**2014 Chemistry Periodic Table Notes**

**Antoine Lavoisier (1700’s)**

* Listed all known elements (33) at the time
* 4 groups: \_\_\_\_\_\_\_\_\_\_\_\_\_,\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_.

**Dobereiner (early 1800’s)**

* Arranged the elements into \_\_\_\_\_\_\_ (groups of three elements) based on \_\_\_\_\_\_\_\_\_\_ in properties.



**John Newlands (1864)**

* Arranged elements by increasing atomic \_\_\_\_\_\_\_\_. (70)
* Noticed a \_\_\_\_\_\_\_\_\_\_\_ pattern of \_\_\_\_\_\_\_\_\_\_\_\_.
* Created the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (repeating patterns at every eighth element)



**Lothar Meyer (1869)**

* Identified and proved that there was a connection between \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_ of the element
* Arranged the elements by increasing atomic mass (added the \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_)

**Dmitri Mendeleev (1869)**

* Proved a \_\_\_\_\_\_\_\_\_\_ between atomic mass and element properties
* Arranged elements by increasing atomic mass
* Predicted the \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ of elements yet to be \_\_\_\_\_\_\_\_\_\_\_

**Henry Moseley (1913)**

* Discovered atomic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Arranged elements by increasing atomic number
* By doing this a pattern of properties was discovered and fixed previous problems

**Periodic Law**

* When elements are arranged by increasing atomic \_\_\_\_\_\_\_\_\_\_, there is a periodic repetition of \_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_ properties.
* Modern Periodic Table:
	+ **\_\_\_\_\_\_\_\_\_\_** (rows)- contain a variety of elements ranging from metals to nonmetals to Noble gases. There are \_\_\_\_\_\_\_\_\_\_.
* **\_\_\_\_\_\_\_\_\_\_** or **\_\_\_\_\_\_\_\_\_\_** (columns)- contain elements that share similar properties. There are \_\_\_\_\_\_\_\_.

**Representative (Main) Elements:**

* Marked by “\_\_\_\_\_” on most groups.
* Elements in the \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_ block
* \_\_\_\_\_\_\_\_\_\_\_\_\_ range of characteristics
* This is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Transition Elements (B) Consists of only metals.**

* Found in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the period table.



**Metals, Nonmetals, and Metalloids**

**Metals:**

* Make up \_\_\_\_\_\_\_\_\_\_\_ of the periodic table
* \_\_\_\_\_\_\_\_ at room temperature (except \_\_\_\_\_\_\_\_\_\_)
* Good conductors of \_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_
* Have Luster (\_\_\_\_\_\_\_\_\_\_\_\_)

**Nonmetals:**

* \_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_ at room temperature (except \_\_\_\_\_\_\_\_, it is a liquid)
* \_\_\_\_\_\_\_\_\_\_\_ conductors of heat or electricity
* \_\_\_\_\_\_\_\_\_\_\_\_\_
* Dull

**Metalloids:**

* \_\_\_\_\_\_\_\_\_\_\_\_ of characteristics of both \_\_\_\_\_\_\_\_\_\_\_ and nonmetals
* \_\_\_\_\_\_, \_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_
* Silicon and Germanium are both used in computer chips

**S- Block:**

* **Alkali Metals**
	+ 1 valence e-. This makes them highly \_\_\_\_\_\_\_\_\_\_\_\_
	+ Exist only as \_\_\_\_\_\_\_\_\_\_\_\_
	+ Silvery white in color
	+ Often bond with \_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Used in salts and batteries
	+ Forms \_\_\_\_\_\_\_\_\_ with a \_\_\_\_\_\_\_\_ charge
* **Alkaline Earth Metals**
	+ 2 valence e-. Makes them highly reactive
	+ Ca and Mg are important components of living cells
	+ Silvery in color
	+ Used to make laptop casings
	+ Forms ions with a \_\_\_\_\_\_\_\_ charge.

**P- Block (Families 13-18):**

* Boron Family (13)
	+ 3 valence e-
	+ Tends to \_\_\_\_\_\_\_\_\_ its valence e- away
	+ Most are \_\_\_\_\_\_\_\_\_\_\_\_
	+ Not as \_\_\_\_\_\_\_\_\_\_\_\_ as group one and two
	+ Forms ions with a 3+ charge

* Carbon Family (14)
	+ 4 valence e-
	+ Can either \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ its valence electrons or take additional electrons
	+ Sn and Pb will form ions with 4+charges
* Nitrogen Family (15)
	+ 5 valence e-, but will form \_\_\_\_\_\_\_ (it prefers to \_\_\_\_\_\_\_ 3 e- rather than \_\_\_\_ away 5)
	+ N and P are reactive and found in many molecular compounds
* Oxygen Family (16)
	+ 6 valence e-
	+ Forms 2- ions. It prefers to gain\_\_\_\_\_\_\_\_\_ 2 e- rather than give away 6)
	+ O and S are reactive and found in many compounds
* **Halogens (17)**
	+ 7 valence e-
	+ Form 1- ions (gains 1 e-)
	+ Highly reactive \_\_\_\_\_\_\_\_\_\_\_\_
	+ Will often bond with metals to make \_\_\_\_\_\_\_\_
* **Noble Gases (18)**
	+ 8 valence e-, full p \_\_\_\_\_\_\_\_\_\_\_
	+ Does not form ions
	+ Inert gases (\_\_\_\_\_\_\_\_\_\_)
	+ They do not \_\_\_\_\_\_\_\_\_\_ with other elements because they do not need any more e-.

**D- Block (3-12)**

* All \_\_\_\_\_\_\_\_\_\_\_\_ metals
* Most are hard metals
* All can exist as \_\_\_\_\_\_\_\_\_ elements in nature
* Will form a variety of \_\_\_\_\_\_\_\_\_ ions due to the fact that the s and d sublevels are close in energy amounts

**F- Block (Period 6 and 7)**

* **Lanthanide Series**
	+ elements 57-70
	+ Fits in period \_\_\_\_\_\_\_
	+ Shiny metals
	+ Highly \_\_\_\_\_\_\_\_\_\_\_
* **Actinide Series**
	+ elements 89-102
	+ Fits in period \_\_\_\_\_\_\_\_\_
	+ Radioactive
	+ The first 4 are naturally occurring the rest are lab created

**\*\* For the Lanthanides and Actinides:**  Electrons fill the f-orbitals in an \_\_\_\_\_\_\_\_\_\_\_\_ manner and there are many \_\_\_\_\_\_\_\_\_\_\_ to electron configuration rules.

**Octet Rule**: Every Element wants \_\_\_\_\_ valence e-



**Formation of Ions:**

* A positive ion (called a \_\_\_\_\_\_\_\_\_\_) results when an atom \_\_\_\_\_\_\_\_\_electrons.
* A negative ion (called an \_\_\_\_\_\_\_\_\_\_\_) results when an atom \_\_\_\_\_\_ electrons.

**Periodic Trends:**

* Patterns in the periodic table that can be determined by \_\_\_\_\_\_\_\_\_\_ a period or a group
* \_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Atomic Radius:**

* The “\_\_\_\_\_\_\_\_\_\_ of atom”
* The outer edge of an atom is not clearly defined; there is no definite edge
* Atomic radius is therefore \_\_\_\_\_\_\_\_ the distance between two identical nuclei

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**Atomic Radius Trend:**

* **\_\_\_\_\_\_\_\_\_\_as you go \_\_\_\_\_\_\_\_\_\_ the period** - as you go across a period, more \_\_\_\_\_\_\_\_\_\_\_ in nucleus, greater positive charge. Added \_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_principal energy level, so they get pulled closer to nucleus.
* **\_\_\_\_\_\_\_\_\_ as you go down the \_\_\_\_\_\_\_\_** – as you go down a group, more \_\_\_\_\_\_\_\_ are added increasing nuclear charge. However added electrons are in successively \_\_\_\_\_\_\_ energy levels which are \_\_\_\_\_\_\_ from the nucleus.
* Electrons are \_\_\_\_\_\_\_\_\_ pulled as tightly toward the nucleus.

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**Electronegativity:**

* the ability of an atom to \_\_\_\_\_\_\_\_\_ an electron while in a \_\_\_\_\_\_\_\_\_\_ bond
* the larger the electronegativity value, the \_\_\_\_\_\_\_\_\_ an atom is at \_\_\_\_\_\_\_ electrons while in the chemical bond

**Electronegativity Trend:**

* **\_\_\_\_\_\_\_across the period** – atoms are smaller going across a period, \_\_\_\_\_\_\_shell is closer to being full, and it is closer to the \_\_\_\_\_\_ nuclear charge
* **Decreases down the \_\_\_\_\_\_\_** – atoms are larger going down a group, outer orbitals \_\_\_\_\_\_\_\_ from positive nuclear charge, not good at attracting electrons

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