

Parts of an Atom

Atom - is electrically neutral.

- is composed of a nucleus containing protons and neutrons, and electrons that surround the nucleus.

Atomic Number - is the number of protons found in the nucleus of an atom.

Protons - are subatomic particles possessing a positive charge.

Neutrons - are subatomic particles possessing a neutral charge.

Electrons - are subatomic particles possessing a negative charge.
For an atom, the electrons are equal to the atomic number.

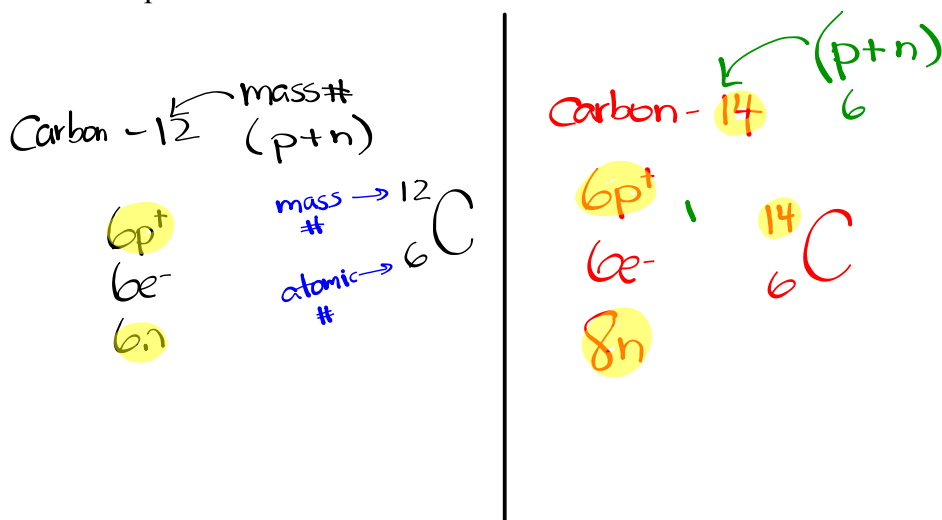
Isotope - is a form of an element in which the atoms have the same number of protons as all other forms of that element, but it has **different number of neutrons and therefore a different atomic mass**

Mass Number - is the sum of the number of protons and neutrons.

Carbon - 6 protons and 6 neutrons has a mass number of 12.

Another isotope of ^{12}C is ^{13}C , which has 6 protons and 7 neutrons.

Isotope Notation:



Isotopes of Carbon

always has 6

changes Atomic #

Isotope	p	n
${}^8\text{C}$	6	2
${}^9\text{C}$	6	3
${}^{10}\text{C}$	6	4
${}^{11}\text{C}$	6	5
${}^{12}\text{C}$	6	6
${}^{13}\text{C}$	6	7
${}^{14}\text{C}$	6	8
${}^{15}\text{C}$	6	9
${}^{16}\text{C}$	6	10
${}^{17}\text{C}$	6	11
${}^{18}\text{C}$	6	12
${}^{19}\text{C}$	6	13
${}^{20}\text{C}$	6	14
${}^{21}\text{C}$	6	15

most common

8
9
10
11

Calculating Atomic Mass

To calculate the atomic mass of an element, multiply the mass of each isotope by its natural abundance, expressed as a decimal, and then add the products.

Ex. Carbon has two stable isotopes: carbon - 12 (12.000 amu) which has natural abundance of 98.89%, and carbon - 13 (13.003 amu), which has natural abundance of 1.11%.
What is the atomic mass of carbon?

$$12.000(0.9889) + 13.003(0.0111)$$
$$= \underline{12.01}$$

Sample Problem

Element X has two natural isotopes. The isotope with a mass of 10.012 amu (^{10}X) has a relative abundance of 19.91%. The isotope with a mass of 11.009 amu (^{11}X) has a relative abundance of 80.09%. Calculate the atomic mass of this element.

$$\left[10.012(0.1991) \right] + \left[11.009(0.8009) \right] = 10.81$$

Homework

Practice Problems #17-24 p.110-118