INDIAN SCHOOL SOHAR
UNIT TEST
CHEMISTRY

Class : XI **Time : 2.00 Hrs.**
Date : 16.05.2017 **Max. Marks : 50**

General Instructions:

(i) All questions are compulsory.
(ii) Question numbers 1 and 2 are very short answer questions carrying 1 mark each.
(iii) Question numbers 3 to 7 are short answer questions carrying 2 marks each.
(iv) Question numbers 8 to 15 are also short answer questions carrying 3 marks each.
(v) Question numbers 16 is a value based question carrying 4 marks.
(vi) Question numbers 17 and 18 are long answer questions carrying 5 marks each.
(vii) Use log tables, if necessary. Use of calculator is not allowed.

1. If 6.02×10^{23} molecules of N_2 react completely with H_2 according to the equation: $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$, then calculate the number of molecules of NH_3 formed.
2. Atomic number of sulphur is 16 and that of oxygen is 8. Calculate the total number of protons in a sulphite ion.
3. Calculate the concentration of nitric acid in moles per litre in a sample which has a density, $1.41 gmL^{-1}$ and the mass per cent of nitric acid in it being 69%.

   OR

   1M solution of $NaNO_3$ has density $1.25 gcm^{-3}$. Calculate its molality. (Mol. Wt. of $NaNO_3$ = $85 gmol^{-1}$)
4. Calculate the volume of O_2 at STP liberated by heating 12.25g of $KClO_3$. (At.wt. of K = 39, Cl = 35.5, O = 16)
5. An organometallic compound on analysis was found to contain C = 64.4%, H = 5.55% and Fe = 29.9%. Determine its empirical formula. (Atomic mass of Fe = 56).
6. One of the spectral lines of caesium has a wavelength of 456 nm. Calculate the frequency of this line ($c = 3.0 \times 10^8 ms^{-1}$).
7. Calculate the number of protons, neutrons and electrons in $^{80}_{35}Br$
8. Calculate the molecular mass of the following: (i) H_2O (ii) CO_2 (iii) CH_4
9. 50 kg of $N_{2(g)}$ and 10.0 kg of $H_{2(g)}$ are mixed to produce $NH_{3(g)}$. Calculate the $NH_{3(g)}$ formed. Identify the limiting agent in the production of NH_3 in this situation.

   OR

   (i) What is limiting agent?
   (ii) Chlorine is prepared in laboratory by treating manganese dioxide (MnO_2) with aqueous hydrochloric acid according to the reaction:
   $4HCl_{(aq)} + MnO_{2(s)} \rightarrow 2H_2O_{(l)} + MnCl_{2(aq)} + Cl_{2(g)}$
   How many grams of HCl react with 5.0g of manganese dioxide? (Atomic mass of Mn = 55u, O = 16 u, H = 1u, Cl = 35.5 u)
10. How many moles of methane are required to produce 22g of $CO_{2(g)}$ after combustion?
11. A solution is prepared by adding 2g of a substance A to 18 g of water. Calculate the mass per cent of the solute.
12. If 4g of NaOH dissolved in 36g of H_2O, calculate the mole fraction of each component in the solution. Also, determine the molarity of solution (specific gravity of solution is $1 gmL^{-1}$).
13. (i) State Avogadro's law.

(ii) What mass of $CaCl_2$ will be formed by reaction of excess of $CaCO_3$ with 25mL of 0.75M HCl according to the equation:

$CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$

(At. Mass of Ca = 40, C =12, O =16, Cl = 35.5 and H = 1)

14. (i) What is photoelectric effect?
    (ii) Define work function.
15. Arrange the following type of radiations in increasing order of frequency: (i) radiation from microwave oven (ii) amber light from traffic signal (iii) radiation from FM (iv) cosmic rays from outer space and (v) X-rays.
16. Wilhelm Roentgen showed that when electrons strike a material in the cathode ray tube, produces rays which can cause fluorescence in the fluorescent material placed outside the cathode ray tubes.

    These rays were called X-rays which were not deflected by electric and magnetic field. X-rays are used as a diagnostic tool in the treatments of diseases and bone fractures. John was arrested by custom officials as he was smuggling drugs and caught by X-ray machines.

    (i) The approximate wavelength of X-rays is _____.
    (ii) Why are X-rays used at airports, to screen luggage?
    (iii) What values are not possessed by John? What measures should be taken to prevent this?
17. A box contains some identical red coloured balls, labelled as A, each weighing 2 g. Another box contains identical blue coloured balls labelled as B, each weighing 5 g. Consider the combinations AB, AB_2, A_2B and A_2B_3 and show that the law of multiple proportions is applicable.

    OR

    1.80 g of a certain metal burnt in oxygen gave 3.0g of its oxide. 1.50g of the same metal is heated in steam gave 2.50g of its oxide. Which law is shown by this data? By calculations illustrate it.
18. Threshold frequency, ν_0 is the minimum frequency which a photon must possess to eject an electron from a metal. It is a different for different metals. When a photon of frequency $1.0 \times 10^{15} s^{-1}$ was allowed to hit a metal surface, an electron having 1.988×10^{-19} J of kinetic energy was emitted. Calculate the threshold frequency of this metal. Show that an electron will not be emitted if a photon with a wavelength equal to 600nm hits the metal surface.($h = 6.63 \times 10^{-34}$Js)

    OR

    (i) In Millikan's experiment, static electric charge on the oil drops has been obtained by shining X-rays. If the static electric charge on the oil drop is -1.282×10^{-18}C, calculate the number of electrons present on it.(Charge of an electron = 1.6×10^{-19} C)
    (ii) In Rutherford's experiment, generally the thin foil of heavy atoms, like gold, platinum etc. have been used to be bombarded by α particles. If the thin foil of light atoms such as aluminium is used, what difference would be observed from the above results?