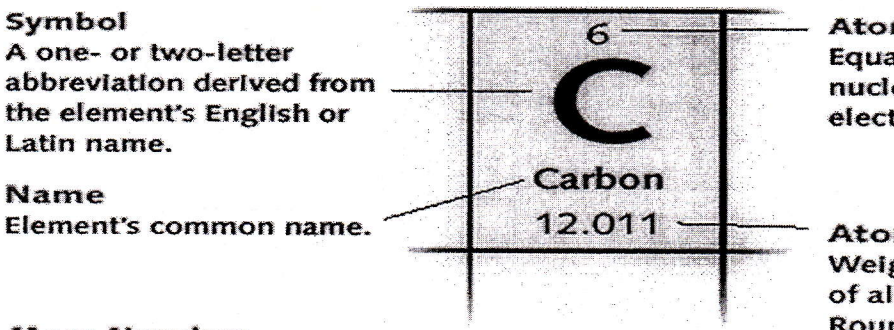
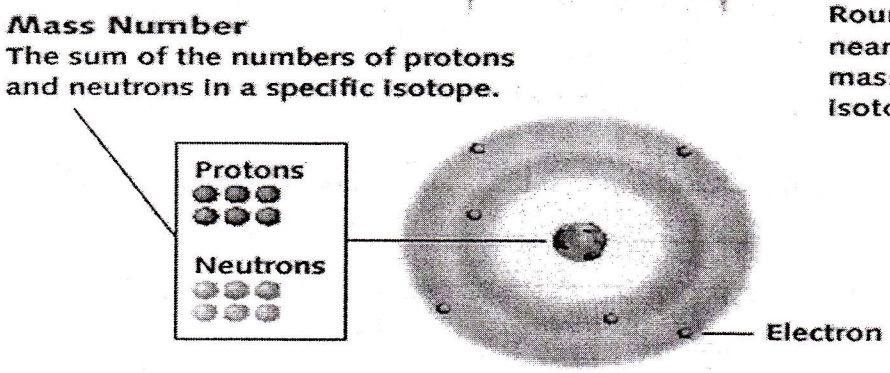
Periodic Table Basics & Introduction to the Bohr Model of the Atom & Lewis Dot Structures

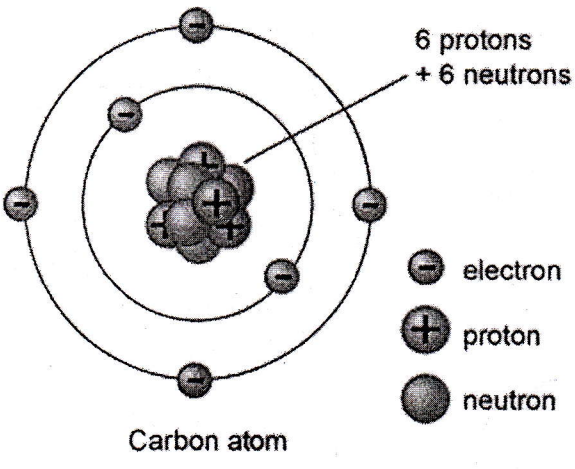




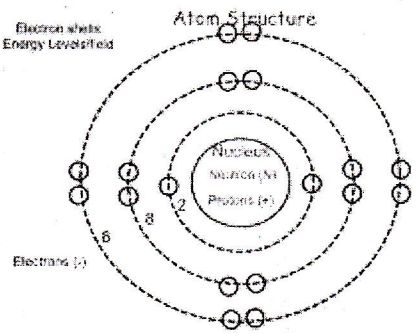
Carbon Atom

How to Draw a Bohr Model (Note: a Bohr model is a simplified version of the Quantum Model)

1. Find the number of Protons (atomic #), Neutrons (Mass # - Atomic #), and Electrons (equal to protons for a neutral atom) using the Periodic Table.
2. Draw a nucleus (as a circle). Place the number of protons and neutrons in the nucleus (P = ..., N = ...)
3. Place the electrons around the outside of the nucleus in the electron shells (also called orbitals or energy levels).
   a. The first shell can hold two electrons. If there is more than 2 electrons, a second shell is needed. The second shell can hold 8 electrons. If more than 10 electrons are in an atom, a third shell is needed. The third shell can hold 8 electrons.



Carbon atom



1st Electron shell: holds 2 electrons
2nd Electron shell: holds 8 electrons
3rd Electron shell: holds 8 electrons

The Quantum Model: (Note: we will use the Bohr model only)

In the quantum model the first orbital is called 1s and can fit 2 electrons. The second orbitals are called 2s (2 electrons) and 2p (6 electrons). The third orbitals are called 3s (2 electrons), 3p (6 electrons), and 3d (10 electrons). The fourth orbitals are called 4s (2 electrons), 4p (6 electrons), 4d (10 electrons), and 4f (14 electrons). Beyond the fourth level all orbitals have an s, p, d, and f region.

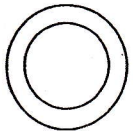
B

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure B

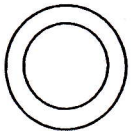
Li

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure Li

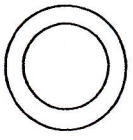
Ne

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure Ne

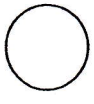
He

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure He

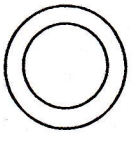
C

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure C

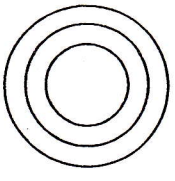
P

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure P

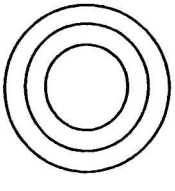
S

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure S

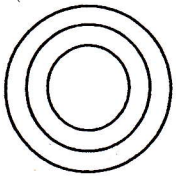
Mg

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure Mg

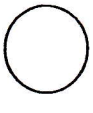
H

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure H

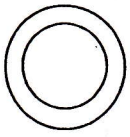
N

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure N

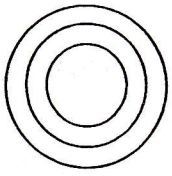
Al

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure Al

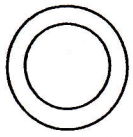
F

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure F

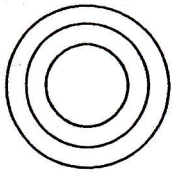
Ar

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure Ar

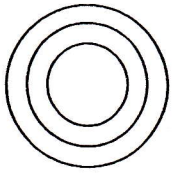
Si

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure Si

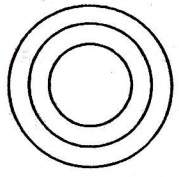
Na

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure Na

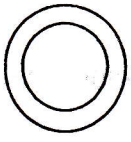
Be

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure Be

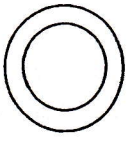
O

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure O

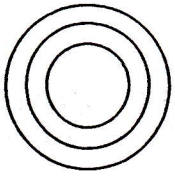
Cl

P = ___

N = ___

E = ___

Bohr Diagram



Lewis Structure Cl

Periodic Table Basics _____

1. Which elements had complete outer shells? Give the name and symbol for each.

_____ _____ _____ _____ _____ _____

2. What do you notice about the location of the elements in #1?

3. Which elements had only one valence electron?

_____ _____ _____ _____ _____ _____

4. What do you notice about the location of the elements in #3?

5. What do you notice about the number of valence electrons as you move from left to right across a row or period in the periodic table? (Na → Mg → Al → Si → P → S → Cl → Ar)

6. What do you notice about the number of energy levels or shells as you move down a group or column in the periodic table? (H → Li → Na)

7. Elements are organized into families according to their physical and chemical properties. Identify the elements that you used in Step 5 that belong to each family based on the number of valence electrons. Give the name and symbol for each element.

Alkali Metals - 1 valence electron _____ _____ & _____ _____

Alkaline Earth Metals - 2 valence electrons _____ _____ & _____ _____

Boron Family - 3 valence electrons _____ _____ & _____ _____

Carbon Family - 4 valence electrons _____ _____ & _____ _____

Nitrogen Family - 5 valence electrons _____ _____ & _____ _____

Oxygen Family - 6 valence electrons _____ _____ & _____ _____

Halides - 7 valence electrons _____ _____ & _____ _____

Noble Gases - Complete outermost shell

_____ _____, _____ _____, & _____ _____

8. What do you notice about the location of the elements in each family?

9. How would you classify hydrogen? Why?

10. Predict the number of valence electrons for each element based on its location in the Periodic Table of Elements. You will need to use the table in your textbook.

Barium = _____ Lead = _____ Xenon = _____ Potassium = _____