



DPP – 1 [Mole Concept]

Chapter: Some Basic Concepts of Chemistry

“The difference between average and confident students is assignment completion”

TYPE–1 : Basic Definitions — amu, Mole & Avogadro’s Number

Q.1 The modern atomic weight scale is based on:

- (1) ^{12}C (2) ^{16}O (3) ^1H (4) ^{13}C

Q.2 1 amu is equal to:

- (1) $\frac{1}{12}$ of ^{12}C (3) 1 g of H_2
(2) $\frac{1}{14}$ of ^{16}O (4) 1.66×10^{-24} kg

Q.3 Mass of 1 amu in g is:

- (1) 1.66×10^{24} g (3) 1.008
(2) 1.66×10^{-24} g (4) 9.1×10^{-28}

Q.4 Gram atomic weight of oxygen is:

- (1) 16 amu (2) 16 g (3) 32 amu (4) 32 g

Q.5 Molecular weight of SO_2 is:

- (1) 64 g (2) 64 amu (3) 32 g (4) 32 amu

Q.6 If Avogadro number N_A is changed from $6.022 \times 10^{23} \text{ mol}^{-1}$ to $6.022 \times 10^{20} \text{ mol}^{-1}$, this would change:

- (1) The ratio of chemical species to each other in a balanced equation
(2) The ratio of elements to each other in a compound
(3) The definition of mass in units of grams
(4) The mass of one mole of carbon

TYPE–2 : Actual Weight of One Atom / Molecule

Q.7 The number of atoms in 52 amu of He are:

- (1) 13 atoms
(2) $13 \times 6.023 \times 10^{23}$ atoms
- (3) 52 atoms
(4) $52 \times 6.023 \times 10^{23}$ atoms

Q.8 Number of atoms present in 120 amu of Ca is:

[NCERT Pg. 16]

- (1) $3N_A$ (2) $6N_A$ (3) 3 (4) 6

Q.9 The weight of one atom of Uranium is 238 amu. Its actual weight is ...g.

- (1) 1.43×10^{26} (3) 6.99×10^{-23}
(2) 3.94×10^{-22} (4) 1.53×10^{-22}

Q.10 The actual weight of a molecule of water is:

- (1) 18 g
(2) 2.99×10^{-23} g
(3) both (1) & (2) are correct
(4) 1.66×10^{-24} g

Q.11 What is the mass of a molecule of CH_4 ?

- (1) 16 g (3) 2.66×10^{-23} g
(2) 26.6×10^{22} g (4) $16 N_A$ g

Q.12 The actual molecular mass of chlorine is:

- (1) 58.93×10^{-24} g (3) 58.93×10^{-24} kg
(2) 117.86×10^{-24} g (4) 117.86×10^{-24} kg

Q.13 The actual mass of a molecule of carbon dioxide is:

- (1) 7.3×10^{-23} g (3) 44 g
(2) 6.02×10^{-23} g (4) 3.65×10^{-23} g

Q.14 1 atom of an element weighs 1.792×10^{-22} g. The atomic weight of the element is:

- (1) 107.92 (2) 17.92 (3) 1.192 (4) 64

Q.15 Volume occupied by one molecule of water (density = 1 g cm^{-3}) is:

- (1) $3.0 \times 10^{-23} \text{ cm}^3$ (3) $9.0 \times 10^{-23} \text{ cm}^3$
(2) $5.5 \times 10^{-23} \text{ cm}^3$ (4) $6.023 \times 10^{-23} \text{ cm}^3$

TYPE-3 : Moles from Weight ($n = W/M$)

Q.16 Calculate the number of gram-atoms (Moles) in a sample of lead (at. wt. 207) weighing 100 grams:

- (1) 0.0483 (2) 0.24 (3) 4.8 (4) 0.48

Q.17 What is the mass of 0.5 moles of ozone (O_3) molecules?

- (1) 8 g (2) 16 g (3) 24 g (4) 48 g

TYPE-4 : Number of Molecules from Weight ($n = W/M$) and ($n = N/N_A$)

Q.18 The number of molecules in 4.25 g of NH_3 is:

- (1) 1.505×10^{23} (3) 6.02×10^{23}
(2) 3.01×10^{23} (4) None of these

Q.19 Which of the following contains least number of molecules?

- (1) 4.4 g CO_2 (3) 1.6 g CH_4
(2) 3.4 g NH_3 (4) 3.2 g SO_2

Q.20 Which contains least number of molecules?

- (1) 1 g CO_2 (2) 1 g N_2 (3) 1 g O_2 (4) 1 g H_2

Q.21 Which has maximum number of molecules among the following?

- (1) 64 g SO_2 (2) 44 g CO_2 (3) 48 g O_3 (4) 8 g H_2

Q.22 Which has maximum molecules?

- (1) 7 g N_2 (2) 2 g H_2 (3) 16 g NO_2 (4) 16 g O_2

TYPE-5 : Number of Atoms from Weight
($n_{atoms} = \text{Atomicity} \times n_{molecules}$) and ($n = N/N_A$)

Q.23 The number of atoms present in 16 g of oxygen is:

- (1) $6.02 \times 10^{11.5}$ (3) $3.01 \times 10^{11.5}$
(2) 3.01×10^{23} (4) 6.02×10^{23}

Q.24 Number of carbon atoms present in 22 g CO_2 is:

- (1) 6.02×10^{23} (3) 3.01×10^{-23}
(2) 3.01×10^{23} (4) 6.02×10^{-23}

Q.25 Number of oxygen atoms in 8 g of ozone is:

- (1) 6.02×10^{23}
(2) $\frac{6.02 \times 10^{23}}{2}$
- (3) $\frac{6.02 \times 10^{23}}{3}$
(4) $\frac{6.02 \times 10^{23}}{6}$

Q.26 The number of atoms in 4.25 g of NH_3 is approx.:

- (1) 1×10^{23} (2) 1.5×10^{23} (3) 2×10^{23} (4) 6×10^{23}

Q.27 A person adds 1.71 gram of sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) in order to sweeten his tea. The number of carbon atoms added are (mol. mass of sugar = 342):

- (1) 3.6×10^{22} (3) 0.05
(2) 7.2×10^{21} (4) 6.6×10^{22}

Q.28 Which of the following contains maximum number of atoms?

- (1) 4 g of H_2 (3) 28 g of N_2
(2) 16 g of O_2 (4) 18 g of H_2O

Q.29 Which one of the following has maximum number of atoms?

- (1) 1 g of $\text{Mg}_{(s)}$ [Atomic mass of Mg = 24]
(2) 1 g of $\text{O}_{2(g)}$ [Atomic mass of O = 16]
(3) 1 g of $\text{Li}_{(s)}$ [Atomic mass of Li = 7]
(4) 1 g of $\text{Ag}_{(s)}$ [Atomic mass of Ag = 108]

Q.30 Which of the following contains maximum number of atoms?

- (1) 1.6 g CH_4 (2) 1.7 g NH_3 (3) 1.8 g H_2O (4) 3.4 g H_2O_2

Q.31 The number of atoms present in 0.5 g-atom (Moles) of nitrogen is same as the atoms in:

- (1) 12 g of C (2) 32 g of S (3) 8 g of oxygen (4) 24 g of Mg

TYPE-6 : Number of Molecules from Atoms

$$(n_{\text{atoms}} = \text{Atomicity} \times n_{\text{molecules}})$$

Q.32 How many moles of aluminium sulphate, $\text{Al}_2(\text{SO}_4)_3$ will contain 0.24 mole of oxygen atoms?
[NCERT Pg. 20]

- (1) 2.0×10^2 (3) 3.0×10^3
(2) 2.0×10^{-2} (4) 1.5×10^{-2}

Q.33 How many moles of magnesium phosphate, $\text{Mg}_3(\text{PO}_4)_2$ will contain 0.25 mol of oxygen atoms?

- (1) 2.5×10^{-2} (3) 3.125×10^{-2}
 (2) 0.02 (4) 1.25×10^{-2}

Q.34 The number of moles of carbon dioxide which contain 8 g of oxygen is:

- (1) 0.5 mole (2) 0.20 mole (3) 0.40 mole (4) 0.25 mole

Q.35 The number of gram molecules of oxygen in 6.02×10^{24} CO molecules is:

- (1) 10 g molecules (3) 1 g molecules
 (2) 5 g molecules (4) 0.5 g molecules

Q.36 The number of atoms in “n” mole of gas can be given by:

- (1) $n \times \text{Av. No.} \times \text{atomicity}$ (3) $\frac{\text{Av. No.} \times \text{Atomicity}}{n}$
 (2) $\frac{n \times \text{Av. No.}}{\text{Atomicity}}$ (4) None

TYPE-7 : Finding Electrons, Protons and Neutrons

Q.37 Sum of number of protons, electrons and neutrons in 12 g of $^{12}_6\text{C}$ is:

- (1) 1.8 (3) 1.084×10^{25}
 (2) 12.044×10^{23} (4) 10.84×10^{23}

Q.38 Number of neutrons present in 1.7 g of ammonia is:

- (1) N_A (3) $(N_A/10) \times 7$
 (2) $N_A/10 \times 4$ (4) $N_A \times 10 \times 7$

Q.39 The total number of electrons in 4.2 g of N^{3-} ion is (N_A is the Avogadro's number):

- (1) $2.1 N_A$ (2) $4.2 N_A$ (3) $3 N_A$ (4) $3.2 N_A$

Q.40 The total number of valence electrons in 4.2 g of N_3^- ion is (N_A is the Avogadro's number):

- (1) $2.1 N_A$ (2) $4.2 N_A$ (3) $1.6 N_A$ (4) $3.2 N_A$

Q.41 The total number of electrons present in 18 mL of water is:

- (1) 6.02×10^{22} (3) 6.02×10^{24}
 (2) 6.02×10^{23} (4) 6.02×10^{25}

Q.42 The total number of electrons in 2.0 g of D_2O to that in 1.8 g of H_2O is:

- (1) Double (2) Same (3) Triple (4) One fourth

TYPE-8 : Moles and Volume of Gas (at STP/NTP)

Q.43 Avogadro's number represents the number of molecules present in:

- (1) 1 cc gas at STP (3) 1 L of a gas at STP
(2) 11.2 L of a gas at STP (4) 22.4 L of a gas at STP

Q.44 5.6 L of oxygen at NTP is equivalent to:

- (1) 1 mol (2) $\frac{1}{2}$ mol (3) $\frac{1}{4}$ mol (4) $\frac{1}{8}$ mol

Q.45 5.6 L of oxygen at STP contains:

- (1) 6.02×10^{23} atoms (3) 1.505×10^{23} atoms
(2) 3.01×10^{23} atoms (4) 0.7525×10^{23} atoms

Q.46 The volume of 1.0 g of hydrogen at NTP is:

- (1) 2.24 L (2) 22.4 L (3) 1.12 L (4) 11.2 L

Q.47 11 grams of a gas occupy 5.6 litres of volume at STP. The gas is:

- (1) NO (2) N₂O₄ (3) CO (4) CO₂

Q.48 4.4 g of an unknown gas occupies 2.24 L of volume at STP. The gas may be:

- (1) N₂O (2) CO (3) CO₂ (4) 1 & 3 both

Q.49 The weight of 1 mole of a gas of density 0.1784 g L⁻¹ at NTP is:

- (1) 0.1784 g (2) 1 g (3) 4 g (4) 4 amu

Q.50 Given that one mole of N₂ at NTP occupies 22.4 L, the density of N₂ is:

- (1) 1.25 g L⁻¹ (3) 2.5 g L⁻¹
(2) 0.80 g L⁻¹ (4) 1.60 g L⁻¹

Q.51 If 224 mL of a triatomic gas has a mass of 1 g at 273 K and 1 atm pressure, then the mass of one atom is:

- (1) 8.30×10^{-23} g (3) 5.53×10^{-23} g
(2) 2.08×10^{-23} g (4) 6.24×10^{-23} g

Q.52 The volume of a gas at 0°C and 700 mm pressure is 760 cc. The number of molecules present in this volume is:

- (1) 1.88×10^{22} (3) 18.8×10^{23}
(2) 6.022×10^{23} (4) 18.8×10^{22}

Q.53 The volume of one litre of water upon vaporisation at STP is nearly:

- (1) 124.3 L (2) 1244.4 L (3) 1 L (4) 22.4 L

Q.54 22.4 L of water vapour at NTP, when condensed to water occupies an approximate volume of:

- (1) 18 L (2) 1 L (3) 1 mL (4) 18 mL

Q.55 The number of mole of oxygen in one litre of air containing 21% oxygen by volume, under standard conditions, is:

- (1) 0.0093 mole (3) 0.186 mole
(2) 2.10 moles (4) 0.21 mole

Q.56 The number of mole of nitrogen in one litre of air containing 10% nitrogen by volume, under standard conditions, is:

- (1) 0.03 mole (3) 0.186 mole
(2) 2.10 moles (4) 4.46×10^{-3} mole

TYPE-9 : Number of Atoms from Volume

Q.57 Calculate the number of atoms in 11.2 L of SO_2 gas at STP:

- (1) $\frac{N_A}{2}$ (2) $\frac{3N_A}{2}$ (3) $3N_A$ (4) N_A

Q.58 Number of atoms in 1 mL of ammonia gas at STP is:

- (1) 2.7×10^{19} (3) 10.8×10^{20}
(2) 1.08×10^{20} (4) 5.4×10^{19}

TYPE-10 : Number of Molecules — Counting and Comparison [Mix]

Q.59 Which of the following will contain maximum number of molecules?

- (1) 100 L $\text{CO}_2(\text{g})$ at NTP (3) 1 L of $\text{H}_2\text{O}(\text{l})$
(2) 10 g of $\text{H}_2(\text{g})$ at NTP (4) 1000 g of $\text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{s})$ at NTP

Q.60 The maximum number of molecules is present in:

- (1) 15 L of water at STP
(2) 15 L of H₂O gas at STP
- (3) 15 g of ice
(4) Same in all

Q.61 The maximum number of molecules are present in:

- (1) 5 L of N₂ gas at STP
(2) 0.5 g of H₂ gas
- (3) 10 g of O₂ gas
(4) 15 L of H₂ gas at STP

Q.62 The number of water molecules is maximum in:

- (1) 18 g of water
(2) 18 mol of water
- (3) 18 molecules of water
(4) 1.8 g of water

Q.63 In which case is the number of molecules of water maximum?

- (1) 18 mL of water
(2) 0.18 g of water
(3) 0.00224 L of water vapours at 1 atm and 273 K
(4) 10⁻³ mol of water

Q.64 If 3.01×10^{20} molecules are removed from 98 mg of H₂SO₄, then the number of moles of H₂SO₄ left are:

- (1) 0.1×10^{-3}
(2) 0.5×10^{-3}
- (3) 1.66×10^{-3}
(4) 9.95×10^{-2}

Q.65 From 200 mg of CO₂, when x molecules are removed, 2.89×10^{-3} moles of CO₂ are left. x will be:

- (1) 10²⁰ molecules
(2) 10¹⁰ molecules
- (3) 21 molecules
(4) 10²¹ molecules

TYPE-11 : Equal Mass, Ratio and Comparison Problems

Q.66 Which of the following has maximum mass?

- (1) 0.1 gram atom of carbon
(2) 0.1 mol of ammonia
(3) 6.02×10^{22} molecules of hydrogen
(4) 1120 cc of carbon dioxide at STP

Q.67 Which of the following has the highest mass?

- (1) 1 g atom of C
 (2) $\frac{1}{2}$ mole of CH_4
- (3) 10 mL of water
 (4) 3.011×10^{23} atoms of oxygen

Q.68 Which of these weighs most?

- (1) 32 g oxygen
 (2) 2 g atom of nitrogen
- (3) 0.5 mole of iron
 (4) 3.01×10^{23} atoms of carbon

Q.69 Rearrange the following (I to IV) in the order of increasing masses and choose the correct answer.

(Atomic masses: N = 14, O = 16, Cu = 63)

I 1 molecule of oxygen

II 1 atom of nitrogen

III $1 \times 10^{-10} \times$ (g molecular weight of oxygen)

IV $1 \times 10^{-10} \times$ (g atomic weight of copper)

- (1) II < I < III < IV
 (2) IV < III < II < I
- (3) II < III < I < IV
 (4) III < IV < I < II

Q.70 Equal masses of H_2 , O_2 and methane have been taken in a container of volume V at temperature 27°C at identical conditions. The ratio of the volumes of gases $\text{H}_2 : \text{O}_2 : \text{CH}_4$ would be:

- (1) 8 : 16 : 1
 (2) 16 : 8 : 1
 (3) 16 : 1 : 2
 (4) 8 : 1 : 2

Q.71 A mixture of gases contains H_2 and O_2 gases in the ratio of 1 : 4 (w/w). What is the molar ratio of the two gases in the mixture?

- (1) 4 : 1
 (2) 16 : 1
 (3) 2 : 1
 (4) 1 : 4

Q.72 Elements A and B form two compounds B_2A_3 and B_2A . 0.05 moles of B_2A_3 weigh 9.0 g and 0.10 mole of B_2A weighs 10 g. Calculate the atomic weight of A and B:

- (1) 20 and 30
 (2) 30 and 40
 (3) 40 and 30
 (4) 30 and 20

Q.73 Initially in a container 1 g of gas A has 4 atm pressure at constant temperature. If 2 g of gas B is added in same container at same temperature then pressure becomes 6 atm. What will be the ratio of molecular weight of A and B?

- (1) $M_A = 4M_B$
 (2) $M_A = 2M_B$
- (3) $M_B = 2M_A$
 (4) $M_B = 4M_A$

TYPE-12 : Molarity and Solution-based Problems
 (Only solve after Concentration Terms DPP is done.)

Q.74 Number of HCl molecules present in 10 mL of 0.1 M solution is:

- (1) 6.022×10^{23} (3) 6.022×10^{21}
(2) 6.023×10^{22} (4) 6.022×10^{20}

Q.75 Number of moles of NaOH in 27 cm^3 of 0.15 M NaOH solution is:

- (1) 0.15 (2) 27 (3) 0.00405 (4) 0.0405 M

Q.76 How many grams of H_2SO_4 are contained in 0.05 litres of 0.5 M solution?

- (1) 4.90 g (2) 9.80 g (3) 2.45 g (4) 3.98 g

Q.77 The number of molecules of CaCO_3 present in 100 mL of 0.01 M CaCO_3 solution is:

- (1) 6.022×10^{22} (3) 6.022×10^{26}
(2) 6.022×10^{20} (4) 6.022×10^{18}

Q.78 The total number of ions present in 1 mL of 0.1 M barium nitrate $\text{Ba}(\text{NO}_3)_2$ solution is:

- (1) 6.02×10^{18} (3) $3.0 \times 6.02 \times 10^{19}$
(2) 6.02×10^{19} (4) $3.0 \times 6.02 \times 10^{18}$

— End of DPP —
