# St. Mary's School, Dwarka
# Holiday Homework
# Class XI
# Subject: Chemistry (043)

**Objective:**

- To enable the students to revise the concepts already taught in the class.
- Application of the concepts to real life situations.
- To give an exposure to the students about the type of HOTS questions related to the topic.

## Worksheet 1

Instructions: Attempt the questions keeping in mind the weightage of each question.

Q1. Activity : Take small size mangoes, labelled as A, let each weighing 2 units. Take big size mangoes, labelled as B, let each weighing 5 units. Consider the combinations AB, $AB_2$, $A_2B$ and $A_2B_3$ and show that law of multiple proportions is applicable. 4

Q.2 What will be the molarity of a solution, which contains 5.85 g of NaCl(s) per 500 mL? 1

Q.3 What will be the mass of one atom of C-12 in grams? 1

Q.4 What is the symbol for SI unit of mole? How is the mole defined? 1

Q.5 What is the difference between molality and molarity? 1

Q.6 Calculate the mass percent of calcium, phosphorus and oxygen in calcium phosphate $Ca_3(PO_4)_2$. 2

Q.7 45.4 L of dinitrogen reacted with 22.7 L of dioxygen and 45.4 L of nitrous oxide was formed. The reaction is given below:

$2N_2(g) + O_2(g) \longrightarrow 2N_2O(g)$

Which law is being obeyed in this experiment? Write the statement of the law? 2

Q.8 If two elements can combine to form more than one compound, the masses of one element that combine with a fixed mass of the other element, are in whole number ratio.

(a)Is this statement true?

(b)If yes, according to which law?

(c)Give one example related to this law. 2

Q.9 Hydrogen gas is prepared in the laboratory by reacting dilute HCl with granulated zinc. Following reaction takes place.

$Zn + 2HCl \longrightarrow ZnCl_2 + H_2$

Calculate the volume of hydrogen gas liberated at STP when 32.65 g of zinc reacts with HCl. 1 mol of a gas occupies 22.7 L volume at STP; atomic mass of Zn = 65.3 u. 3

Q.10 The density of 3 molal solution of NaOH is 1.110 g $mL^{-1}$. Calculate the molarity of the solution. 3

## Worksheet 2

Q.1 Activity : Observe the packed food item at your home. Find out the kind of packaging materials used. Categorised them into metal based and other materials. Deduce a suitable method to either decompose them at home or reuse in home ? 1

Q.2 A measured temperature on Fahrenheit scale is 200 °F. What will this reading be on Celsius scale? 1

Q.3 One mole of any substance contains $6.022\times10^{23}$ atoms/molecules. Number of molecules of $H_2SO_4$ present in 100 mL of 0.02M $H_2SO_4$ solution is _____. 1

Q.4 One mole of oxygen gas at STP is equal to _____. 1

Q.5 How many significant figures should be present in the answer of the following calculations? 2.51 x 1.25 x 3.5/ 2.01 1

Q.6 Calculate the average atomic mass of hydrogen using the following data : 2

| Isotope | %Natural abundance | Molar mass |
|---|---|---|
| $^{1}H_1$ | 99.985 | 1 |
| $^{2}H_1$ | 0.015 | 2 |

Q.7 The reactant which is entirely consumed in reaction is known as limiting reagent. In the reaction $2A + 4B \rightarrow 3C + 4D$, when 5 moles of A react with 6 moles of B, then
(i)which is the limiting reagent?
(ii)calculate the amount of C formed? 2

Q.8 What does the following prefixes stand for –
(a) pico (b) nano (c) centi (d) deci 2

Q.9 If 4 g of NaOH dissolves in 36 g of $H_2O$, calculate the mole fraction of each component in the solution. Also, determine the molarity of solution (specific gravity of solution is 1g/mL) 3

Q.10 Vitamin C is essential for the prevention of scurvy. Combustion of 0.2000g of vitamin C gives 0.2998g of $CO_2$ and 0.819g of $H_2O$. What is the empirical formula of vitamin C? 3

## Worksheet 3

Q.1 Collect the different type of washing and bathing soap available at home. Check there foaming capacity by adding equal amount of soap and water in each case. What is the effect of adding a pinch of baking soda in the formation of lathers.
Write a detail report on the above activity. 1

Q.2 If 500 mL of a 5M solution is diluted to 1500 mL, what will be the molarity of the solution obtained? 1

Q.3 What will be the molality of the solution containing 18.25 g of HCl gas in 500 g of water? 1

Q.4 Which of the following terms are unitless?
(i)Molality (ii)Molarity (iii)Mole fraction (iv)Mass percent 1

Q.5 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

Q.6 What is the difference between molecules and compounds? Give examples of each. 2

Q.7 Write seven fundamental quantities & their units. 2

Q.8 Find out atomic number, mass number, number of electron and neutron in an element $^{40}X_{20}$? 2

Q.9 Calculate the frequency and energy of a photon of radiation having wavelength 3000$^{o}$A. 3

Q.10 a. What is the relation between kinetic energy and frequency of the photoelectrons?
b. What did Einstein explain about photoelectric effect? 3

## Worksheet 4

Q.1 Take 5 equal size porcelain plates and numbered them as 1,2,3,4 and 5. Take 5 m L of water, vinegar, alcohol based sanitizer, acetone (nail polish remover) and either glycerine or honey. Pour all these liquids into plates respectively. With the help of stopwatch find out the time taken by each liquid to change into vapour. (Study the rates of evaporation of different liquids). Keep record of evaporation time and click picture of this activity. 1

Q.2 If the concentration of glucose ($C_6H_{12}O_6$) in blood is 0.9 g $L^{-1}$, what will be the molarity of glucose in blood? 1

Q.3 What is the mass percent of carbon in carbon dioxide? 1

Q.4 "Compounds are formed when atoms of different elements combine in a fixed ratio". Which of the following laws is not related to this statement?
(i)Law of conservation of mass (ii) Law of definite proportions
(iii)Law of multiple proportions (iv)Avogadro law 1

Q.5 Classify following substances as element, compounds and mixtures – water, tea, silver, steel, carbon-dioxide and platinum 1

Q.6 What is the difference between mass & weight? How is mass measured in laboratory? 2

Q.7 How is volume measured in laboratory? Convent 0.5L into ml and 30$cm^3$ to $dm^3$ 2

Q.8 Calculate the wavelength corresponding to a frequency of 98.8MHz. 2

Q.9 Calculate energy of 2mole of photons of radiation whose frequency is $5 \times 10^{14}$ Hz 3

Q.10 a. What is emission and absorption spectra?
b. Spectral lines are regarded as the finger prints of the elements. Why? 3