Saitech Informatics

43, Haridoss Main Rd, CH-99. Ph:9444929163

BASIC CONCEPTS IN CHEMISTRY

Class 11 - Chemistry

Time Allowed: 1 hour and 29 minutes **Maximum Marks: 45**

1. What is the SI unit of mass? How is it defined? **[1]**
2. Why are the atomic masses of most of the elements fractional? **[1]**
3. Two substances X and Y combine to give a substance Z. The process is exothermic and Z has properties different from those of X and Y. Is the substance Z, an element, a mixture or a compound? Give explanation to support your answer. **[1]**
4. For precious stone, carat is used for specifying its mass. If 1 carat = 3.08647 grains (a unit of mass) and 1 gram = 15.4324 grains. Find the total mass in kilogram of a ring that contains 0.700 carat diamond and 5.00 gram gold. **[1]**
5. Calculate the number of gram molecules of water in a beaker containing 576 g of water. **[1]**
6. Give an example of molecule in which the ratio of the molecular formula is six times the empirical formula. **[1]**
7. Volume of a solution changes with change in temperature, then will the molality of the solution be affected by temperature? Give reason for your answer. **[1]**
8. What is the difference between precision and accuracy? **[1]**
9. What is stoichiometry? **[1]**
10. At what temperature will both the Celsius and Fahrenheit scales read the same value? **[1]**
11. 10 mL of a solution of NaCl containing KCl, gave an evaporation 0.93 g of the mixed salt. This salt - mixture gave 1.865 g of AgCl by reacting with Ag NO_3 solution. **[3]**

    Calculate the quantity of NaCl in 10 mL of the solution.

    Given: Atomic masses; Ag = 108, Cl = 35.5, K = 39.0, N = 14.0, O = 16.0
12. The vapour density of a mixture of NO_2 and N_2O_4 is 38.3 at 27°C. Calculate the number of moles of NO_2 in 100 g of the mixture. **[3]**
13. Calcium carbonate reacts with aqueous HCl to give $CaCl_2$ and CO_2 reaction given below: **[3]**

    $CaCO_3(s) + 2HCl\ (aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$

    What mass of $CaCl_2$ will be formed when 250 mL of 0.1 M HCl reacts with 1000 g of $CaCO_3$? Name the limiting reagent. Calculate the number of moles of $CaCl_2$ formed in the reaction.
14. The density of water at room temperature is 1.0g / mL. **[3]**

    How many molecules are there in a drop of water if its volume is 0.05 mL?
15. An alloy of iron (53.6%), nickel (45.8 %) and manganese (0.6 %) has a density of 8.17 g cm^{-3}. Calculate the number of Ni atoms present in the alloy of dimensions 10.0 cm $\times$ 20.0 cm $\times$ 15.0 cm **[3]**
16. i. Give an example of a molecule in which **[5]**

    a. The ratio of the molecular formula and the empirical formula is 6: 1.

    b. Molecular weight is two times of the empirical formula weight.

c. The empirical formula is CH_2O and the ratio of molecular formula weight and empirical formula weight is 6.

ii. 1.615 g of anhydrous $ZnSO_4$ was left in moist air. After a few days its weight was found to be 2.875 g. What is the molecular formula of hydrated salt?
(At. masses: Zn = 65.5, S = 32, O=16, H = 1)

17. Arrange the following in order of their increasing masses in gram: **[5]**

i. one atom of silver,
ii. one gram-atom of nitrogen,
iii. one mole of calcium, carbon and
iv. one mole of oxygen molecules,
v. 10^{23} atoms of carbon.

18. i. Calculate the atomic mass (average) of chlorine using the following data : **[5]**

	% natural abundance	**Molar mass**
^{35}CI	75.77	34.9689
CI	24.23	36.9659

ii. In three moles of ethane (C_2H_6), calculate the following:

a. Number of moles of carbon atoms
b. Number of moles of hydrogen atoms
c. Number of molecules of ethane

19. i. The density of the water at room temperature is 1.0 g/mL. How many molecules are there in a drop of water if its volume is 0.05 mL? **[5]**

ii. An alloy of iron (53.6 %), nickel (45.8 %) and manganese (0.6 %) has a density of 8.17 g cm^{-3}. Calculate the number of Ni atoms present in the alloy of dimensions 10.0 cm$\times$ 20.0 cm $\times$ 15.0 cm.