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Max Time : 2 hr   **Class : 11th Chemistry**   **Max Marks : 50**

Some basic concepts of Chemistry , Structure of Atom , Periodic Classification , Chemical Bonding , Redox

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Section A   [1 x 10 = 10]

Q.1   Number of moles in 1 m^3 gas at NTP are :
   a) 4.46   b) 44.6   c) 446   d) 4460

Q.2   Haemoglobin contains 0.34 % of iron by mass. The number of Fe atoms in 3.3 g of haemoglobin is :
   a) 1.21×10^5 b) 12.0×10^6 c) 1.21×10^{20} d) 3.4×10^{22}

Q.3   The correct set of four quantum numbers for the valence electron of rubidium (Z = 37) is :
   a) 5 , 1 , 1 , + 1/2   b) 6 , 0 , 0 , + 1/2   c) 5 , 0 , 0 , + 1/2   d) 5 , 1 , 0 , + 1/2

Q.4   The characteristics of element X , Y and Z with atomic number respectively are 33 , 53 and 83.
   a)   X and Z are non-metals but Y is a metalloid.   b)   X and Y are metalloid but Z is a metal.
   c)   X , Y and Z are metals.   d)   X is a metalloid , Y is a non-metal , Z is a metal.

Q.5   The ionic radii (in Å) of N^{3-}, O^{2-} and F^{-} are respectively :
   a)   1.71 , 1.40 , 1.36   b) 1.71 , 1.36 , 1.40   c) 1.36 , 1.40 , 1.71   d) 1.36 , 1.71 , 1.40

Q.6   Arrange the following in increasing order of decreasing bond angles : NH_3 , NH_2^- , NH_4^+.

Q.7   If the speed of light is 3×10^8 m/s, calculate the distance covered by light in 2 ns.

Q.8   What would be the IUPAC name and symbol for the element with atomic number 120 and 116.

Q.9   Why electrons are present around the nucleus of an atom do not fall into the nucleus?

Or

   Which element does not have any neutron in it?

Q.10 Out of σ and π-bonds, which one is stronger and why?

Section – B   [2 X 5 = 10]

Q.11 Calculate the oxidation number of each Sulphur atom in the following compounds :
   (a) $Na_2S_2O_3$ (b) $Na_2S_4O_6$ (c) Na_2SO_3 (d) Na_2SO_4

Q.12 Explain dipole moment and write its S.I. unit.

Q.13 Calculate the total number of angular nodes and radial nodes present in 3p orbital.

Or

   What are the maximum and minimum oxidation numbers of N , S and Cl?

Q.14 Explain why cations are smaller and anions are larger in radii than their parent atoms?

Q.15 If the binding energy of electrons in a metal is 250 KJ/mol, what should be threshold frequency of the striking photons?

Section – C   [3 X 5 = 15]

Q.16 The Density of 3 M solution of NaCl is 1.25 g/ml. Calculate the molality of the solution.

Or

Explain Electronegativity and Molality.

Q.17 Assign the position of the elements having outer electronic configuration :

a) $ns^2 np^4$ for n = 3   b) $(n-1) d^2 ns^2$ for n = 4   c) $(n-2) f^7 (n-1)d^1 ns^2$ for n = 6 in the periodic table .

Q.18 Which hybrid orbitals are used by carbon atoms in the following molecules ?

(a) $CH_3 – CH_3$ (b) $CH_3 – CH = CH_2$ (c) $CH_3 – CH_2 – OH$ (d) $CH_3 – CHO$ (e) CH_3COOH

Q.19 1 g of a mixture of carbonates of calcium and magnesium gave 240 cm^3 of CO_2 at STP. Calculate the percentage composition of the mixture.

Q.20 Calculate the wave number for the longest wavelength transition in the Balmer series of atomic Hydrogen.

Section – D   [5 X 3 = 15]

Q.21 (a)   A welding fuel gas contains carbon and hydrogen only. Burning a small sample of it in oxygen gives 3.38 g carbon dioxide, 0.69 g of water and no other products. A volume of 10 L (measured at STP) of this welding gas is found to weight 11.6 g. Calculate : i) empirical formula   ii) molar mass of the gas   iii) molecular formula

(b)   Write the Hybridization and draw the shape of the following : (i) ICl_3 (ii) XeF_4 (iii) PCl_3.

Q.22 (a)   Draw the M.O. diagram of O_2.

(b)   Compare bond order of : (i) F_2 , F_2^- , F_2^+ (ii) NO , NO^+.

Q.23 (a)   Explain Photoelectric effect and plot a graph between:

(i)   Intensity of incident light and Number of ejected electrons.

(ii)   Frequency of incident light and Number of ejected electrons.

(b)   What designation is given to an orbital having :

(i)   n = 2 , l = 1   (ii)   n = 3 , l = 0   (iii)   n = 5 , l = 3

Or

(a)   Balance the following equations by Ion electron method :

(i) I^- (aq) + IO_3^- (aq) + H^+ (aq) $\longrightarrow$ I_2 (aq) + H_2O (l)   [In acidic medium]

(ii) $Cr(OH)_4^-$ (aq) + H_2O_2 (aq) $\longrightarrow$ CrO_4^{2-} (aq) + H_2O (l)   [In basic medium]

(b) The EMF of the following cells are :   Ag | Ag^+ (1 M) || Cu^{2+} (1 M) | Cu : E^o = $-$ 0.46 V

Zn | Zn^{2+} (1 M) || Cu^{2+} (1 M) | Cu : E^o = + 1.1 V

Calculate the e. m. f. of the cell :   Zn | Zn^{2+} (1 M) || Ag^+ (1 M) | Ag