

# ARMY PUBLIC SCHOOL RATNUCHAK

SESSION: 2017-18

## WORKSHEET

CLASS XI

MATHEMATICS

Q1. Draw the Venn diagrams to illustrate the following relationship among sets E, M and U, where E is the set of students studying English in a school, M is the set of students studying Mathematics in the same school, U is the set of all students in that school.

- All the students who study Mathematics study English, but some students who study English do not study Mathematics.
- There is no student who studies both Mathematics and English.
- Some of the students study Mathematics but do not study English, some study English but do not study Mathematics, and some study both.
- Not all students study Mathematics, but every student studying English studies Mathematics.

Q2. Use the properties of sets to prove that for all the sets A and B

$$A - (A \cap B) = A - B$$

Q3. In a group of 50 students, the number of students studying French, English, and Sanskrit were found to be as follows: French = 17, English = 13, Sanskrit = 15 French and English = 09, English and Sanskrit = 4, French and Sanskrit = 5, English, French and Sanskrit = 3. Find the number of students who study

- |                           |   |
|---------------------------|---|
| (i) French only           | (v) French and Sanskrit but not English           |
| (ii) English only         | (vi) French and English but not Sanskrit          |
| (iii) Sanskrit only       | (vii) at least one of the three languages         |
| (iv) English and Sanskrit | (viii) none of the three languages but not French |

Q4. Let A and B be two sets such that  $n(A) = 24$ ,  $n(A \cup B) = 46$  and  $n(A \cap B) = 8$ . Find

- (i)  $n(B)$     (ii)  $n(A - B)$     (iii)  $n(B - A)$

Q5. In a survey of 800 students in a school 200 were listed as taking apple juice, 250 taking orange juice and 125 were taking both apple as well as orange juice. Find how many students were taking neither apple juice nor orange juice.

Q6. In a class of 35 students, 17 have taken mathematics 10 have taken mathematics but not economics. Find the number of students who have taken both mathematics and economics and the number of students who have taken economics but not mathematics, if it is given that each student has taken either mathematics or economics or both.

Q7. Using laws of algebra of sets, show that (i)  $(A \cup B) \cap (A \cup B) = A$  (ii)  $A \cup (B - A) = A \cup B$

Q8. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medal in all the three sports, how many received medals in exactly two of the three sports?

Q9. There are 210 members in a club. 100 of them drink tea and 65 drink tea but not coffee, each member drinks tea or coffee. Find how many drink coffee, how many drink coffee, but not tea.

Q10. Two finite sets have m and n elements. The total no. of subsets of the first set is 56 more than the total no. of subsets of second set. Find the value of m and n.

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## WORKSHEET

### SOME BASIC CONCEPTS OF CHEMISTRY

CLASS XI

SCIENCE

#### Type-I Questions

1. A measured temperature on Fahrenheit scale is 200 °F. What will this reading be on Celsius scale?
2. What will be the molarity of a solution, which contains 5.85 g of NaCl(s) per 500 mL?
3. If 500 mL of a 5M solution is diluted to 1500 mL, what will be the molarity of the solution obtained?
4. The number of atoms present in one mole of an element is equal to Avogadro number. Which of the following element contains the greatest number of atoms?
  - (i) 4g He
  - (ii) 46g Na
  - (iii) 0.40g Ca
  - (iv) 12g He
5. If the concentration of glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) in blood is 0.9 g L<sup>-1</sup>, what will be the molarity of glucose in blood?
6. What will be the molality of the solution containing 18.25 g of HCl gas in 500 g of water?
7. One mole of any substance contains 6.022 × 10<sup>23</sup> atoms/molecules. Number of molecules of H<sub>2</sub>SO<sub>4</sub> present in 100 mL of 0.02M H<sub>2</sub>SO<sub>4</sub> solution is \_\_\_\_\_
8. What is the mass percent of carbon in carbon dioxide?
9. The empirical formula and molecular mass of a compound are CH<sub>2</sub>O and 180 g respectively. What will be the molecular formula of the compound?
10. If the density of a solution is 3.12 g mL<sup>-1</sup>, the mass of 1.5 mL solution in significant figures is \_\_\_\_\_.
11. Which of the following reactions is not correct according to the law of conservation of mass.
  - (i) 2Mg(s) + O<sub>2</sub>(g) → 2MgO(s)
  - (ii) C<sub>3</sub>H<sub>8</sub>(g) + O<sub>2</sub>(g) → CO<sub>2</sub>(g) + H<sub>2</sub>O(g)  
S200 mL of water vapour.

#### Type-II Questions

In the following questions two or more options may be correct.

1. One mole of oxygen gas at STP is equal to \_\_\_\_\_.
  - (i) 6.022 × 10<sup>23</sup> molecules of oxygen
  - (ii) 6.022 × 10<sup>23</sup> atoms of oxygen
  - (iii) 16 g of oxygen
  - (iv) 32 g of oxygen
2. Sulphuric acid reacts with sodium hydroxide as follows :  
$$\text{H}_2\text{SO}_4 + 2\text{NaOH} \longrightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$$

When 1L of 0.1M sulphuric acid solution is allowed to react with 1L of 0.1M sodium hydroxide solution, the amount of sodium sulphate formed and its molarity in the solution obtained is

  - (i) 0.1 mol L<sup>-1</sup>
  - (ii) 7.10 g
  - (iii) 0.025 mol L<sup>-1</sup>
  - (iv) 3.55 g
3. Which of the following pairs have the same number of atoms?
  - (i) 16 g of O<sub>2</sub> (g) and 4 g of H<sub>2</sub>(g)
  - (ii) 16 g of O<sub>2</sub> and 44 g of CO<sub>2</sub>
  - (iii) 28 g of N<sub>2</sub> and 32 g of O<sub>2</sub>

- (iv) 12 g of C(s) and 23 g of Na(s)
4. Which of the following solutions have the same concentration?
- 20 g of NaOH in 200 mL of solution
  - 0.5 mol of KCl in 200 mL of solution
  - 40 g of NaOH in 100 mL of solution
  - 20 g of KOH in 200 mL of solution
5. 16 g of oxygen has same number of molecules as in
- 16 g of CO
  - 28 g of N<sub>2</sub>
  - 14 g of N<sub>2</sub>
  - 1.0 g of H<sub>2</sub>
6. Which of the following terms are unitless?
- Molality
  - Molarity
  - Mole fraction
  - Mass percent
7. One of the statements of Dalton's atomic theory is given below:  
 "Compounds are formed when atoms of different elements combine in a fixed ratio"  
 Which of the following laws is not related to this statement?
- Law of conservation of mass
  - Law of definite proportions
  - Law of multiple proportions
  - Avogadro law

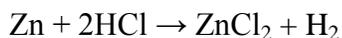
$$\frac{2.5 \times 1.25 \times 3.5}{2.01}$$

### Type-III Questions: Short Answer Type Questions

- What will be the mass of one atom of C-12 in grams?
- How many significant figures should be present in the answer of the following calculations?
- What is the difference between molality and molarity?
- Calculate the mass percent of calcium, phosphorus and oxygen in calcium phosphate Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>.
- 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:  
 $2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{N}_2\text{O}(\text{g})$   
 Which law is being obeyed in this experiment? Write the statement of the law?
- 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.
  - Is this statement true?
  - If yes, according to which law?
  - Give one example related to this law.
- Calculate the average atomic mass of hydrogen using the following data :

Isotope	% Natural abundance	Molar mass
<sup>1</sup> H	99.985	1
<sup>2</sup> H	0.015	2

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



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.

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

10. 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.

11. If 4 g of NaOH dissolves in 36 g of  $\text{H}_2\text{O}$ , calculate the mole fraction of each component in the solution. Also, determine the molarity of solution (specific gravity of solution is  $1 \text{ g mL}^{-1}$ ).

12. The reactant which is entirely consumed in reaction is known as limiting reagent. In the reaction  $2\text{A} + 4\text{B} \rightarrow 3\text{C} + 4\text{D}$ , 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?

#### **Type-IV Questions: Assertion and Reason Type Questions**

In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.

1. Assertion (A): The empirical mass of ethene is half of its molecular mass.

Reason (R): The empirical formula represents the simplest whole number ratio of various atoms present in a compound.

(i) Both A and R are true and R is the correct explanation of A.

(ii) A is true but R is false.

(iii) A is false but R is true.

(iv) Both A and R are false.

2. Assertion (A) : One atomic mass unit is defined as one twelfth of the mass of one carbon-12 atom.

Reason (R) : Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as standard.

(i) Both A and R are true and R is the correct explanation of A.

(ii) Both A and R are true but R is not the correct explanation of A.

(iii) A is true but R is false.

(iv) Both A and R are false.

3. Assertion (A) : Significant figures for 0.200 is 3 whereas for 200 it is 1.

Reason (R) : Zero at the end or right of a number are significant provided they are not on the right side of the decimal point.

(i) Both A and R are true and R is correct explanation of A.

(ii) Both A and R are true but R is not a correct explanation of A.

(iii) A is true but R is false.

(iv) Both A and R are false.

4. Assertion (A) : Combustion of 16 g of methane gives 18 g of water.

Reason (R) : In the combustion of methane, water is one of the products.

(i) Both A and R are true but R is not the correct explanation of A.

(ii) A is true but R is false.

(iii) A is false but R is true.

(iv) Both A and R are false.

## Type-V Questions: Long Answer Type Questions

1. A vessel contains 1.6 g of dioxygen at STP (273.15K, 1 atm pressure). The gas is now transferred to another vessel at constant temperature, where pressure becomes half of the original pressure. Calculate
  - (i) volume of the new vessel.
  - (ii) number of molecules of dioxygen.
2. Calcium carbonate reacts with aqueous HCl to give CaCl<sub>2</sub> and CO<sub>2</sub> according to the reaction given below:  
$$\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$$

What mass of CaCl<sub>2</sub> will be formed when 250 mL of 0.76 M HCl reacts with 1000 g of CaCO<sub>3</sub> ? Name the limiting reagent. Calculate the number of moles of CaCl<sub>2</sub> formed in the reaction.
3. Define the law of multiple proportions. Explain it with two examples. How does this law point to the existence of atoms?
4. A box contains some identical red coloured balls, labelled as A, each weighing 2 grams. Another box contains identical blue coloured balls, labelled as B, each weighing 5 grams. Consider the combinations AB, AB<sub>2</sub>, A<sub>2</sub>B and A<sub>2</sub>B<sub>3</sub> and show that law of multiple proportions is applicable.

