

## Atomic Number, Atomic Mass and Isotopes

### Review from science 10

- Each element is different due to the number of protons. This number of protons is called the atomic number. The atomic number is also equal to the number of electrons in a neutral atom as the protons and electrons must be equal to cancel the positive charge (proton) with the negative charge (electron). If an electron is added or subtracted then the atom is no longer neutral, it is charged and is called an ion. If the atom loses electrons then the ion charge is positive.

Ex. - Fluorine has a symbol of F and protons =

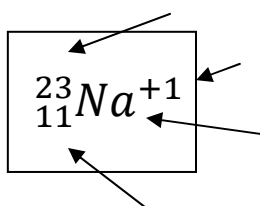
Electrons = 9 +1 added =

Now total charge of nucleus =

Now total charge of electrons =

Total charge of atom = so the ion is written F<sup>-</sup> not just F

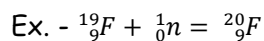
- Since the nucleus contains the mass of an atom and the nucleus is composed of protons and neutrons then the mass of an atom is composed of the mass of the \_\_\_\_\_ and \_\_\_\_\_. This total mass of an atom is known as the \_\_\_\_\_. Symbols and information for the atoms are written as follows:



- Neutrons can be solved for by subtracting the protons from the atomic mass rounded to the nearest whole number. Ex. - sodium (Na) has a rounded atomic mass of 23 and 11 protons so  $23 - 11 = 12$ . There are 12 neutrons in each sodium atom.

## Isotopes

- Isotopes -



\*\*\* Remember that isotopes for water have individual names.  ${}^1_1\text{H}$  is hydrogen,  ${}^2_1\text{H}$  is deuterium (heavy hydrogen) and  ${}^3_1\text{H}$  is tritium (radioactive hydrogen).

- The molar mass of chlorine is 35.5 g. You can't have the protons and neutrons add up to a decimal number when they are both whole values. So why is this? 35.5 g is an **average molar mass** for chlorine with all of its isotopes included.

Ex. - Experimentation has shown that Cl-35 is found in an abundance of 75.77% and Cl-37 is 24.23%.  
What is the average atomic mass of chlorine?

Ex. 2 - Find the expected molar mass of the following sample.  ${}^{10}_5\text{B} = 18.8\%$  and  ${}^{11}_5\text{B} = 81.2\%$

Ex. 3 - Naturally occurring silicon consists of 92.23% Si-28 and 4.67% Si-29 and 3.10% Si-30.  
Calculate the average mass.