# INDIAN SCHOOL AL WADI AL KABIR

**UNIT TEST (2024-25)**
**Sub: Chemistry (043)**
**SET-1**

**Date: 02.06.2024** **Max. Marks: 30**
**Class: XI** **Time Allowed: 01 hour**

**General Instructions:**

**Read the following instructions carefully.**

(a) There are 15 questions in this question paper with internal choice.

(b) SECTION A consists of 08 multiple -choice questions carrying 1 mark each.

(c) SECTION B consists of 02 short answer questions carrying 02 marks each.

(d) SECTION C consists of 03 short answer questions carrying 03 marks each.

(e) SECTION D consists of 01 case - based question carrying 4 marks.

(f) SECTION E consists of 01 long answer question carrying 05 marks.

(g) All questions are compulsory.

(h) Use of log tables and calculators is not allowed.

## SECTION A

**The following questions are multiple -choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.**

1. Irrespective of the source, pure sample of water always yields 88.89% mass of oxygen and 11.11% mass of hydrogen. This is explained by the law of
   (a) conservation of mass
   (b) definite proportion
   (c) multiple proportion
   (d) Avogadro law

2. The radius of Bohr orbit is _____
   (a) 52.9 m
   (b) 52.9 pm
   (c) 105.8 m
   (d) 105.8 pm

3. Two flasks A and B of equal capacity contain $NH_3$ and $SO_2$ gas respectively under similar conditions. Which flask has more number of moles?

(a) Flask A
(b) Flask B
(c) Both flasks have same no: of moles.
(d) Cannot be predicted as they are two different gases.

4. Magnesium reacts with HCl by the reaction
$Mg(s) + 2HCl\ (aq) \rightarrow MgCl_2\ (aq) + H_2\ (g)$
Calculate the moles of HCl required to produce 3 moles of $H_2$.
(a) 6 moles of HCl
(b) 3 moles of HCl
(c) 2 moles of HCl
(d) 1 mole of HCl

5. The molecular mass of ethanol is _____ (Atomic mass of C = 12u, H = 1 u, O = 16 u)
(a) 46 g
(b) 45 u
(c) 46 u
(d) 30 u

6. The empirical formula of a compound 'X' is $C_4H_{10}S$. The molar mass of the compound 'X' is $180 gmol^{-1}$. The molecular formula of the compound 'X' is _____
(Atomic mass of C=12 u, H=1u, S=32 u)
(a) $C_4H_{10}S$
(b) $C_2H_5S$
(c) $C_8H_{20}S_2$
(d) $C_3H_{10}S_3$

7. Given below are two statements labelled as Assertion (A) and Reason (R)
**Assertion (A):** The stationary states for electron are numbered as n = 1,2,3.....
**Reason (R):** The stationary states are arranged concentrically around the nucleus.

Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

8. Given below are two statements labelled as Assertion (A) and Reason (R)
**Assertion (A):** Molarity is the number of moles of solute present in 1 kg of the solvent.
**Reason (R):** Molarity is temperature dependent.

Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

## SECTION B

**This section contains 02 questions. The following questions are very short answer type and carry 2 marks each.**

9. (a) Calculate the no: of atoms in 72 u of Mg. (Atomic mass of Mg = 24 u).
   (b) A solution is prepared by adding 3 g of a solute to 27 g of water. Calculate the mass per cent of the solute.

**OR**

   (a) Define the term molality.
   (b) Is molality affected by dilution. Explain.

10. Write any two limitations of Bohr model of atom.

## SECTION C

**This section contains 03 questions with internal choice in one question. The following questions are short answer type and carry 03 marks each.**

11. (a) Define the term 'mole'.
   (b) Calculate the number of H atoms in 3.42 g of $C_{12}H_{22}O_{11}$. (Atomic mass of H=1u, C= 12u, O= 16u)

12. What are the frequency and wavelength of a photon emitted during a transition from n = 5 state to the n = 1 state in the hydrogen atom? (h= $6.626 \times 10^{-34}$ Js, c = $3\times10^{8}$ $ms^{-1}$)

13. (a) Mole fraction is a unit less quantity. Justify.
   (b) Calculate the mole fraction of NaCl and $H_2O$ if 2 moles of NaCl are dissolved in 72 g of water. (Molar mass of $H_2O$ = 18 $gmol^{-1}$)

**OR**

   (a) What is atomic mass unit?
   (b) A solution of fructose (Molar mass = 180 $gmol^{-1}$) is labelled as 10% by mass. What would be the molarity of the solution? Density of the solution is 1.8 $gml^{-1}$.

## SECTION D

**The following question is a case -based question. The question carries 4 (1+1+2) marks. Read the passage carefully and answer the questions that follow.**

14.

In atomic physics, the Bohr model is an obsolete model of the atom, presented by Niels Bohr. It consists of a small, dense nucleus surrounded by orbiting electrons. It is analogous to the structure of the Solar System, but with attraction provided by electrostatic force rather than gravity, and with the electron energies quantized. (assuming only discrete values).
The Bohr model says that the angular momentum of an electron within a hydrogen atom can only be integer multiples of a certain number.

Bohr's model is also useful because it explains the cause of light. Bohr agreed with classical theory that light has a wave-particle duality (meaning that it is made of both electromagnetic waves and particles called photons), but he said that light was given off when an electron in a hydrogen atom jumps from a higher

energy level to a lower one. Basically, if an electron with *x* amount of energy goes to a lower state of energy and loses *y* energy, then a photon with energy *y* is emitted by the atom and either becomes light or some other form of radiation.

(a) Write an equation to express angular momentum of an electron.
(b) What is Bohr frequency rule?
(c) Calculate the energy associated with the first orbit of $He^{+}$ ion.

**OR**

(c) Calculate the radius associated with second orbit of $Li^{2+}$ ion.

## SECTION E

**The following question is a long answer type question and carry 5 marks. There is an internal choice.**

15. (a) State law of Multiple proportion.
    (b) Calculate the mass percent of different elements present in Glucose. ($C_6H_{12}O_6$)
    (c) Calculate the mass of NaOH required to make 500 ml of 0.01 M aqueous solution. The molar mass of NaOH = 40 $gmol^{-1}$.

OR

    (a) Write the empirical formula for
        (i) $C_2H_6$ (ii) $CH_3OH$
    (b) Define the term limiting reagent.
    (c) 23 g of Na reacts with 16 g of S to form Sodium sulphide as per the reaction
        $2Na + S \rightarrow Na_2S$
    Calculate the mass of $Na_2S$ formed. Identify the excess reagent. (Atomic mass of Na = 23 u, S = 32 u)