Atomic Mass:

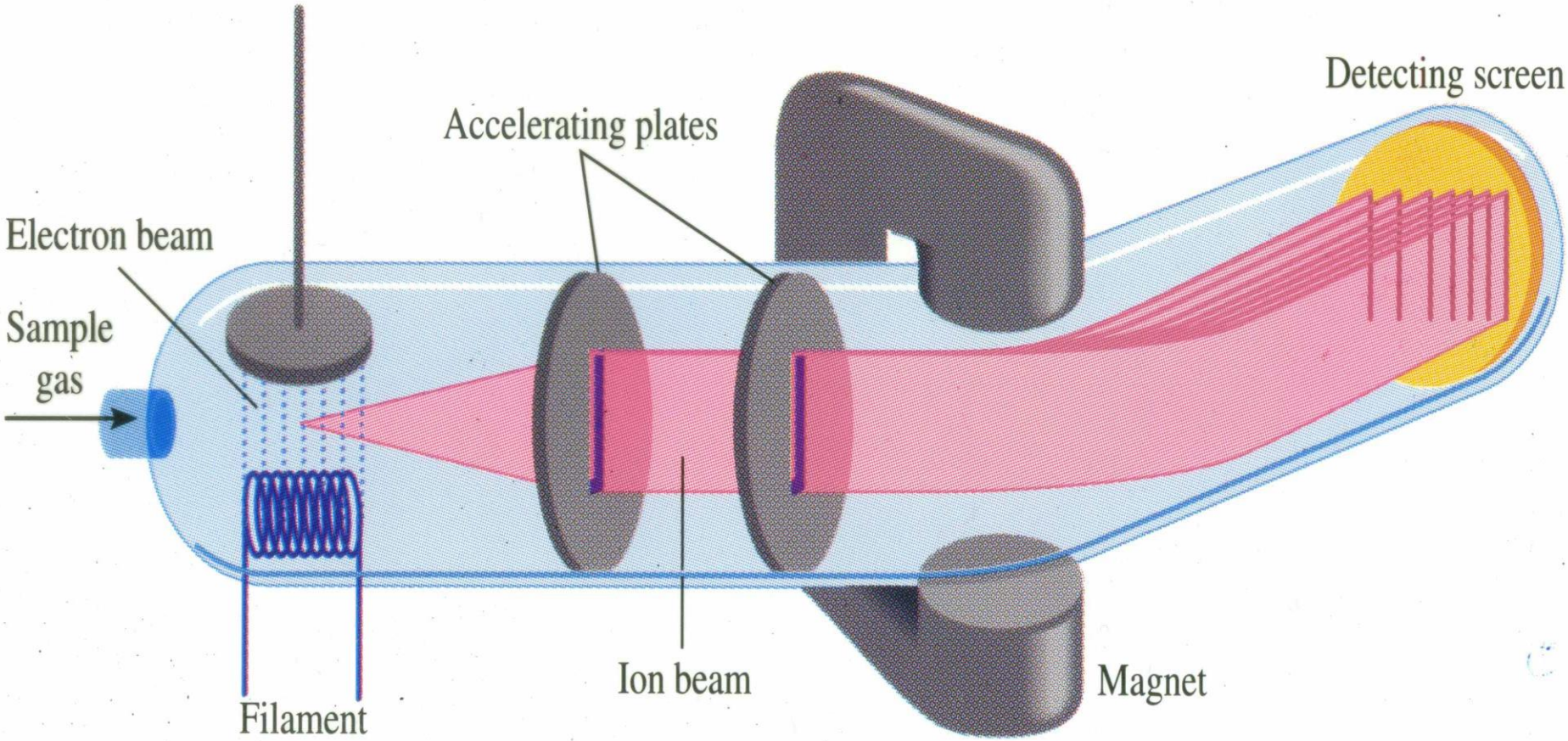
Mass of an atom in atomic mass units.

It was internationally agreed upon that the carbon-12 atom ($^{12}_{6}C$) would be given an atomic mass of 12 amu or 12 μ.

1 amu = (mass of one carbon-12 atom)/12

The hydrogen atom is 8.4% as massive as carbon-12 atom. Thus the hydrogen atom has an atomic mass of 1.008 amu.

Mass Spectrometer:



Average Atomic Mass:

For elements containing isotopes, the average atomic mass is used.

Avg = Σ(natural abundance)×(atomic mass)

atomic mass

Ex: Given the following data calculate the average atomic mass of the chlorine atom.

Isotope	Atomic Mass	% Abundance
Cl-35	34.969 amu	75.77%
Cl-37	36.966 amu	24.23%

The Mole:

- **Avogadro's Number→ 6.02205×10^{23}**
- **mole(mol)-The amount of substance that contains the same number of elementary entities as there are atoms in exactly 12 g of carbon-12.**
- **1 mole = 6.02205×10^{23} elementary particles**
- **Atomic mass of Be = 9.01218 amu**
- **Thus 9.01218 g Be = 1 mole Be = 6.02205×10^{23} Be atoms**

Atomic Mass

Atomic mass(g/mole) is another way to express the atomic weight of a compound.

- **Atomic mass is the mass in grams of one mole unit.**
- **Carbon-12 has an atomic mass of 12.0 g/mole.**

Molecular or Molar Mass:

- **molecular mass or weight - The sum of the atomic masses of the atoms that constitute a molecule.**
- **formula mass or weight - The sum of the atomic masses of the atoms that constitute an ionic compound.**

Ex: Calculate the number of moles and molecules in 1 cup of water(300. g H_2O).

Ex:2 Determine the number of H atoms in 1 cup of water(300. g H_2O).

Percentage Composition of a Compound:

- **The percentage by mass of each element that makes up a substance.**

$$\%\ \text{mass of element} = \frac{\text{g element}}{\text{g of compound}} \times 100\%$$

- **If the percent composition is known, the empirical formula may be determined.**

Ex:1 Find the empirical formula of a compound that contains 43.6% P and 56.4% O?

Percent Composition and Empirical Formula/Molecular Formula:

Note: The molecular formula can be derived from the empirical formula if the molecular weight of the compound is known.

Ex:2 If the molecular weight of the compound from previous example is 284 g, find the molecular formula?

Likewise if the chemical formula is known, the percent composition can be determined.

Ex:3 Find the %Fe in Fe_2O_3?