**Unit Four Note-taking Guide – Periodicity**

**Podcast 4.1 Organization of the Periodic Table**

* Elements with similar properties were placed in vertical **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (columns) or **\_\_\_\_\_\_\_\_\_\_\_\_\_.**
* Placed by increasing atomic weights in rows called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

Families/Groups

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Metals
	+ Group 1 – Lithium, Sodium, Potassium, Rubidium, Cesium, Francium
	+ **\_\_\_\_\_\_\_\_\_\_\_\_**electron in valence (outer) shell
	+ Very, VERY reactive – not found free in nature
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Metals
	+ Group 2 – Beryllium, Magnesium, Calcium, Strontium, Barium, Radium
	+ **\_\_\_\_\_\_\_\_\_\_\_\_** electron in valence shell
	+ Very reactive – not usually found pure in nature
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Group 18 – Helium, Neon, Argon, Krypton, Xenon, Radon
	+ **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** valence electron shell
	+ Very stable (not reactive)
	+ Under normal conditions do not form compounds with other elements
	+ XeF4 (xenon tetrafluoride) is the first reported stable compound of a noble gas - 1962
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Group 17 – Fluorine, Chlorine, Bromine, Iodine, Astatine
	+ **\_\_\_\_\_\_\_\_\_\_\_\_\_** electrons in valence shell
	+ Halogen means “salt former”
	+ Compounds they form are called salts
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Metals
	+ Groups 3 to 12, periods 4 to 7
	+ **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** electrons in valence electron shell
	+ Hard and have a high melting point
	+ Often used to form alloys (mixtures of metals)

**Podcast 4.2: Early Periodic Tables**

* Mid 1800’s – 60 Different Elements were identified
* 5 were **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** at room temperature (all non-metals)
	+ H, O, N, F, Cl
* 2 were **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
	+ Hg (metal)
	+ Br (non-metal)
* The rest were **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Scientists searched for a way to organize these elements
	+ Elements with similar **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** were placed near one another.
* Dimitri Mendeleev
	+ In 1869 he published the first periodic table
	+ Mendeleev’s Table arranged by
		- **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (Molar Mass)
		- Combining Capacity
* Modern Periodic Table arranged by
	+ **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
	+ Number of valence electrons
	+ Put together by Henry Mosely
* Why use Atomic Number rather than Atomic Weight?
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Podcast 4.3: Ions – Charged Particles**

Ions Are Charged Particles

* Atoms will transfer one or more **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** to another to become more stable.
* Each atom is left with a **\_\_\_\_\_\_\_\_\_\_\_\_\_** outer shell.
* Atoms neutral; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ balance electrons
* Ions carry a charge because electrons (-) are gained or lost from a neutral atom.

Lewis Dot Diagrams: Represent Valence Electrons as Dots

* **Example 1: Sodium + Chlorine**
* **Example 2: Magnesium + Bromine**
* An atom that **gains** one or more electrons will have a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** charge.
* An atom that **loses** one or more electrons will have a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** charge.
* A positive ion is called a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and a negative ion is called an **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

Ionization Equations

* To show how an ion forms, electrons are written as reactants (gained) or as products (lost) in a chemical equation
* Sodium
* Chlorine
* Magnesium
* Oxygen

**Podcast 4.4: Periodic Trends**

Nuclear Charge, Z

* The nucleus is made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The charge of the nucleus comes from the protons
* The more protons, the \_\_\_\_\_\_\_\_\_\_\_\_\_ the charge

Electrostatic Force -- Coulomb’s Law

* The force of attraction is described by Coulomb’s Law

*write equation here:*

Electron Affinity = Electronegativity

* How tightly held are the valence electrons?
* More Electronegativity pulls electrons \_\_\_\_\_\_\_\_

Atomic Radius

* Smaller atoms take up less space
* More closely-held electrons take up less space

Ionization Energy: The energy required to REMOVE an electron

* Higher energy means it’s harder to take the electron away
* Cations have \_\_\_\_\_\_\_\_\_\_\_ ionization energies
* Anions have \_\_\_\_\_\_\_\_\_\_\_ ionization energies

Flame Test Results

* Sodium
* Lithium
* Potassium
* Barium

Effects of Electron Shielding

* Back to Coulomb’s Law… distance from the nucleus \_\_\_\_\_\_\_\_\_\_\_ the attraction experienced by valence electrons
* Other electrons get in the way – \_\_\_\_\_\_\_\_\_\_\_ valence electrons from the nuclear charge

Which has more influence… Nuclear Charge or Shielding?

* As the principle energy level increases, effects of shielding \_\_\_\_\_\_\_\_\_\_\_ .

*Answer the question and explain your reasoning:*

Electronegativity (Electron Affinity)

Atomic Radius

Ionization Energy