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**Class : 11th Chemistry**

**Sample paper – 1**

**Section A**

1. Total number of electron present in 18 mL of H2O

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.02 x 1023 | b) 6.02 x 1022 | c) 6.02 x 1024 | d) 6.02 x 1025 |

1. How many moles of e- weight 1 kg (wt. of e- = 9.1 x 10-31 kg).

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.022 x 1023 | b) 1031 | c) 1054 | d) 108 |

1. Which of the following will contain same number of atoms as in 20 g of Ca?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 24 mg Mg | b) 12 gm C | c) 8 gm oxygen gas | d) 16 gm oxygen atom |

1. The number of Cl- and Ca2+ ions in 222 gm of CaCl2 are:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 4N , 2N | b) 2N , 4N | c) 1N , 2N | d) 2N , 1N |

1. The order of screening effect of electrons of s, p, d and f orbitals of a given shell of an atom on its outer shell electrons is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) s > p > d > f | b) f > d > p > s | c) p < d < s > f | d) f > p > s > d |

1. The first ionization enthalpies of Na, Mg, Al and Si are in the order :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Na < Mg > Al < Si | b) Na > Mg > Al > Si | c) Na < Mg < Al < Si | d) Na > Mg > Al < Si |

1. Which of the following is the correct order of size of the given species :

|  |  |  |  |
| --- | --- | --- | --- |
| a) I > I - > I+ | b) I+ > I - > I | c) I > I+ > I - | d) I - > I > I+ |

1. Element with valence shell electronic configuration as (n-1)d5 ns1 is placed

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1, s-block | b) 16, s-block | c) 7, s-block | d) 6, s-block |

1. The highly metallic element will have the configuration of

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2, 8, 7 | b) 2, 8 , 8, 5 | c) 2, 8, 8, 1 | d) 2, 8, 2 |

1. Which of the following represents most electro positive element ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) [He] 2s1 | b) [He] 2s2 | c) [Xe] 6s1 | d) [Xe] 6s2 |

1. Screening effect is not observed in

|  |  |  |  |
| --- | --- | --- | --- |
| a) He+ | b) Li2+ | c) Be3+ | d) in all the three |

1. In which case effective nuclear charge is minimum ?

|  |  |
| --- | --- |
| a) Be | b) Be2+ |
| c) Be3+ | d) all have the same effective nuclear charge |

1. Covalent radius of nitrogen is 70 pm. Hence covalent radius of boron is about

|  |  |  |  |
| --- | --- | --- | --- |
| a) 60 pm | b) 110 pm | c) 50 pm | d) 40 pm |

1. The first ionization potential (eV) of Be and B respectively are

|  |  |  |  |
| --- | --- | --- | --- |
| a) 8∙29, 9∙32 | b) 9∙32, 8∙29 | c) 9∙32, 9∙32 | d) 8∙29, 8∙29 |

1. Electronic configuration of most electronegative element is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1s2 2s2 2p6 3s1 | b) 1s2 2s2 2p6 3s2 3p5 | c) 1s2 2s2 2p5 | d) 1s2 2s2 2p6 3s2 3p6 |

1. The ionic radii of isoelectronic species N3- , O2- and F - in Å are in the order :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1∙36 , 1∙40 , 1∙71 | b) 1∙36 , 1∙71 , 1∙40 | c) 1∙71 , 1∙40 , 1∙36 | d) 1∙71 , 1∙36 , 1∙40 |

1. The maximum number of hydrogen bonds that a water molecule can form is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 | b) 2 | c) 3 | d) 4 |

1. Which of the following is not paramagnetic ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) S2- | b) NO | c) | d) |

1. The type of hybrid orbitals used by chlorine atom in is

|  |  |  |  |
| --- | --- | --- | --- |
| a) sp3 | b) sp2 | c) sp | d) none of these |

1. Which contain both polar and non-polar bonds ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) NH4Cl | b) HCN | c) H2O2 | d) CH4 |

1. Among the following, the pair in which the two species are not isostructural is

|  |  |  |  |
| --- | --- | --- | --- |
| a) SiF4 & SF4 | b) & XeO3 | c) & | d) & SF6 |

1. The maximum number of 90˚ angles between bond pair-bond pair of electrons is observed in

|  |  |  |  |
| --- | --- | --- | --- |
| a) dsp3 hybridisation | b) sp3d hybridisation | c) dsp2 hybridisation | d) sp3d2 hybridisation |

1. The ions that is isoelectronic with CO is

|  |  |  |  |
| --- | --- | --- | --- |
| a) | b) | c) | d) CN – |

1. An sp3 hybrid orbitals contains

|  |  |  |  |
| --- | --- | --- | --- |
| a) s-character | b) s-character | c) s-character | d) s-character |

1. The hybridization of ‘C’ in diamond, graphite & acetylene are respectively

|  |  |  |  |
| --- | --- | --- | --- |
| a) sp2, sp, sp3 | b) sp, sp2, sp3 | c) sp3, sp2, sp | d) sp2, sp3,sp |

1. The hybridization of carbon atoms in C-C single bond of HC C CH CH2 is

|  |  |  |  |
| --- | --- | --- | --- |
| a) sp3 – sp3 | b) sp2 – sp3 | c) sp – sp2 | d) sp3 – sp |

1. The hybridization of CH3 CH2  , CH C , CH2 CH are

|  |  |  |  |
| --- | --- | --- | --- |
| a) sp3, sp2, sp | b) sp3, sp, sp2 | c) sp3, sp2, sp2 | d) sp3, sp, sp |

1. The shape of ion would be

|  |  |  |  |
| --- | --- | --- | --- |
| a) square planer | b) tetrahedral | c) irregular tetrahedron | d) square pyramidal |

1. The state of hybridization of Xe in XeF4 is

|  |  |  |  |
| --- | --- | --- | --- |
| a) sp2 | b) sp3 | c) sp3d | d) sp3d2 |

1. Shape of is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Trigonal | b) Linear | c) Octahedral | d) Square planar |

1. Which of the following has fractional bond order?

|  |  |  |  |
| --- | --- | --- | --- |
| a) | b) | c) | d) |

**More than One Options**

1. Which of the following elements can show covalency greater than 4 ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Be | b) P | c) S | d) B |

1. Which of the following have no unit ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Electronegativity | b) Electron gain enthalpy | c) Ionization enthalpy | d) Metallic character |

1. Which of the following processes do not involve absorption of energy :

|  |  |  |  |
| --- | --- | --- | --- |
| a) S (g) + e – → S – (g) | b) O – (g) + e – → O2– (g) | c) Cl (g) + e – → Cl – (g) | d) O (g) + e – → O – (g) |

1. Species having same bond order are

|  |  |  |  |
| --- | --- | --- | --- |
| a) | b) | c) | d) |

1. Paramagnetic species are

|  |  |  |  |
| --- | --- | --- | --- |
| a) | b) | c) | d) |

1. Which of the following have identical bond order ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) CN– | b) | c) NO+ | d) CN+ |

**Section B**

1. The volume of a drop of water is 0.04 ml. How many H2O molecules are there in a drop of water?
2. From 200mg of CO2, 1021 molecules are removed. How many moles of CO2 are left?
3. The measured density at NTP of He is 0.1784 g/l. what is the weight of 1 moles?
4. Calculate the mass of CO2 which contains the same number of molecules as are contained in 40g of oxygen
5. Find the number of atoms of each type present in 3.42 grams of cane sugar (C12H22O11)?
6. How many atoms and molecules of phosphorus are present in 124g of phosphorus (P4)?
7. Calculate the total number of electrons present in 1.4g of nitrogen gas?
8. Calculate the percentage of the naturally occurring isotopes 35Cl and 37Cl that accounts for the atomic mass of chlorine taken as 35.45.
9. Calculate the molar mass of water if it contains 50% heavy water (D2O).
10. What is the Molarity of a barium chloride solution prepared by dissolving 3.5 g of BaCl2.2H2O in enough water to make 500mL of solution? (At. Mass : Ba = 137, Cl = 35.5)
11. Concentration of glucose in normal blood is 90 mg per 100 mL. What is the Molarity of the glucose in blood?
12. Hydrochloric acid is sold commercially as 12 M solution. How many moles and how many grams of HCl are in 300 mL of 12 M solution?
13. Calculate the Molarity of a 96% by mass H2SO4 solution, whose density is 1.78 g/cm3 ?
14. Equal moles of water and urea are taken in flask. What is Mass percentage of H2O in the solution?
15. A sugar syrup of weight 214.2 g contains 34.2 g sugar (C12H22O11). Calculate:

a) Molal concentration b) Mole fraction of sugar in the syrup.

1. Calculate : a) Molarity

b) Molality of sulphuric acid solution of specific gravity 1.198 containing 27% H2SO4 by weight.

1. A salt containing water of crystallization gave the following percentage composition:

Mg = 9.76, S = 13.01, O = 26.01 and H2O = 51.22 . Calculate the simplest formula?

1. A crystalline salt when heated becomes anhydrous and loses 51.2% of its weight. The anhydrous salt on analysis gave the following percentage composition: Mg = 20% S = 26.66% & O = 53.33%

Calculate the molecular formula of the anhydrous salt and the crystalline salt. Molecular mass of the anhydrous salt is 120.

1. A chemical is found to have the following composition:

C= 19.57% Fe = 15.2% N = 22.83% and K = 42.39%

Calculate the empirical formula of the compound. What will be its molecular formula if the molecular mass of the compound is 368?

1. A compound containing sodium, sulphur, hydrogen and oxygen gave the following results on analysis:

Na = 14.28% S = 9.92% and H = 6.20%

Calculate the molecular formula of the anhydrous compound. If all the atoms of hydrogen in the compound are present in combination with oxygen as water of crystallization, what is the structure of the crystalline salt? The molecular mass of the crystalline salt is 322.

1. Define : (a) Molarity (b) Molality (c) Normality (d) Mass percentage (d) Mole fraction
2. Calculate the percentage of higher isotope of neon which has atomic mass 20.2 and the isotopes have the mass number 20 and 22.
3. Find the number of protons, electrons and neutrons in (a) (b)
4. How many neutrons and protons are there in following nuclei?

, , , ,

1. Calculate (a) wave number (b) frequency of yellow radiations having wavelength of 5800 Å.
2. Calculate the frequency of infrared radiations having wavelength 3 x 106 nm.
3. Calculate the range of frequencies of visible light from 3800 – 7600 Å.
4. Calculate the wave number of radiations having a frequency of 4 x 1014 Hz.
5. Calculate the frequency and energy of a photon of radiation having wavelength 6000 Å.
6. A 100 watt bulb emits monochromatic light of wavelength 400 nm. Calculate the number of photons emitted per second by the bulb.
7. What is the ratio between the energies of two radiations, one with a wavelength of 6000 Å and the other with 2000 Å
8. Calculate the wavelength of the spectral line obtained in the spectrum of Li2+ ion when the transition takes place between two levels whose sum is 4 and the difference is 2.
9. Calculate the wavelength from the Balmer formula when n = 3.
10. The mass of an electron is 9.1 x 10 – 31 kg. If its K.E. is 3 x 10 – 25 J. calculate its wavelength.
11. Calculate de Broglie wavelength of an electron moving with 1 % of the speed of light.
12. A microscope using suitable photons is employed to locate an electron in an atom within a distance of 0.1 Å. What is the uncertainty involved in the measurement of its velocity?
13. Calculate the uncertainty in the velocity of a wagon of mass 3000 kg whose position is known to an accuracy of 10 pm (Planck’s constant, h = 6.63 x 10 – 34 J s)
14. Calculate the uncertainty in the position of a dust particle with mass equal to 1 mg if the uncertainty in its velocity is 5.5 x 10 – 20 m/s.
15. Using s , p , d , and f notations, describe the orbitals with the following quantum numbers :

(a) n = 2 , l = 1 (b) n = 4 , l = 0 (c) n = 5 , l = 3 (d) n = 3 , l = 2

1. Which of the following sets of quantum numbers are not permitted ?

|  |  |
| --- | --- |
| a) n = 2 , l = 2 , m = 1 , s = + 1/2 | b) n = 2 , l = 1 , m = 1 , s = 1/2 |
| c) n = 2 , l = 0 , m = 0 , s = 0 | d) n = 2 , l = 1 , m = 2 , s = + 1/2 |

1. Write down the quantum numbers n , l and m for the following orbitals :

(a) (b) (c) (f)

1. If n = 3, what are the values of quantum numbers l and m?
2. Write the correct orbital notations for each of the following sets of quantum numbers :

(a) n = 1 , l = 0 , m = 0 (b) n = 2 , l = 1 , m = 1 (c) n = 3 , l = 2 , m = + 1

1. What designation is given to an orbital having

(a) n = 2 , l = 1 (b) n = 3 , l = 0 (c) n = 5 , l = 3 (d) n = 4 , l = 2

1. Which of the following sets of quantum numbers are not possible ?

|  |  |
| --- | --- |
| a) n = 3 , l = 2 , m = 0 , s = 1/2 | b) n = 3 , l = 2 , m = 2 , s = 1/2 |
| c) n = 3 , l = 3 , m = 3 , s = + 1/2 | d) n = 3 , l = 1 , m = 0 , s = + 1/2 |

1. Give the electronic configuration of the following ions :

(a) Cu2+ (b) Cr3+ (c) Fe2+ and Fe3+  (d) H –  (e) S2 –

1. Give the electronic configurations of the ions : H – 1  , Na+ , N – 1  , N2+
2. What are the atomic numbers of elements whose outermost electrons are represent by :

(a) 3s1 (b) 2p3 (c) 3d6

1. What atoms are indicated by the following configurations ?

(a) [He] 2s1 (b) [Ne] 3s2 3p3 (c) [Ar] 4s2 3d1

1. Define: (a) Isotopes (b) isobars (c) Isoelectronics (d) Isotones (e) Isodiapheres.
2. Explain Photoelectric effect
3. Explain De-Broglie equation and its significance.
4. Explain Plank’s quantum theory.
5. Define Ionization enthalpy and write factors affecting ionization enthalpy.
6. Define Electron Gain enthalpy and write factors affecting Electron gain enthalpy
7. Define Electronegativity enthalpy and write factors affecting electronegativity enthalpy
8. Differentiate between sigma bond and Pia bond
9. Differentiate between Ionic bond and covalent bond
10. Compare the properties of ionic compounds and covalent compounds.
11. Explain Fazan’s rule.
12. Differentiate between Bonding orbitals and anti-bonding orbitals
13. Explain : (a) Pauli exclusion principle (b) Hund’s rule of maximum multiplicity (c) Aufbau rule
14. (a) Draw the M.O. diagram of O2 and F2.

(b) Compare bond order of : (i) F2 , , (ii) NO , NO+.