PRACTICE PAPER 09 (2024-25)
CHAPTER 03 ATOMS AND MOLECULES

SUBJECT: SCIENCE **MAX. MARKS : 40**
CLASS : IX **DURATION : 1½ hrs**

General Instructions:
(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A
Questions 1 to 10 carry 1 mark each.

1. A change in the physical state can be brought about:
(a) Only when energy is given to the system.
(b) Only when energy is taken out from the system.
(c) When energy is either given to or taken out from the system.
(d) Without any energy change.

2. An ionic compound will be formed by the combination of one of the following pairs of elements. This pair of elements is:
(a) Barium and Oxygen
(b) Sulphur and Carbon
(c) Hydrogen and hydrogen
(d) Chlorine and chlorine

3. Which of the following are incorrect for the mass of products in a chemical reaction?
(I) Mass of reactants is more than the mass of products in a chemical reaction.
(II) Mass of reactants or products can neither be created nor be destroyed.
(III) Mass of reactants before reaction is equal to the mass of products after reaction.
(IV) Mass of reactants decreases during reaction.
Options:
(a) (I) and (II) (b) (II) and (III) (c) (III) and (IV) (d) (I) and (IV)

4. Which of the following is correct statement ?
(a) Na_2S is Sodium sulphide, Na_2SO_3 is Sodium sulphite and Na_2SO_4 is Sodium sulphate.
(b) Na_2S is Sodium sulphite, Na_2SO_3 is Sodium sulphide and Na_2SO_4 is Sodium sulphate.
(c) Na_2S is Sodium sulphite, Na_2SO_3 is Sodium sulphate and Na_2SO_4 is Sodium sulphide
(d) Na_2S is Sodium sulphide, Na_2SO_3 is Sodium sulphate and Na_2SO_4 is Sodium thiosulphate.

5. Which of the following statements is false about an atom?
(a) Atoms are not able to exist independently.
(b) Atoms are the basic units from which molecules and ions are formed.
(c) Atoms are always neutral in nature.
(d) Atoms aggregate in large numbers to form the matter that we can see, feel or touch.

6. An ion with 13 protons, 14 neutrons, and a charge of 3+ has an atomic number of:
(a) 10 (b) 13 (c) 14 (d) 27

7. The mass of a molecule is defined as:
(a) When comparing the mass of one molecule of any material to the mass of one atom of C–12.
(b) One atom's mass in comparison to a hydrogen atom's mass.
(c) Mass of a molecule compared to mass of an atom.
(d) All of the above

8. From the following elements ozone, sulphur, argon and phosphorus, which has the highest and lowest atomicities?
(a) Ozone and Sulphur
(b) Phosphorus and Argon
(c) Sulphur and Argon
(d) Sulphur and Phosphorus

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

9. **Assertion (A):** An atom is the smallest particle in an element that possesses the element's properties.
Reason (R): Molecules are made up of two or more atoms.

10. **Assertion (A):** Nitrogen has an atomic mass of 14.
Reason (R): Nitrogen atoms are 14 times heavier than carbon-12 atoms of the same mass.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. (a) Define atomic mass unit.
(b) Distinguish between molecular mass and molar mass.

12. Define atomicity. Give an example of each of monoatomic, diatomic, tetra-atomic and polyatomic molecules.

13. Ravi prepared a solution of sodium chloride by mixing 5.85 g of salt in 1 litre of water. Find
(a) Molar mass of sodium chloride.
(b) Number of moles of sodium chloride dissolved.
[Atomic masses of sodium and chlorine are 23 u and 35.5 u respectively].

OR

(a) Define polyatomic ion.
(b) Write the name of the compound $(NH_4)_2SO_4$ and mention the ions present in it.

14. An element 'X' forms an oxide with formula X_2O_3
(a) State the valency of X.
(b) Write the formula of (i) chloride of X, (ii) sulphate of X.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. The percentage of three elements, calcium, carbon and oxygen in a sample of calcium carbonate is given as: Calcium = 40%; Carbon = 12%; Oxygen = 48%.

If the law of constant proportion is true, what weights of these elements will be present in 1.5 g of another sample of calcium carbonate? [Atomic mass of Ca = 40 u, C = 12 u, O = 16 u]

16. Write the formulae of (a) Magnesium hydroxide (b) Hydrogen sulphide (c) Potassium chloride (d) Calcium oxide (e) Barium chloride (f) Sodium carbonate

17. (a) Define the term mole.
(b) Calculate the no. of (i) atoms (ii) molecules in 124 grams of phosphorus, P_4
[Given atomic mass of P = 31.0 u, $N_A = 6.023 \times 10^{23}$ mol^{-1}]

OR

(a) Define one mole. How is it related to Avogadro's constant.
(b) Find the number of sodium ion in one mole of sodium sulphate.

SECTION – D

Questions 18 carry 5 marks each.

18. (a) Calculate the number of oxygen atoms in 0.10 mole of $Na_2CO_3.10H_2O$.
(b) If one mole of sulphur weighs 32 grams, what is the mass (in grams) of 1 atom of sulphur?
(c) Identify the correct formula for ammonium sulphate from the following formula:
$(NH_4)(SO_4)_3$,$(NH_4)_2SO_4$,$NH_4(SO_4)_2$

OR

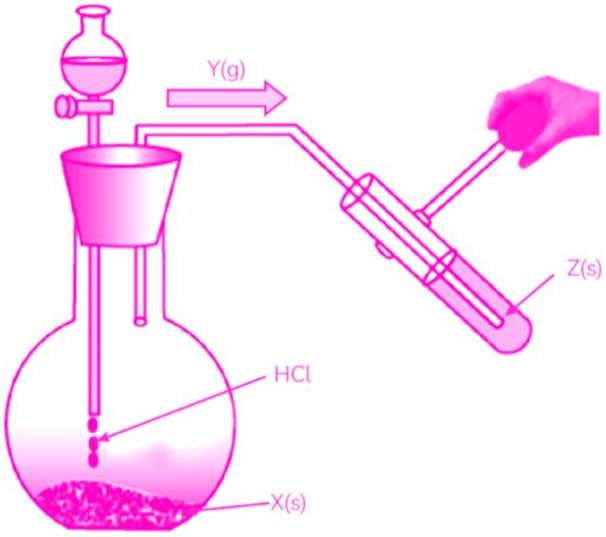
(a) Write chemical formulae of all the compounds that can be formed by the combination of the following ions: Ca^{2+}, K^+, Fe^{3+}, Cl^-, SO_4^{2-}
(b) Molar mass of nitrogen is 14u. What will be the mass of one atom of nitrogen in grams?

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Read the following information and answer the questions based on information and related studied concepts.

House flooring is usually made from one of the forms of the naturally occurring solid compound X. Brisk effervescence is produced when a few drops of weak hydrochloric acid are added to X. When 60 grams of reactant X were heated rapidly, 32 grams of gas Y and 28 grams of solid Z were formed as products. When dilute HCl is added to X, gas Y exhibits a rapid effervescence. Solid Z is utilised for whitewashing, while gas Y causes global warming.



(a) Name X (solid), Y (gas) and Z (solid).
(b) From 60 grams of X, what is the total mass of Y and Z?

(c) What mass of sodium sulphate solution will react with 5.85 g of barium chloride solution to produce 14.35 g of precipitates of barium sulphate and 8.5 g of sodium chloride solution if the law of conservation of mass is true?

20. Read the given passage and answer the questions that follow based on the passage and related studied concepts.

Several natural sources yield a liquid chemical X with a molecular mass of 18 amu. Liquid X is required for the life of all creatures and plants. When an electric current is carried through 100 grams of pure liquid X, 78 grams of gas Y and 22 grams of gas Z are created under ideal conditions. The positive electrode produces gas Y, while the negative electrode produces gas Z. Furthermore, gas Y promotes combustion, whereas gas Z self-combusts, resulting in explosions.

(a) Name the following: (i) Liquid X (ii) Gas Y (iii) Gas Z

(b) Write the balanced equation of liquid X when electrolysis is done.

(c) Calculate the molecular mass of gas Y and gas Z.