Mole concept numerical problems with answer class9

CBSE Set Paper - 1

1. Calculate the number of mole in 52 g of Helium.

Solution: 4 g of He = 1mole   so, 52 gm of He = 1/4} x 52 = 13 moles

2. Calculate the number of moles for 12.044 X 10^{23} atoms of Helium.

Solution: 6.022 x 10^{23} atom = 1 mole of He

So,   12.044 X 10^{23} atoms of Helium = {1/(6.022 x 10^{23})} x12.044 X 10^{23} = 2 mole

3.Calculate the mass of 0.5 mole of Nitrogen atoms.

Solution: Mass of 1 mole of Nitrogen atoms = 14g

 Mass of 0.5 mole of Nitrogen atoms = 14g x 0.5 = 7g

4. What is the mass of 6.022 x 10^{23} number of Nitrogen atoms = 14 g

Solution: the mass of 3.011 X 10^{23} number of Nitrogen atoms = 14g

So, the mass of 3.011 X 10^{23} number of Nitrogen atoms = (14/6.022 x 10^{23}) x 3.011 X 10^{23} = 7g

5. Calculate the number of particles in each of the following:(i) 0.1 mole of Carbon atoms(ii) 46 grams of Sodium atoms   Solution: (i) 6.022 x 10^{22} (ii) 12.044 X 10^{23}

6. Calculate the mass of 0.5 mole of N_2 gas.   Solution: 14g

7. In which case the number of Hydrogen atoms is more - 2 mol of HCl or 1 mol of NH_3 ?

Solution: We know that, HCl contains 2 moles of H atoms and NH_3 contains 3 moles of H atoms.

 Therefore, 1 mole of NH_3 contains more number of atoms

8. An ornament of silver contains 20 gram silver. Calculate the moles of silver present

Solution: 0.185 mole

9. If 1 g sulphur dioxide contains x molecules, what will be the number of molecules in 1 g of methane?

Solution: Molecular mass of SO_2 = 32 + (16 X 2) = 64 gram.

64 g of SO_2 contain 6.022 x 10^{23} molecules

so, 1 g of SO_2 contain (6.022 x 10^{23})/64 molecules = x(given)

Now, Molecular mass of CH_4 = 12 + 1x4 = 16g

So, 16g of CH_4 contain 6.022 x 10^{23} molecules

so, 1 g of CH_4 contain $(6.022 \times 10^{23})/16$ molecules $= [(6.022 \times 10^{23})/64] \times 4 = 4x$ molecules

10. How many grams of neon will have the same number of atoms as 4 g of calcium?

Solution: Molar mass of calcium = 40 g/mol

Therefore, 40 g of calcium = 1 mole of calcium ; then, No of moles in 4 g = (1/40) x 4 = 0.1 mole

Now, no of atoms in one mole of any substance remains constant, i.e 6.022 10

So 0.1 mol of calcium will contain same no of atoms as in 0.1 mol of neon.

Molar mass of neon = 20 g/mol   Therefore, 1 mole of neon = 20 g of neon

so, mass of 0.1 mol of neon = 20 x 0.1 = 2 g

Hence 2 gm of neon will have the same no of atom as in 4 gm of calcium

11. Calculate the number of aluminium ions present in 0.051g of aluminium oxide.

Solution: In 102 g of aluminium oxide contain $2 \times 6.022 \times 10^{23}$ ion of Al ion

so, In 0.051g of aluminium oxide contain $\{(2 \times 6.022 \times 10^{23})/102\} \times 0.051 = 6.022 \times 10^{20}$ of Al ion

12. A sample of ethane ($C2H6$) gas has the same mass as 1.5×10^{20} molecules of methane (CH_4). How many C_2H_6 molecules does the sample of gas contain?

Solution: Molecules Mass of one mole of C2 H6 = 30 g and Mass of one mole of CH4 =16 g

we know that 1 mole of any substance contains 6.022×10^{23} molecules

Mass of 6.022×10^{23} molecules of Methane = 16 g

Mass of 1.5×10^{20} molecules of methane = $[16 / 6.022 \times 10^{23}] \times 1.5 \times 10^{20} = 3.98 \times 10^3$ g

Now, 30 g of Ethane contains 6.022×10^{23} molecules

Then 3.98×10^3 g of ethane will contain $\{6.022 \times 10^{23} /30\} \times 3.98 \times 10^3 = 0.8 \times 10^{18}$ molecules

13. A gold sample contains 90% of gold and the rest copper. How many atoms of gold are present in one gram of this sample of gold?

Sol: The percentage of gold in a sample = 90% ; Therefore, the mass of gold in 100g of sample = 90 g

Mass of gold in 1 g of sample = 90/100= 0.9 g

No. of atoms in 197 g of gold = 6.022×10^{23}

No. of atoms in 0.9 g of gold = $(0.9/197) \times 6.022 \times 10^{23} = 2.75 \times 10^{21}$