OF ELEMENTS AND PERIODICITY OF PROPERTIES

61. The law of octaves was proposed by
 (a) J.W. Dobereiner (b) J.A.R. Newlands
 (c) Lothar Mayer (d) D.I. Mandeleev.
62. Mendeleev's periodic law is based on
 (a) Atomic number (b) Atomic weight
 (c) Equivalent weight (d) Valency.

63. The two places left empty by Mendeleev in the periodic table were for
 (a) Aluminium and silicon
 (b) Gallium and germanium
 (c) Arsenic and antimony
 (d) Antimony and bismuth.
64. The cause of periodicity of properties is
 (a) Increasing atomic radius
 (b) Increasing atomic weights
 (c) Number of electrons in valence orbits
 (d) The recurrence of similar outer electronic configuration.
65. Alkali and alkaline earth metals belong to
 (a) s-block elements (b) p-block elements
 (c) d-block elements (d) f-block elements.
66. Elements whose atoms have two outer most shells incomplete are called
 (a) s-block elements (b) p-block elements
 (c) d-block elements (d) f-block elements.

67. In transition elements, the incoming electron occupies $(n - 1)$ d-orbital in preference to
- (a) np – orbital (b) ns – orbital
- (c) $(n - 1)$ p – orbital (d) $(n + 1)$ s – orbital.
68. The sixth period of the periodic table contains
- (a) Two s-block and six p-block element
- (b) Fourteen f-block elements
- (c) Ten d-block elements
- (d) All.
69. One would expect the atomic structure of silicon to be similar to that of
- (a) Zinc (b) Diamond
- (c) Sulphur (d) Magnesium.
70. In comparison to the parent atom, the size of the
- (a) Cation is smaller but anion is larger
- (b) Cation is larger but anion is smaller
- (c) Cation and anion are equal in size
- (d) All the three are correct depending upon the atom.

71. Which of the following has largest radius?
- (a) $1s^2 2s^2 2p^6 3s^2$
- (b) $1s^2 2s^2 2p^6 3s^2 3p^1$
- (c) $1s^2 2s^2 2p^6 3s^2 3p^3$
- (d) $1s^2 2s^2 2p^6 3s^2 3p^5$.
72. Atoms which have high first ionisation potential always have
- (a) High nuclear charge
- (b) Small atomic size
- (c) Metallic properties
- (d) Strongly bound valence electrons.
73. The element which has highest first ionisation energy in the periodic table is
- (a) H (b) Rn
- (c) F (d) He.

74. The lower electron affinity of fluorine than that of chlorine is due to
- (a) Small size
 - (b) Smaller nuclear charge
 - (c) Difference in their electronic configurations
 - (d) Its highest reactivity.
75. The element having very high ionization energy but zero electron affinity is
- (a) H
 - (b) F
 - (c) He
 - (d) Be.
76. With respect to Cl, H will be
- (a) Electro positive
 - (b) Electronegative
 - (c) Neutral
 - (d) None.
77. Which of the following sets of elements has the strongest tendency to form anions?
- (a) P, S, Cl
 - (b) N, O, F
 - (c) V, Cr, Mn
 - (d) Ga, In, Tl.
78. Which one of the following elements has zero valency?
- (a) Platinum
 - (b) Gold
 - (c) Sulphur
 - (d) Neon.

79. Among the halogens across the group in the P.T.
- (a) Ionic radius increases
 - (b) Electro negativity increases
 - (c) Ionization potential increases
 - (d) Reactivity increases.
80. Characteristics of Transition element is
- (a) Incomplete d-orbitals
 - (b) Incomplete f-orbitals
 - (c) Incomplete s-orbitals
 - (d) Incomplete p-orbitals
81. The long form of the periodic table consists of
- (a) 8 horizontal and 7 vertical series
 - (b) 7 horizontal and 18 vertical series
 - (c) 7 horizontal and 7 vertical series
 - (d) 8 horizontal and 8 vertical series
82. In the periodic table, on moving along the period the ionisation potential
- (a) Increases from left to right
 - (b) Remains unchanged
 - (c) First increases and then decreases
 - (d) Decreases from left to right

83. Of the four alkali metals given below, which has the smallest size?
- (a) Rb (b) K
(c) Na (d) Li.
84. Which pair of atomic numbers represent elements which are both s-block elements?
- (a) 7, 15 (b) 6, 12
(c) 9, 17 (d) 3, 11.
85. Which of the following noble gases does not have an octet of electrons in its outermost shell?
- (a) Neon (b) Radon
(c) Argon (d) Helium.
86. Eka-aluminium and eka-silicon are known as
- (a) Gallium and germanium
(b) Aluminium and Silicon
(c) Iron and Sulphur
(d) Proton and Silicon.
87. An atom of an electro negative element becomes an anion by
- (a) Gain of electrons
(b) Loss of electron
(c) Loss of radius
(d) Serving as a reductant.

88. Which electronic configuration represents the atom of the element having the highest second ionization potential
- (a) $1s^2 2s^2 2p^5$ (b) $1s^2 2s^2 2p^6$
(c) $1s^2 2s^2 2p^6 3s^1$ (d) $1s^2 2s^2 2p^6 3s^2$.
89. Which elements has the lowest electronegativity
- (a) Li (b) F
(c) Fr (d) Cl.
90. The correct statement in respect of d-block elements is
- (a) They are metals
(b) They show variable valency
(c) They form complex compounds
(d) All are correct.

UNIT IV

CHEMICAL BONDING AND NONMETALS.

91. Which of the following is a property of covalent molecule?
- (a) Exist as ions
(b) Usually soluble in water
(c) Conducts electricity
(d) Low melting and boiling point.

92. Which of the following is covalent?
(a) H_2 (b) CaO
(c) KCl (d) Na_2S
93. Which one among the following do not contain a H – Bond?
(a) Phenol
(b) Liquid ammonia
(c) Water
(d) Hydrogen sulphide gas
94. Credit for the discovery of noble gases goes to
(a) Cavendish
(b) William Ramsay
(c) Raleigh
(d) Frankland and Lockyear.
95. The radioactive noble gas is
(a) Krypton (b) Xenon
(c) Radon (d) Helium.

96. Noble gases do not usually react with other elements since they
(a) Have valency shells which are closed octets
(b) Are monoatomic
(c) Are found in traces
(d) Are low boiling gases.
97. XeF_6 is
(a) Tetrahedral
(b) Distorted octahedral
(c) Trigonal bipyramidal
(d) Pyramidal.
98. The inert gas abundantly found in the atmosphere is
(a) Neon (b) Krypton
(c) Helium (d) Argon.
99. Which of the following naturally occurring gases is filled in electric bulbs/tubes?
(a) Oxygen (b) Nitrogen
(c) Argon (d) Helium.

100. Which one the following noble gases is the least polarisable?

- (a) Helium
- (b) Neon
- (c) Krypton
- (d) Xenon.

101. Argon was discovered by

- (a) Ramsay
- (b) Jansen
- (c) Frankland and Lockyear
- (d) Raleigh.

102. Charcoal maintained at -100°C adsorbs

- (a) He and Ne
- (b) He and Ar
- (c) Ne and Kr
- (d) Ar, Kr and Xe.

103. The noble gas which behaves abnormally in liquid state is

- (a) Xenon
- (b) Neon
- (c) Helium
- (d) Argon.

104. At room temperature, colour of Hydrogen is

- (a) Yellow
- (b) Red
- (c) Orange
- (d) Colourless.

105. Ordinary hydrogen contains

- (a) ${}^1\text{H}^1$
- (b) Deuterium atoms
- (c) Tritium atoms
- (d) All the above.

106. Hydrogen gas is used on industrial scale in the manufacture of

- (a) H_2SO_4
- (b) C_2H_2
- (c) Margarine
- (d) Water.

107. When electric discharge is passed through ordinary hydrogen at low pressure as 0.5 mm we get

- (a) Ortho hydrogen
- (b) Atomic hydrogen
- (c) Nascent hydrogen
- (d) Active hydrogen.

108. The hydrogen produced in contact with the substance to be reduced is known as

- (a) Molecular hydrogen
- (b) Atomic hydrogen
- (c) Nascent hydrogen
- (d) Heavy hydrogen.

109. Diamond and graphite are

- (a) Isomers
- (b) Isotopes
- (c) Allotropes
- (d) Polymer.

110. Graphite is soft because

- (a) The carbon atoms are joined together in hexagonal forms in layers
- (b) Each carbon is in sp^3 hybridized state
- (c) Carbon atoms are tetrahedrally arranged
- (d) Carbon atoms are octahedrally arranged.

111. The most reactive form of carbon is

- (a) Diamond
- (b) Coal
- (c) Charcoal
- (d) Graphite.

112. Red phosphorous is less reactive than yellow phosphorus because

- (a) Its colour is red
- (b) It is insoluble in ethanol
- (c) It is hard
- (d) It is highly polymerized.

113. Which of the following properties are shared by red phosphorus?

- (a) It phosphoresces in air
- (b) It reacts with hot aqueous NaOH
- (c) It dissolves in CS_2
- (d) It burns when heated in air.

114. The smallest atom among halogens is

- (a) Fluorine
- (b) Chlorine
- (c) Bromine
- (d) Iodine.

115. The radioactive Halogen is

- (a) Thorium
- (b) Radium
- (c) Astatine
- (d) Uranium.

116. Freon is

- (a) CCl_2F_2
- (b) CCl_3F
- (c) CH_2F_2
- (d) CHF_3 .

117. Which of the following elements is extracted commercially by the electrolysis of an aqueous solution of one of its compounds?

- (a) Na
- (b) Al
- (c) Br
- (d) Cl.

118. Chlorine acts as a bleaching agent only in the presence of

- (a) Sunlight
- (b) Moisture
- (c) Pure oxygen
- (d) Dry air.

119. Iodine is used in

- (a) Making iodoform
- (b) Treatment of goiter
- (c) In making dyes
- (d) All the above.

120. Higher Fullerenes have structure similar to

- (a) Football
- (b) Spherical balloon
- (c) Basket ball
- (d) Tennis ball.

UNIT V AIR AND WATER

121. Biodegradable materials are

- (a) Those which spoil the geological environment
- (b) Are toxic
- (c) Can be broken by bacteria
- (d) Used for converting waste into greenery.

122. The extent of pollution in the environment can be known by quantity (in ppm) in which they are present. The ppm stands for

- (a) Particles per mole
- (b) Parts per million
- (c) Purity per microgram
- (d) Pollutant percent measure.

123. Greenhouse effect cause

- (a) Rise in temperature of the earth
- (b) Continuous rainfall
- (c) Lowering in temperature of the earth
- (d) Continuous snowing on the earth.

124. There is no life on moon as there is no?

- (a) Nitrogen
- (b) Water
- (c) Carbon
- (d) Silicates.

125. The solid component of the earth surface is known as

- (a) Hydrosphere
- (b) Lithosphere
- (c) Atmosphere
- (d) Solid sphere.

126. Which will not cause any atmospheric pollution?

- (a) Oxygen
- (b) SO_2
- (c) CO_2
- (d) CO.

127. Which type of gas was evolved in Bhopal tragedy?

- (a) Carboxyl chloride
- (b) Carbon monoxide
- (c) Methyl cyanide
- (d) Methyl isocyanate.

128. Which disease is caused by Mercury poisoning in water

- (a) Itai-tai (b) Minamata
- (c) Paralysis (d) Polio.

129. Hardness of water is due to the presence of

- (a) NaCl (b) $MgCl_2$
- (c) $CaSO_4$ (d) Both (b) and (c).

130. Dimineralised water is free from

- (a) Cations
- (b) Anions
- (c) Cations and Anions
- (d) None of these.

131. Eutrophication is otherwise called as

- (a) Green house effect (b) Acid rain
- (c) Algal bloom (d) None of the above.

132. Common salt is obtained from sea water by the process of

- (a) Sublimation (b) Evaporation
- (c) Crystallization (d) Both (b) and (c).

133. Detergents produce lather with hard water because

- (a) They are soluble in hard water
- (b) They are colourless substances
- (c) The calcium and magnesium salts of sulphonic acids are soluble in water
- (d) They form sodium carbonate with hard water.

134. The process that does not involve evolution of CO_2 is

- (a) Combustion (b) Respiration
- (c) Fermentation (d) Photosynthesis.

135. A gas which is not present in normal samples of air is

- (a) Neon (b) Chlorine
- (c) Carbon dioxide (d) Helium.

136. The pH of drinking water is in the range

- (a) 4 – 6 (b) 6 – 8
- (c) < 4 (d) > 8.

137. The purest form of water is

- (a) Rain water (b) Heavy water
- (c) Tap water (d) Distilled water.

138. Ozone is important to mankind because it
- (a) Releases hydrogen in the atmosphere
 - (b) Maintains the temperature of the earth
 - (c) Creates a protective coverage against ultraviolet rays
 - (d) Releases oxygen in the air.
139. The gas used for inflating balloons is
- (a) Nitrogen
 - (b) Hydrogen
 - (c) Helium
 - (d) Air.
140. pH of rainwater is
- (a) 5 - 6
 - (b) 7
 - (c) 8 - 9
 - (d) 3 - 4.
141. Which one among the following does not have hydrogen bond
- (a) Phenol
 - (b) Liquid NH_3
 - (c) Water
 - (d) Liquid HCl .
142. Among the following bonds which is very weak?
- (a) Ionic bond
 - (b) Covalent bond
 - (c) Hydrogen bond
 - (d) Electrovalent bond.

143. Which one of the following compounds contains intramolecular hydrogen bonding?
- (a) Salicylic acid
 - (b) Water
 - (c) Hydrogen fluoride
 - (d) m-nitrophenol.
144. Coagulation is generally adopted, when turbidity of water is greater than _____ mg/l.
- (a) 50
 - (b) 60
 - (c) 40
 - (d) 100.
145. Which of the following is a waterborne disease?
- (a) Filariasis
 - (b) Typhoid
 - (c) Chicken pox
 - (d) Cancer.
146. Trickling filters are used to remove
- (a) Suspended solids
 - (b) Colloidal solids
 - (c) Organic matter
 - (d) Pathogenic bacteria.
147. The main mechanisms causing purification of sewage in trickling filters are
- (a) Adsorption and biological oxidation
 - (b) Absorption and adsorption
 - (c) Absorption and chemical oxidation
 - (d) None of the above.

148. Minimum sampling duration for dust fall rate is

- (a) 30 days (b) 15 days
- (c) 7 days (d) 60 days.

149. The limit of Pb pollution in water according to ISI standards is

- (a) 1 ppm (b) 0.01 ppm
- (c) 2 ppm (d) > 1 ppm.

150. High content of organic solids present in natural water indicates _____.

- (a) Pollution
- (b) Contamination and pollution
- (c) Water free from inorganic solids
- (d) Fresh water.