Mole concept numerical problems with answer class9

CBSE Set Paper - 2

1. Determine the mass of 6.022 X 10^23 number of N_2 molecules.

Sol: the mass of 6.022 X 10^23 number of N_2 molecules = mass of N_2 =14 x 2 = 28g

2. Calculate the number of particles in- (i) 8 g of O_2 molecules (ii) 2.5 mol of calcium atoms.

Sol: (i) 32g of O_2 have molecules = 6.022 X 10^23

So, 8g of O_2 have molecules = (6.022 X 10^23/32) x 8 = 1.5 x 10^23 molecules

(ii) 1 mol of calcium have a = 6.022 X 10^23 atoms

So, 2.5 mol of calcium have a = 6.022 X 10^23 x 2.5 = 15.055 x10 ^23 atoms

3. What is the mass of 2.5 mol of Methane?

Sol. the mass of 1 mol of CH_4 = 12 + 4 = 16g

so, the mass of 2.5 mol of Methane = 16 x 2.5 = 36g

4.Find the mass of one molecule of water.

Sol: the mass of 6.022 X 10^23 molecule of water = 18g

the mass of one molecule of water = 18/6.022 X 10^23 = 2.989 x 10^(-23) g

5.Calculate the number of water molecules and number of oxygen and hydrogen atoms

in a drop of water containing 0.03 mol of water.

Sol: the number of water molecules in 1 mole of water = 6.022 X 10^23

So, the number of water molecules in 0.03 mole of water = 6.022 X 10^23 x 0.03 = 2.007 x 10^21

In water ratio of H : O = 2:1

Number of oxygen atoms in a drop of water containing 0.03 mol of water = 1 x 2.007 x 10^21 = 2.007 x 10^21

Number of hydrogen atoms in a drop of water containing 0.03 mol of water = 2 x 2.007 x 10^21 = 2 x 4.014x 10^21

6. How many molecules of water and oxygen atoms are present in 0.9g of water?

Sol: 18 g of water contains 1 mole

So, 0.9g of water contains (1/18)x 0.9 = 0.05 mole

Number of molecules of water in 0.05 moles = 0.05×6.02 ×10^23 = 3.010×10^22

As one molecule of water contains one oxygen atom ,so number of oxygen atoms = 3.010×10^22

7. Calculate mass of Nitrogen (N_2) which contains same number of molecules as are present in 4.4 grams of Carbon-di-oxide (CO_2).

Sol: molecules present in 44 grams of Carbon-di-oxide (CO_2). = 6.02 ×10^23

So, molecules present in 4.4 grams of Carbon-di-oxide (CO_2). = (6.02 ×10^23/44) x 4.4 = 6.02 ×10^22

Now , Mass of 6.02 ×10^23 molecules of N_2 = 28g

So, Mass of 6.02 ×10^22 molecules of N_2 = (28/6.02 ×10^23) x 6.02 ×10^22 = 2.8g

8.Atomic mass of gold is 197 u. How many moles of gold are present in an ornament containing 88.65 grams of gold?

Sol: in 197g of gold = 1 mole so, 88.65 grams = (1/197)x 88.65 = 0.45 mol

9. How many moles of SO_2 have same mass as 3 moles of oxygen?

Sol: mass of 3 moles of oxygen = 3 x 16 = 48g

Now, mass of SO2 = 32 + 2 x16 = 64g

as 64g of SO2 = 1 mole then 48 g of SO2 = (1/64)x 48 =0.75 mole

10. A glass of water contains 5 mol of water. How many molecules of water are present?

Sol: 1 mole of water contain = 6.02 ×10^23 molecules of water

So, 5 mole of water contain = 5 x 6.02 ×10^23 = 3.011 x 10^24 molecules of water

11. What is the mass of a formula unit of $Na^+ Cl^-$?

Sol: the mass of a formula unit of $Na^+ Cl^-$ = molecular masss of NaCl = 23 + 35.5 = 58.5 u

12. How many atoms of Silver are present in a silver wire weighing 5.4 grams?

Sol: 1 mole of silver weighs **108**g = 6.02 ×10^23 atom

then 5.4 grams of silver contain = (5.4/108)x 6.022 ×10^23 = 3.011 ×10^22 atoms

13. Calculate the ratio of molecules present in 16 g of methane and 16 g of oxygen.

Sol: molecules present in 16 g of methane / molecules present in 16 g of oxygen = 1:1

14. Convert into mole. (a) 12 g of oxygen gas (b) 20 g of water (c) 22 g of carbon-dioxide.

Sol: (a) 32 g of oxygen gas = 1 mol

12 g of oxygen gas = (/32)x12 = 0.375 mol1

(b) 18 g of water = 1 mole

20 g of water = (1/18) x 20 = 1.11 mole

(c) 44 g of carbon-dioxide = 1 mole

22 g of carbon-dioxide = 0.5 mole

15. Determine the number of bromide ion in 0.2 mole of $Mg Br_2$.

Sol: No. of Br ion present in 1 mole of $Mg Br_2$ = 2 x 6.022 ×10^23

No. of Br ion present in 0.2 mole of $Mg Br_2$ = 2 x 6.022 ×10^23 x 0.2 = 2.4088 x 10^23