**NOTES: More Patterns in the Periodic Table**

**and Bohr Diagrams**

**Bohr Model Diagrams**

Bohr Models illustrate energy shells and the electron arrangement of a particular atom.

In this model, electrons will fill up each inner shell before flowing into the next shell on the outside.

The capacity of each shell from inside to out is as follows: **2, 8, 8, 18, 18**.



**Drawing Bohr ATOMS**

1. Pick an Element. Write Symbol in nucleus!
2. Write the number of PROTONS.
3. Write the number of NEUTRONS (atomic mass – atomic number).
***There are 2 different ways to draw a Bohr Atom:***
4. Draw electrons as dots filling up the shells from the nucleus out (remember: 2, 8, 8, 18, 18):

**(The total number of electrons is equal to the number of protons in an uncharged atom.)**

1. Write the number of electrons as symbols and shells as **semi-circles** from the nucleus out:

**Element symbol**

**#protons
#neutrons**

**Electron configurations of the first 18 elements in the Periodic Table**



**Patterns in the Periodic Table**

Elements in each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have the same number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons

(electrons in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).

Elements in each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have the same number of shells. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number indicates the number of shells that will be occupied by electrons.

**DEFINE Valence Electrons: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**DEFINE Valence Shell: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Ions**

An\_\_\_\_\_\_ is an atom that has \_\_\_\_\_\_\_or\_\_\_\_\_\_\_ electrons resulting in an electric charge. The number of protons does not change.

* + - In an ion the # electrons \_\_\_\_ # protons

Most elements **gain or lose electrons in order** to be \_\_\_\_\_\_\_\_\_\_\_\_ like Noble gases and have the **same e- arrangement as the nearest noble gas**.

* + **Metals** *\_\_\_\_\_\_\_\_\_\_*electrons to empty their valence shell and form \_\_\_\_\_\_\_\_\_\_ions (Ca2+  --> lost 2 e-)
	+ **Non-metals (except noble gases)** ­­\_\_\_\_\_\_\_\_\_electrons to fill their valence shell and form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ions (O2- –-> gained 2 e-)

**Noble gases** are stable and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because their \_\_\_\_\_\_\_\_\_\_\_\_ shells are completely full. They do not form \_\_\_\_\_\_\_\_\_.

**Charge on an Ion**

Cl- charge is \_\_\_\_\_ vs Be2+  charge is \_\_\_\_\_\_

The charge on an ion = \_\_\_\_\_\_\_ of charges on its protons and electrons

* + O2- has \_\_\_\_\_\_ protons and \_\_\_\_\_\_\_ electrons so Total Charge = ( ) + ( -) =

**What pattern in ion charges do you notice on the periodic table?**

Elements of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form ions \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
(except transition metals) which form\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Drawing Semi-Circle Bohr IONS**

1. Follow the same steps for drawing a Bohr atom except:
* Write the element symbol with its \_\_\_\_\_\_\_\_\_\_
* Determine # electrons 🡪 # electrons $\\_\\_\\_\\_\\_$# protons
* Write the number of electrons as symbols (2e, 8e, 8e, 18e, 18e) filling up the shells from the nucleus out
* Draw shells as semi-circles from the nucleus out and put the **charge** of the ion on the element symbol

**Charge**

 **+**

**#protons
#neutron**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Atom or Ion**  | **Atomic** **Number**  | **Atomic Mass** |  **Ion Charge** | **#** **Protons**  | **#****Electrons** | **# Neutrons** |
| **Carbon atom** | **6** | **12** | **0** | **6** | **6** | **12 – 6 = 6** |
| **Sulphur atom** |  | **32** |  |  |  | **16** |
| **Ca2+** |  | **40.1** |  | **20** |  |  |
| **Cl –**  |  | **35.5**  |  | **17** |  |  |
| **Neon atom** | **10** |  |  |  | **10** | **10** |

**Do this Now!** 1) Complete Note Examples 2) Handout pages!

**TRY IT: Use Semi-Circle Diagrams to draw Bohr Diagrams! Refer to notes!**

1. Potassium Atom Potassium Ion
2. Oxygen Atom Oxide Ion
3. Sodium atom Sodium ion
4. Fluorine atom Fluoride ion
5. Aluminum atom Aluminum ion