

	Symbol	Mass	Charge	Location
Electron	e ⁻	0 amu (1/1822)	-1	around the nucleus
Proton	p ⁺	1 amu	+1	In the nucleus
Neutron	n ⁰	1 amu	0	In the nucleus

amu = atomic mass unit
1 amu = 1.66 x 10⁻²⁴ g

Nucleus:
has all mass
very little volume
(1/100,000 total diameter)

- **Atoms are neutral**

$$\#p^+ = \#e^-$$

- **Atomic Number, Z**

- number of protons
- identifies the element

- **Mass Number, A**

- mass of all protons + mass of all neutrons

- **Isotopes**

atoms with the same # protons (same element)
but different # neutrons (different mass #)

Ex: C-12 6 p⁺ 6 n⁰
C-14 6 p⁺ 8 n⁰

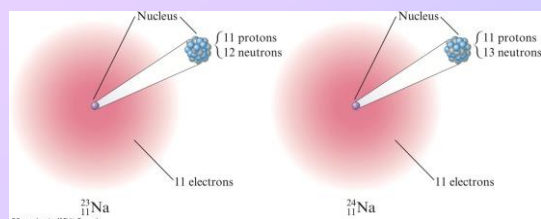
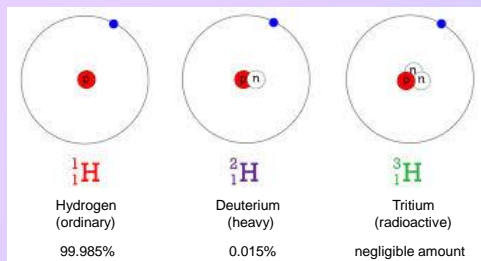
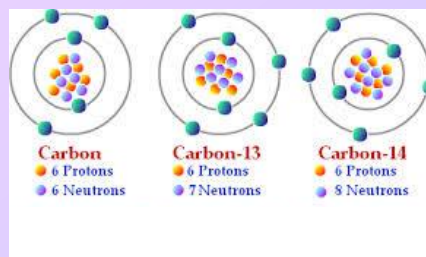
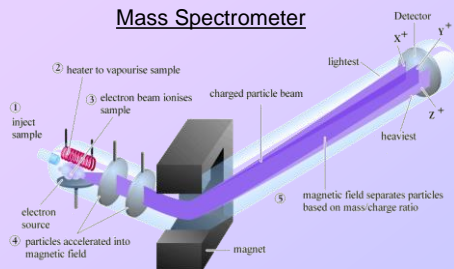
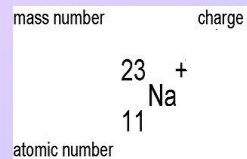
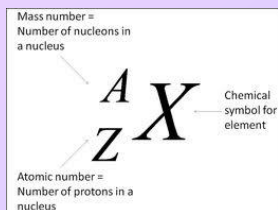


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Mass Spectrometer

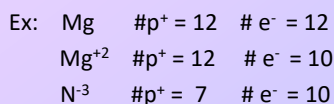


Nuclear Symbol



• Ions

atoms with unequal # of protons and electrons
 negative— **anions**, more electrons than protons
 positive— **cations**, fewer electrons than protons



Ex: An atom has 15 protons and 16 neutrons.

1. What element is it? phosphorus
2. Atomic number? 15
3. Mass number? 31
4. Number of electrons? 15

Atomic Mass (atomic weight)

- Not the same as atomic number
- Not the same as mass number
- Found on the periodic table
- **Weighted average of all the isotope masses of an element**
- These are relative masses
- Based on 1 amu being 1/12 the mass of a C-12 nuclide

Example:

An element has 2 isotopes, X-10 and X-11.
 The abundance of X-10 is 20.2%.

What is the atomic mass of this element?

$$\text{abund. of X-11: } 100 - 20.2 = 79.8\%$$

$$(10)(0.202) + (11)(0.798) = \mathbf{10.8}$$

What do you think this element might be?

Boron