CBSE

ATOMS AND MOLECULES WS 5

Class 09 - Science

Section A

1. A sample of $CaCO_3$ contains 3.01×10^{23} ions of Ca^{+2} and $CO_3{}^{-2}$. The mass of the sample is: **[1]**

   a) 200 g
   b) 50 g
   c) 100 g
   d) 5 g

2. The maximum amount of sodium that can be obtained by electrolysis of 117 g of sodium chloride is **[1]**
   [Atomic mass of Na = 23 u, Cl = 35.5 u]

   a) 40 g
   b) 52 g
   c) 23 g
   d) 46 g

3. 440 g of carbon dioxide can be represented as **[1]**

   i. 5 g mole of carbon dioxide
   ii. 10 moles of carbon dioxide
   iii. 6.023×10^{23} molecules of carbon dioxide
   iv. 6.023×10^{24} molecules of carbon dioxide

   a) (ii) and (iii) only
   b) (i), (ii), (iii) and (iv)
   c) (i) and (ii) only
   d) (ii) and (iv) only

4. What mass of CO_2 will 3.011×10^{23} molecules contain? **[1]**

   a) 4.4 g
   b) 11.0 g
   c) 44.0 g
   d) 22.0 g

5. An ionic compound of element M and chlorine has the formula, MCl_3. The molecular mass of MCl_3 is 118.5. **[1]**
   What will be the molecular mass of the oxide of element M?

   a) 72
   b) 44
   c) 28
   d) 99

6. **Assertion (A):** The molecular mass and formula unit mass of a substance is the sum of atomic masses of all the atoms in the molecular formula or formula unit of a compound. **[1]**
   Reason (R): The only difference between the molecular mass and formula unit mass is that former is for molecular compounds (covalent compounds) and the latter is for ionic compounds. However, their numerical value is the same.

   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.

7. **State True or False:** **[1]**

   (a) Mass of 1 mole of a substance is called its molar mass. **[1]**

8. **Fill in the blanks:** **[1]**

   (a) 1 mole of a substance is equal to its atomic mass or molecular mass expressed in _____. **[1]**

9. Calculate the formula unit mass of $CaCl_2$. **[1]**

10. Molecular mass of water is 18 u. What will be the number of molecules of water in 18 g water? **[1]**

11. Calculate the formula unit mass of $NaHCO_3$. **[1]**

Section B

12. a. Calculate the relative molecular mass of water (H_2O). **[2]**

    b. Calculate the molecular mass of HNO_3.

13. Calculate the molar mass of (a) water (H_2O) (b) nitric acid (HNO_3). **[2]**

14. Hydrogen and oxygen combine in the ratio 1 : 8 by mass to form water. What mass of oxygen gas would be required to react with 3 g hydrogen gas? **[2]**

15. Calculate the molecular Mass of **[2]**

    a. Ammonium sulphate [$(NH_4)_2SO_4$]

    b. Penicillin [$C_{16}H_{18}N_2SO_4$]

    c. Paracetamol [C_8H_9NO]

16. What is the difference between the mass of a molecule and molecular mass? **[2]**

17. The mass of one molecule of a substance is 4.65×10^{-23} g. What is its molecular mass? What could this substance be? **[2]**

18. Calculate the formula mass of sodium carbonate (Na_2CO_3. 10 H_2O). **[2]**

Section C

19. Calculate the molar mass of the following substances. **[5]**

    a. Ethyne, C_2H_2

    b. Sulphur molecule, S_8

    c. Phosphorus molecule, P_4 (Atomic mass of phosphorus= 31)

    d. Hydrochloric acid, HCl

    e. Nitric acid, HNO_3

20. Calculate the formula unit masses of ZnO, Na_2O, K_2CO_3, given atomic masses of Zn = 65 u, Na = 23 u, K = 39 u, C = 12 u, and O = 16 u. **[5]**

21. Calculate the molecular masses of H_2, O_2, Cl_2, CO_2, CH_4, C_2H_6, C_2H_4, NH_3, CH_3OH. **[5]**

22. Find the ratio of the mass of the combining elements in the following compounds: (You may use Appendix-III) **[5]**

    a. $CaCO_3$

    b. $MgCl_2$

    c. H_2SO_4

    d. C_2H_5OH

    e. NH_3

    f. $Ca(OH)_2$