**AVOGADRO CONSTANT AND THE MOLE**

The mole (mol) is the amount of substance of a system that contains as many elementary particles as there are atoms in 0.012kg of Carbon-12 isotope i.e. 6.02x1023 (Avogadro constant)

Eg.1 1 mol (56g) of iron contains 6.02x1023 iron atoms

Eg.2 1 mol (17g) of ammonia (NH3) contains 6.02x1023 ammonia molecules

Eg.3 Calculate the no. of atoms in 0.006kg of carbon.

Solution: Relative atomic mass of carbon is 12, so 1mol of carbon has a mass of 0.012kg. There are 6.02x1023 atoms in every mole of substance. In 0.006kg of carbon there are 0.006/0.012 = 0.5moles. So there are 0.5 x 6.02x1023 = 3.01x1023 atoms of carbon present.

Eg.4 Calculate the number of molecules in 200cm3 of water.

Solution: ρ of water = 1000kg/m3 = 1g/cm3

Therefore, 200cm3 of water has a mass of 200g = 0.2kg

Relative molecular mass of water (H2O) = (1x2) + 16 = 18. So 0.018kg of water contains 6.02x1023 molecules. Therefore 0.2kg of water contains (0.2 x 6.02x1023)/ 0.018 = 6.69 x 1024 molecules.

QUESTIONS

1. How many molecules are there in 1.5litres of water?
2. How many atoms are there in a small copper coin, mass 5 grams?
3. A research laboratory prepares a sample of very pure magnesium (RMM = 24g) containing 1014 atoms of magnesium. What is its mass?
4. A small drop of sulphuric acid (RMM = 98g) contains 1.6 x 1019 molecules. What is the mass of the drop?