CHEMISTRY

1. ATOMIC STRUCTURE

(2009-E)

1. The wavelength of electron waves in two orbits is 3 : 5. The ratio of kinetic energy of electrons will be:
   1. 25 : 9 2. 5 : 3 3. 9 : 25 4. 3 : 5

2. Electrons with a kinetic energy of 6.023×10^{4} J/mol are evolved from a surface of a metal, when is exposed to radiation of wavelength of 600 nm. The minimum amount of energy required to remove an electron from the metal atom is
   1. 2.3125×10^{-19} J 2. 3×10^{-19} J 3. 6.02×10^{-19} J 4. 6.62×10^{-34} J

(2009-M)

3. With increase in Principal Quantum number n, the energy difference between adjacent energy levels in Hydrogen atom
   1) Increases 2) Decrease 3) Remains constant
   4) Decrease for lower values of n and increases for higher values of n

4 **Assertion (A) :** The probability of finding an electron in a small volume around a point (x,y,z) at a distance 'r' from the nucleus is proportional to ψ^2.

Reason (R) :- Subatomic particles have both wave and particle nature
1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true but R is not the correct explanation of A
3) A is true but R is not true 4) A is not true but R is true

(2008 - M)

5 The wavelength (in A°) of an emission line obtained for Li^{2+} during an electronic transition from $n_2 - 2$ to $n_1 - 1$ is (R = Rydberg constant)

1. $\frac{3R}{4}$ 2. $\frac{27R}{4}$ 3. $\frac{4}{3R}$ 4. $\frac{4}{27R}$

6 Match the following

List – I	**List – II**
A) $mvr = \frac{nh}{2\pi}$	i) Paschen series
B) Infra-red	ii) Electron total energy
C) $\lambda = \frac{h}{p}$	iii) de Broglic equation
D) $\frac{-e^2}{2r}$	iv) Schrodinger equation
	v) Bohr's equation

	A	**B**	**C**	**D**		**A**	**B**	**C**	**D**
1.	v	**ii**	**iii**	i	2)	**iii**	**ii**	v	**iv**
3.	v	i	**iii**	**ii**	4)	**iv**	i	**ii**	**iii**

(2008-E)

7 An electronic transition in hydrogen atom results in the formation of H_α line of hydrogen in Lyman series, the energies associated with the electron in each of the orbits involved in the transition (in kCal mol^{-1})
1) –313.6,–34.84 2) –313.6,–78.4 3) –78.4,–34.84 4)–78.4,–19.6

8. The velocities of two particles A and B are 0.05 and 0.02 ms^{-1} respectively. The mass of B is five times the mass of A. The ratio of their de Broglie's wavelength is
   1) 2 : 1 2) 1 : 4 3) 1 : 1 4) 4 : 1

(2007-E)

9 The wavelength of a spectral line emitted by hydrogen atom in the Lyman Series is $\frac{16}{15R}cm$. What is the value of ? (R = Rydberg constant)

1) 2 2) 3 3) 4 4) 1

10). The maximum number of sub levels, orbitals and electrons in 'N' shell of an atom are respectively

1) 4, 12, 32 2) 4, 16, 30 3) 4, 16, 32 4) 4, 32, 64

(2007-M)

11. What is the wave number of 4th line in Balmer series of Hydrogen spectrum? (R = 1,09,677 cm^{-1})

1) 24,630 cm^{-1} 2) 24,360 cm^{-1} 3) 24,730 cm^{-1} 4) 97490 cm^{-1}

12. The atomic number of an element 'M' is 26. How many electrons are present in the M-shell of the element in its M^{3+} state?

1) 11 2) 15 3) 14 4) 13

(2006-E)

13) The uncertainties in the velocities of two particles A and B are 0.05 and 0.02 respectively. The mass of B is five times to that of mass A. What is the ratio of uncertainties in their positions?

1) 2 2) 0.25 3) 4 4) 1

14) The energy of a photon is ergs. What is its wavelength in nm?

$\left(h = 6.62\times10^{-27} ergs - s; c = 3\times10^{10} cm/s\right)$

1) 662 2) 1324 3) 66.2 4) 6.62

(2005 Medical)

15) What is the lowest energy of the spectral line emitted by the hydrogen atom in the Lyman series?

(1) $\frac{5hcR}{36}$ (2) (3) (4)

16 What is the wave length (in m) of a particle of mass gm moving with a velocity of $10^3 ms^{-1}$?

(1) 6.62×10^{-4} (2) 6.62×10^{-3} (3) 10^{-5} (4)

(2006 Medical)

17. The angular momentum of an electron present in the excited state of Hydrogen is .The electron present in

1) Third orbit 2) Second orbit 3) Fourth orbit 4) Fifth orbit

2. PERIODIC TABLE

(2009 - E)

18. Which one of the following order is correct for the first ionization energies of the elements ?

1. B < Be < N< O 2. Be < B < N < O 3. B< Be < O < N 4. B < O < Be < N

(2008 - M)

19. The elements 'X','Y' and 'Z' from oxides which are acidic, basic and amphoteric respectively. The correct order of their electro – negativity is

1. X > Y >Z 2) Z > Y > X 3) X > Z > Y 4) Y > X > Z

(2008 - E)

20. The atomic numbers of elements A, B, C and D are z – 1, z, z+1 and z+2 , respectively. If B is a nobles gas, choose the correct answers from the following statements:
a) A has higher electron affinity b) C exists in +2 oxidation state c) D is an alkaline Earth metal
1) a and b 2) b and c 3) a and c 4) a,b and c

(2007 - M)

21. Element with Atomic number 38, belongs to
1) II A group and 5th period 2) II A group and 2nd period
3) V A group and 2nd period 4) III A group and 5th period

(2007-E)

22. An oxide of an element is a gas and dissolves in water to give an acidic solution. The element belong to
1) II group 2) IV group 3) VIII group 4) zero group

(2006-E)

23. Observe the following statements :
I) The physical and chemical properties of elements are periodic functions of their electronic configuration
II) Electronegativity of fluorine is less than the electronegativity of chlorine
III) Electropositive nature decreases from top to bottom in a group
The correct answer is
1) I, II and III are correct 2) only I is correct
3) only I and II is correct 4) only II and III are correct

(2005 Engg.)

24. Identify the correct order in which the covalent radius of the following elements increases.
(I) Ti (II) Ca (III) Sc
(1) I, II, III (2) III, II, I (3) II, I, III (4) I, III, II

(2005 Medical)

25. Identify the correct order in which the ionic radius of the following ions increases
(I) (II) (III)
(1) III, I, II (2) I, II, III (3) II, III, I (4) II, I, III

$\frac{N}{a^3}$

3. CHEMICAL BONDING

(2009-M)

26. $BaSO_4$ is insoluble in water due to its:
1) high hydration energy 2) High lattice energy
3) high ionization energy 4) High kinetic energy

(2009-M)

27. Lattice energy of an ionic compound depends upon:
1) Charge on the ion only 2) Size of the ion only
3) Charge on the ion and size of the ion 4) Packing of its ions only

(2008-M)

28. Match the following :

List – I	**List – II**
A) BCl_3	i) Linear
B) $PdBr^{2-}_4$	ii) Planer Triangular
C) SF_6	iii) Tetrachedral
D) I_3^{-1}	iv) Octahcdral
	v) Square planar

	A	**B**	**C**	**D**		**A**	**B**	**C**	**D**
1)	ii	iii	iv	i	2)	v	iii	ii	i
3)	ii	v	iv	i	4)	v	iv	iii	ii

29. X, Y are anhydrides of sulphurous acid and sulphuric acid respectively. The hybridization state and the shape of X and Y are

X	Y
1. sp^2 , angular	sp^3 , tetrahedral
2. Sp^2, angular	sp^2, angular
3. sp^2, angular	sp^2, planer triangular
4. sp^3, planer	sp^3, planer

(2008-E)

30. Which one of the following is a correct set ?

1) H_2O, sp^3, angular 2) BCl_3, sp^3, angular
3) NH^+_4, dsp^2, square planar 4) CH_4, dsp^2 , tetrahedral

(2008-M)

31. AB is an ionic solid. If the ratio of ionic radii of A^+ and B^- is 0.52 .What is the coordination number of B^- ?

1) 2 2) 3 3) 6 4) 8

(2007-M)

32. **Assertion (A) :** is linear

Reason (R) : It is not in SP hybridized state

The correct answer is

1) Both (A) and (R) are true and (R) is the correct explanation of (A).
2) Both (A) and (R) are true but (R) is not the correct explanation of (A).
3) (A) is true and (R) is not true 4) (A) is not true and (R) is true

(2007-E)

33. The decreasing order of bond dissociation energy of C - C, C - H and H - H bonds is

1) $H-H > -C-H > -C-C$ 2) $(r_c + r_a)$
3) 4)

34. Which of the following is not tetrahedral ?

1) 2) 3) 4)

(2006-E)

35. A molecule (X) has (i) four sigma bonds formed by the overlap of and s orbitals (ii) one sigma bond formed by and orbitals and (iii) one bond formed by and orbitals. Which of the following is X ?

1) 2) 3) 4)

36. AB is an ionic solid. The ionic radii of and are respectively and . Lattice energy of AB is proportional to

1) 2) 3) 4)

(2005 Medical)

37. Which of the following is a favourable factor for cation formation?

(1) Low ionisation potential (2) High electron affinity
(3) High negativity (4) Small atomic size

4. GASEOUS STATE

(2009-E)

38. The average kinetic energy of one molecule of an ideal gas at 27°C and 1 atm. Pressure is

1) 900 cals K^{-1} mol^{-1} 2. 6.21×10^{-21} J K^{-1} $molecule^{-1}$

3) 336.7 $J.K^{-1}$ $molecule^{-1}$ 4. 374.3 $J.k^{-1}$ mol^{-1}

(2009-M)

39. The vapor of a substance effuses through a small hole at the rate of 1.3 times faster than SO_2 gas at 1 atm. pressure and 500K The molecule weight of the gas is

1) 49.2 2) 37.9 3) 41.6 4) 83.2

(2008-M)

40. 40 grams of a sample of carbon on combustion left 10% of it unreached. The volume of oxygen required at STP for this combustion reaction is

1. 22.4l 2. 67.2 l 3. 11.2 l 4. 44.8 l

(2008-M)

41. In a flask of 'V' litres , 0.2 moles of O_2, 0.4 moles of N_2, 0.1 moles of NH_3 and 0.3 moles of He gases are present at 27°C. If total pressure exerted by these non-reacting gases is 1 atm, the partial pressure exerted by N_2 gas is

1. 0.4 atm 2. 0.3 atm 3. 0.2 atm 4. 0.1 atm

(2008-E)

42. What is the temperature at which the kinetic energy of 0.3 moles of Helium is equal to the kinetic energy of 0.4 moles of Argon at 400 K ?

1) 400 K 2) 873 K 3) 533 K 4) 300K

(2007-M)

43. The most probable velocity of a gas molecule at $\log \frac{P}{T}$ is 300 m/s. Its RMS. Velocity in m. s^{-1} is

1) 420 2) 245 3) 402 4) 367

(2007-E)

44. A certain mass of a gas occupies a volume of 2 litres at STP. To what temperature the gas must be heated to double its volume, keeping the presure constant?

1) 100 K 2) 273 K 3) 273^0C 4)

(2006-E)

45. Which of the following set of variables give a straight line with a negative slope when plotted ?
(P = vapour pressure. T = Temperature in K)

y-axis	x-axis	y-axis	x-axis
1) P	T	2)	T
3) P		4)	

46. At. T(K), 100 L of dry oxygen is present in a sealed container. It is subjected to silent electric discharge, till the volumes of oxygen and ozone become equal. What is the volume (in litres) of ozone formed at T (K)?

1) 50 2) 60 3) 30 4) 40

47. The volume -temperature graphs of a given mass of an ideal gas at constant pressures are shown below. What is the correct order of pressures ?

1) $P_1 > P_3 > P_2$ 2) 3) 4)

(2005 Engg.)

48. A and B are ideal gases. The molecular weights of A and B are in the ratio of 1 : 4, the pressure of a gas mixture containing equal weights A and B is P atm. What is the partial pressure of 'B' in the mixture?

(1) (2) (3) (4)

(2005 Medical)

49. What is the ratio of kinetic energies of 3 gm. of hydrogen and 4 grams of oxygen at T K?
(1) 12 : 1 (2) 6 : 1 (3) 1 : 6 (4) 24 : 1

5. STOICHIOMETRY

(2009-E)

50. 1.5g of $CdCl_2$ was found to contain 0.9 g of Cd. Calculate the atomic weight of Cd.
1. 118 2. 112 3. 106.5 4. 53.25

(2009-M)

51. The volume of oxygen gas liberated at 27°C and 760mm Hg pressure when 24.5 g of $KClO_3$ is heated:
1) 4.48 lit 2) 9.6 lit 3) 7.4 lit 4) 11.2 lit

(2008-E)

52. Match the following:

List – I

A)

B) $1.06g.NaCO_3 \xrightarrow{excessHCl}$

C) $2.4g.C \xrightarrow[combustion]{excess\ O_2}$

D) $0.56g.CO \xrightarrow[combustion]{excess\ O_2}$

List – II (At STP)

(i) 0.224 lit. CO_2

(ii) 4.48 lit, CO_2

(iii) 0.448 lit. CO_2

iv) 2.24 lit. CO_2

v) 22.4 lit. CO_2

	A	B	C	D
1)	iv	i	ii	iii
3)	iv	i	iii	ii

	A	B	C	D
2)	v	i	ii	iii
4)	i	iv	ii	iii

(2007-M)

53. In an oxidation reduction reaction, dichromate ($Cr_2O_7^{-2}$) ion is reduced to Cr^{+3} ion. The equivalent weight of $K_2Cr_2O_7$ in this reaction is

1) 2) $\frac{\text{Molecular weight}}{6}$ 3) $\frac{\text{Molecular weight}}{1}$ 4) $\frac{\text{Molecular weight}}{2}$

(2007-E)

54. **Assertion (A) :** Equal moles of different substances contain same number of molecules
Reason (R) : Equal weights of different substances contain the same number of constituent particles
The correct answer is
1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true but R is not the correct explanation of A
3) A is true, but R is false 4) A is false, but R is true

(2005 Engg.)

55. '*x*' gms of $CaCO_3$ was completely burnt in air. The weight of the solid residue formed is 28 gm. What is the value of '*x*' (in gms.)?
(1) 44 (2) 200 (3) 150 (4) 50

(2005 Medical)

56. 4 gm of hydrocarbon $\left(C_xH_y\right)$ on complete combustion gave 12 gm of CO_2. What is the empirical formula of the hydrocarbon.
(1) CH_3 (2) C_4H_9 (3) CH (4) C_3H_8

13. ENVIRONMENTAL CHEMISTRY

(2009-E)

57. The chemical entities present in thermosphere of the atmosphere
1) 2) 3) 4)

(2009-M)

58. Which of the following oxides finally dissolve in water to cause acid rain
1) NO, NO_2 2) NO_2, SO_2 3) NO_3, SO_3 4) N_2O_5,SO_3

(2008-E)

59. Among the following compounds, which one is not responsible for depletion of zone layer ?
1) CH_4 2) $CFCl_3$ 3) NO 4) Cl_2

(2008-M)

60. 5 l aqueous solution is kept in the presence of oxygen and suitable micro-organism for five days at 20°C. If the O_2 consumed is 0.2 g, the BOD value of the sample is
1) 4 ppm 2) 0.4 mgl^{-1} 3) 40 ppm 4) 20 mgl^{-1}

(2007-M)

61. Which of the following is not an air pollutant?
1) CO 2) SO_2 3) NO 4) N_2

(2007-E)

62. Bhopal gas tragedy of 1984 was caused by
1) Carbon Monoxide 2) Phosgene 3) Methyl cyanate 4) Methyl Isocyanate

(2005 Engg.)

63. Which of the following is not an air pollutant?
(1) N_2 (2) N_2O (3) NO (4) CO

(2005 Medical)

64. In which part of atmosphere, ozone layer is present?
(1) Stratosphere (2) Troposphere (3) Mesosphere (4) Thermosphere

12. NOBLE GASES

(2009-E)

65. The number of $p\pi - d\pi$ 'pi' bonds present in XeO_3 and XeO_4 molecules, respectively
1) 3, 4 2) 4, 2 3) 2, 3 4) 3, 2

(2009-M)

66. Which of the following statements is not correct ?
1) In the Dewar's method for the separation of noble gases, activated coconut charcoal is used.
2) Krypton is used in miners cap lamps.
3) The electron affinity values of noble gases are nearly equal to zero.
4) Xenon gives different colours when mixed with mercury vapour.

(2008-M)

67. Which of the following statements about Noble gases are correct ?
(I) XeO_3 is an explosive tetrahedral molecule.
(II) In fisher Ringe method, a mixture of $CaCl_2$ and CaC_2 is used to remove N_2 and O_2.
(III) He and Ne are chemically inert due to lack of d-orbitals and high ionization potential.
IV) At 173 K he and Ne are adsorbed on activated charcoal.
The correct answer is
1) I and II 2) II and III 3) II,III and IV 4) I,II, III and IV

(2007-M)

68. In the separation of noble gas mixture from air by Ramsay Rayleigh's first method, the substances used for the removel of and O_2 respectively are
1) Cu and Mg 2) Mg and Cu 3) C and CaC_2 4) KOH solution

(2007-E)

69. Which one of the following noble gases is used in miner's cap lamps ?
1) Helium 2) Neon 3) Argon 4) Krypton

(2006-E)

70. What is the correct order of occurrence (% by weight) in air of Ne, Ar and Kr ?
1) $Ne > Ar > Kr$ 2) 3) 4)

(2005 Engg.)

71 In Fischer-Ringe's method of separation of noble gases mixture from air, _____ is used.
(1) 90% (2) Coconut charcoal
(3) Sodalime + potash solution (4) urea

(2005 Medical)

72 Which of the following is not correct?
(1) has four and four bonds.
(2) The hybridization of in is
(3) Among noble gases, the occurance (present by weight) of argon is highest in air.
(4) Liquid helium is used as Cryogenic liquid.