ASSIGNMENT for SUMMER VACATION

Class : XI   CHEMISTRY

Annexure –A
SOME BASIC CONCEPTS OF CHEMISTRY

1. The density of 3M solution of NaCl is 1.25 g mL^{-1}. Calculate the molality of the solution.

2. How much Sugar in Kg will be required if each person on Earth is given 10^{15} mol sugar per day. Population of Earth is 3×10^{10}.

3. Calculate the number of moles in 4.68 mg of Silicon whose at. Mass is 28u.

4. Balance the following:

    a) $Fe_2(SO_4)_3 + NH_3 + H_2O$ ---------> $Fe(OH)_3 + (NH_4)SO_4$

    b) $Cl_2 + NaOH$ ---------> $NaCl + NaClO_3 + H_2O$

5. Calculate the mass % of different elements present in Sodium sulphate.

6. Calculate the mass of one mole of Electrons.

7. Write the balanced chemical equations for the following reactions:

    (i)   Manganese dioxide and concentrated hydrochloric acid.

    (ii)   Sodium thiosulphate and iodine.

    (iii)   Copper and dilute nitric acid.

    (iv)   Sulphur dioxide and hydrogen sulphide.

8. Balance the following equations:

    (i) H_3PO_3 ------------> $H_3PO_4 + PH_3$.

    (ii) $Ca + H_2O$ --------------> $Ca(OH)_2 + H_2$.

    (iii) $Fe_2(SO_4)_3 + NH_3 + H_2O$ -------------> $Fe(OH)_3 + (NH_4)_2SO_4$.

9. Carbon and oxygen combine to form two oxides having the composition : 1st oxide C= 42.9% and II oxide C=27.3%. Show that the data is in agreement with the law of multiple proportions.

10. Calculate the amount of grams of:

    (i)   2.5 gram atoms of nitrogen

    (ii)   3.6 gram mole of carbondioxide

11. Calculate

    (i)   number of molecules present in 2.24 dm^3 of carbon dioxide at N.T.P.

    (ii)   Mass of an atom of oxygen.

    (iii)   Number of oxygen atoms in 2 mol of ozone.

    (iv)   Volume occupied by 4.4 g of SO_2 at N.T.P.

12. One atom of nickel weighs 9.75×10^{-23} g. Calculate the atomic mass of nickel.

13. Calculate the number of molecules of oxygen in 150 ml of it at 20^0C and 750 mm pressure.

14. How many moles of hydrogen, phosphorus and oxygen are there in 0.4 moles of phosphoric acid (H_3PO_4).

15. What volume of concentrated aqueous sulphuric acid which is 98.0% H_2SO_4 by mass and has a density of $1.84g\ mL^{-1}$ is required to prepare 10.0 L of 0.200M H_2SO_4 solution?

Annexure – B

STRUCTURE OF ATOM

1. Explain why the following sets are not possible:
   a) n=1   l =0   m = 1   s=+1/2
   b) n = 2   l = 2   m = 0   s = -1/2

2. The mass of an electron is 9.1×10^{-31} Kg. If its K.E is 3.0×10^{-25} J, calculate its wavelength. What part of electrdmagnetic spectrum does it belong to ?

3. How many photons of light having a waveiength of 500 nm would provide 1.2 J of energy ?

4. How much energy is required to ionise a H-atom if the electron occupies n = 5. Compare your answer with the ionisation enthalpy of H-atom(energy required to remove the electron from n = 1 orbit.

5. What is the maximum number of emission lines when the ecciyed electron of a H-atom in   n = 6 drops to the ground state ?

6. Calculate the uncertainty in position of an electron if the uncertainty in velocity is 5.7×10^5 ms-1.

7. Calculate the de Broglie wavelength of an electron travelling with a speed equal to 10% of the speed of light.

8. Calculate the wavelength of the spectral line when the electron in the H-atom undergoes transition from n = 4 to n = 2 state.

9. Calculate the wave number for the longest wavelength transition in the Balmer series.

   Mass of an electron = 9.1×10^{-31} Kg

   h = 6.6×10^{-34} Js

   c = 3.0×10^8 ms-1

10. The wavelength of green light from a traffic signal is about 520mm. Calculate the frequency and wave number of this radiation.

11. Bond dissociation energy of a bond (A – B) is 165 KJ mol-1. Calculate the minimum frequency of photon required to break this bond.

12. How many photons of light having a wavelength of 500nm are necessary to provide 1 joule of energy?

13. What is the wavelength of light emitted when the electron in a hydrogen atom undergoes transition from the energy level with n= 4 to the energy level with n=1 ? In which region of the electromagnetic spectrum does this radiation fall?

14. The wavelength of a beam of light is 25.0um. What is (i) its wavelength in cm (ii) its frequency (iii) its wave number and its energy of one of its photons?

15. In the balmer series of atomic spectra of hydrogen atom, a line corresponding to wavelength 656.4 nm was obtained. Calculate the number of higher orbit from which the electron drops to produce this line.
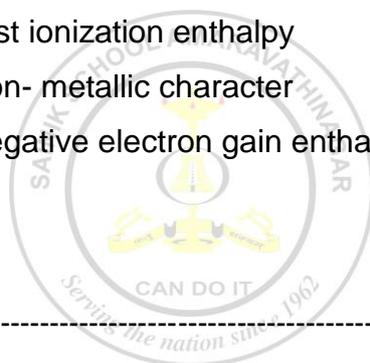
Annexure – C
PERIODIC TABLE

1. Explain the following:
   a) The size of cation is smaller than the corresponding neutral atom.
   b) Ionisation enthalpy of Mg is more than Sodium.
   c) Gallium is smaller than Aluminium.
   d) Electron gain enthalpy of Oxygen is less negative than Sulphur.
   e) Potassium is more reactive than Sodium.

2. Justify the statement: 'Properties of the elements are the periodic function of their atomic number.

3. Explain why Ionisation enthalpies decrease down the group of the periodic table?

4. Account for the fact that the third period of the periodic table has eight and not eighteen elements.

5. What are transition elements? Which of the following are not transition elements ?
   Cu(Z=29), S(=16), Ga(Z=31),Pd(Z=46), U(Z=92).

6. Why is ionisation of B less than that of Be an O is less than that of N?

7. Mg^{2+} is smaller than O^{2-} ion although both although both have same electronic structure . Explain.

8. The increasing order of reactivity among group 1 elements is Li < Na<k <Rb < Cs whereas that among the group 17 elements is F>Cl>Br>I. Explain.

9. Account for the difference in size of Fe^{2+} and fe^{3+} as:
$$Fe^{2+}=0.076nm$$
$$Fe^{3+}=0.064nm$$

10. There is a close relationship between the electronic configuration and the chemical behaviour of elements. Justify the statement giving reasons supported by two examples.

11. Account for the fact that the 4th period has eighteen and not eight elements.

12. Explain why electron gain enthalpy of atoms become more negative from left to right along a period in the periodic table.

13. Lanthanoids and actinoids are placed in separate rows at the bottom of the periodic table. Explain the reason for this arrangement.

14. Answer the following with reasons:

      (a) Which element has higher value of negative electron gain enthalpy, F or Cl?

      (b) Which element has larger atomic volume, Na or K ?

      (c) Which element has smaller size, O or F ?

      (d) Which element is more metallic, Na or Cl?

      (e) Which element has larger second ionisation enthalpy, Na or F ?

15. Consider the elements N, p, O and S and arrange them in order of

      (i)   Increasing first ionization enthalpy

      (ii)   Increasing non- metallic character

      (iii)   Increasing negative electron gain enthalpies.

Annexure – D   PROJECT WORK

1. Environmental Chemistry
2. Redox reaction: a basis for Electrochemistry
3. Atomic models
4. Mole concept in stoichiometric calculation
5. Genesis of Modern periodic table
6. States of matter
7. pH of solutions
8. Hydrolysis of salts
9. Acid-base titration and Indicators
10. Types of reactions.