Indian School Al Wadi Al Kabir
Unit test (2025-2026)

Class: XI | Subject: CHEMISTRY(043) | Max. marks: 30

Date: 25/05/2025 | SET - 1 | Time: 1 hour

General instructions:

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

(b) SECTION A consists of 8 multiple -choice questions carrying 1 mark each.

(c) SECTION B consists of 2 short answer questions carrying 2 marks each.

(d) SECTION C consists of 3 short answer questions carrying 3 marks each.

(e) SECTION D consists of 1 case - based question carrying 4 marks.

(f) SECTION E consists of 1 long answer question carrying 5 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. A solution is prepared by dissolving 20 g of a substance in 200 g of water. The mass per cent of the solute is ……

(A) 20 %

(B) 10 %

(C) 9.09 %

(D) 11.89 %

2. One mole is equal to

(A) 32 g of oxygen gas

(B) 16 g of oxygen gas

(C) 6.022×10^{23} atoms of oxygen

(D) 32 u of oxygen

3. Sum of mole fractions of all the components of a solution is ……

(A) infinity

(B) zero

(C) unity

(D) less than one

4. Empirical formula of Propane is …….

(A) C_3H_8

(B) C_3H_6

(C) CH_2

(D) $C_{1.5}H_4$

5. How many atoms are there in 22g of carbon dioxide?

(A) 6.022×10^{23}

(B) 9.033×10^{23}

(C) 3.011×10^{23}

(D) 1.89×10^{24}

6. Identify the correct statement from the following.

(A) The energy of an electron in the orbit increases with time.

(B) The energy of an electron in the orbit does not change with time.

(C) The energy of an electron in the orbit decreases with time.

(D) The energy of an electron in the orbit increases first and then decreases with time.

7. Given below are two statements labelled as Assertion (A) and Reason (R).

Assertion: According to Bohr's theory, an electron can move only in certain orbits.

Reason: An electron can move only in those orbits for which its angular momentum is integral multiple of $h/2\pi$.

(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: Radius of the first orbit of hydrogen atom is less than that of He^+

Reason: Hydrogen atom is smaller than Helium atom.

(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 2 questions with no internal choice. The following questions are very short answer type and carry 2 marks each.

9. Differentiate between Molarity and Molality. How do they vary with temperature?

10. The energy of the 2^{nd} orbit of an atom/ion is -4.905×10^{-18} J. Identify the atom/ion.

SECTION C

This section contains 3 questions with an internal choice. The following questions are short answer type and carry 3 marks each.

11. The density of 2 M solution of $MgCl_2$ is 2.19 g mL^{-1}. Calculate molality of the solution. (Mg = 24 u, Cl = 35.5 u)

OR

Calculate the number of atoms in each of the following:

a) 20 moles of He b) 20 u of He c) 20 g of He (Atomic mass of He = 4 u)

12. Calculate the radius and energy of the 4^{th} stationary state of He^+.

13. Calculate the amount of energy emitted when an electron in hydrogen atom moves from 4^{th} to 2^{nd} energy level.

SECTION D

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

14. Chemical reactions represent the chemical changes undergone by different elements and compounds. The quantitative study of the reactants required or the products formed is called stoichiometry. Using stoichiometric calculations, the amounts of one or more reactant(s) required to produce a particular amount of product can be determined and vice-versa. The amount of substance present in a given volume of a solution is expressed in number of ways such as mass per cent, mole fraction, molarity and molality.

a) If 400 mL of 0.9 M HCl is diluted to 1.2 L, what will be the molarity of the diluted solution?

b) Which of the following does not have a unit?

Molarity, Molality, Mole fraction

c) Calculate the mass of NaCl to be dissolved in water in order to prepare 500 ml of 0.2 M solution. (Na = 23u, Cl = 35.5u)

OR

c) Calculate the molality of a solution which is prepared by dissolving 4.44 g of $CaCl_2$ in 800 g of water. (Ca = 40u, Cl = 35.5u)

SECTION E

The following question is a long answer type and carries 5 marks. This question has an internal choice.

15. a) State Law of multiple proportions.

b) Define the term 'limiting reagent'. Identify the limiting reagent and calculate the mass of water formed when 14 g of H_2 is mixed with 96 g of oxygen gas.

(O = 16u, H = 1u)

$2H_2 + O_2 \rightarrow 2H_2O$

c) What is the mass percent of carbon in carbon dioxide?

OR

a) State Gay Lussac's law of gaseous volumes.

b) A hydrocarbon contains 82.76% carbon and 17.24% hydrogen. Its molecular mass is 58 u. Identify the empirical and molecular formulae.

c) An aqueous solution of sodium hydroxide contains 2 mol of NaOH in 324g of water. Calculate the mole fraction of NaOH.