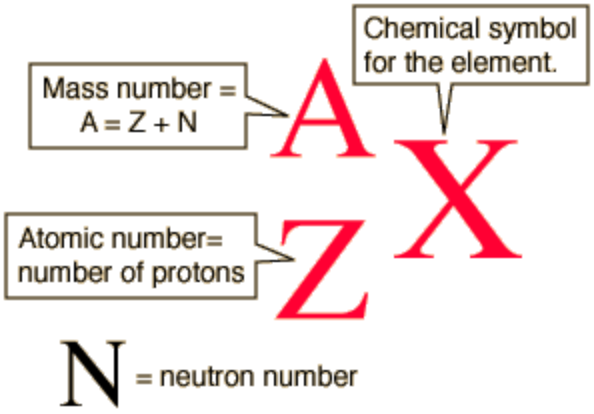
SPH3U0 Atoms and Isotopes Worksheet

- Prepare a Bohr-Rutherford diagram of a Calcium atom
- Prepare a Bohr-Rutherford diagram of a Calcium ion
- Prepare a Bohr-Rutherford diagram of a Flouride ion
- For Calcium;
    - Determine the number of protons, neutrons, and electrons
- For Flourine;
    - Determine the number of protons, neutrons, and electrons
- The number of nucleons inside a Calcium atom are; _____
- The number of nucleons inside a Magnesium atom are; _____
- The atomic number for Potassium is; _____
- The mass number for Potassium is; _____

As we draw Bohr-Rutherford diagrams, the electrons are shown in their ground state (lowest possible energy level that can be occupied. However, in real life, atoms will have electrons in a variety of excited states (higher levels than what the Bohr-Rutherford diagram would suggest).

- What is the highest energy level occupied by an electron in a;
  - Zirconium atom in its ground state _____
  - Silicon atom in its ground state _____
  - Bismuth atom in its ground state _____
  - Strontium atom and a valence electron has been excited to jump up one energy level _____

Isotopes: see the diagram on the side for the standard way of representing different isotopes; … eg;



$^{1}_{1}H$ hydrogen-1 (protium)

$^{2}_{1}H$ hydrogen-2 (deuterium)

$^{3}_{1}H$ hydrogen-3 (tritium)

Radioisotopes: Are unstable isotopes that spontaneously changes its nuclear structure and releases energy in the form of radiation
Radiation: energy released when the nucleus of an unstable isotope undergoes a change in structure

Given the following isotopes, determine the atomic number, the mass number, the number of protons, electrons and neutrons.

Isotope Symbol	Atomic Number	Mass Number	Protons	Electrons	Neutrons	Isotope Name
$^{131}_{53}I$						
$^{35}_{16}S$						
$^{4}_{2}He$						
$^{27}_{13}Al$						
$^{81}_{36}Kr$						
$^{81}_{37}Rb$						

PART B

Complete the following chart by writing the symbol for the isotope of the following elements. In addition, give the number of protons, electrons, mass number and atomic number and complete the element name.

Element Name	Neutrons	Protons	Electrons	Mass Number	Atomic Number	Isotope Symbol
Uranium-_____	145					
Chlorine-_____	28					
Oxygen-_____	9					
Boron-_____	6					
Beryllium-_____	5					
Hydrogen-_____	1					
Carbon-_____	8					

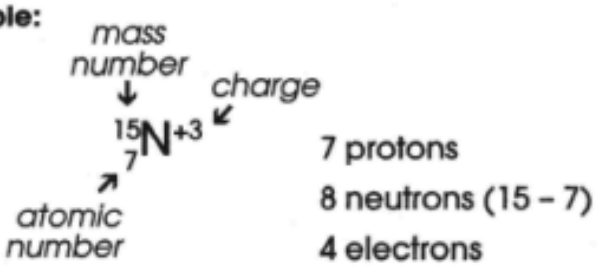
ATOMIC STRUCTURE

Name _____

An atom is made up of protons and neutrons (both found in the nucleus) and electrons (in the surrounding electron cloud). The atomic number is equal to the number of protons. The mass number is equal to the number of protons plus neutrons. In a neutral atom, the number of protons equals the number of electrons. The charge on an ion indicates an imbalance between protons and electrons. Too many electrons produces a negative charge, too few, a positive charge.

This structure can be written as part of a chemical symbol.

Example:



Complete the following chart.

Element/ Ion	Atomic Number	Atomic Mass AVERAGE	Mass Number	Protons	Neutrons	Electrons
H			3			
H^+					0	
$^{12}_{6}C$						
$^{7}_{3}Li^+$						
$^{35}_{17}Cl^-$						
$^{39}_{19}K$						
$^{24}_{12}Mg^{2+}$						
As^{3-}			76			
Ag			108			
Ag^{+1}					59	
S^{-2}					17	
U			240			