Unit 4: The Periodic Table and Periodicity

Name: ____________________

**The Elements**

Element names come from a variety of sources.
- elements known to the ancients… Au, Ag, S, Sn, C
- place names… Fr, Po, Ge, Ga, In, Eu, Am, Cf, Sc
- famous people… Es, Fm, Md, No, Gd, Rf, Bh
- foreign languages… W, Fe, Au, Ag, Pb, Sn, K
- mythology-related names… Th, Pm, Ce, Ta, Ti, Pd, Ir
- names related to element properties… Xe

**Background on the Periodic Table**

Dmitri Mendeleev: given credit for Periodic Table (~1870)

Henry Moseley: put elements in order of increasing atomic number

**Describing the Periodic Table**

*periodic law*: the properties of elements repeat every so often

*period:*

*group (family):*

**Regions of the Table**

*metals*: left side of Table; form cations

*properties:*

*nonmetals*: right side of Table; form anions

*properties:*

*metalloids (semimetals)*: “stair” between metals and nonmetals

*properties:*

Si and Ge →
alkali metals:
alkaline earth metals:
halogens:
noble gases:
lanthanides:
actinides:
coinage metals:
transition elements:
main block (representative) elements:

Same number of valence e⁻ =
Li Na

In any group, the element BELOW has one more occupied energy level than does the element ABOVE.

Li Na

The period that an element is in is the same as the energy level that its valence electrons are in.

Li → Na →

**Periodicity** → there are trends in properties of elements
-- left-right AND up-down trends

atomic radius:
...
...

coulombic attraction: attraction between (+) and (–); depends on...

<table>
<thead>
<tr>
<th>amount of charge</th>
<th>distance between charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>2+</td>
<td>2+</td>
</tr>
<tr>
<td>2−</td>
<td>2−</td>
</tr>
<tr>
<td>1+</td>
<td>2+</td>
</tr>
<tr>
<td>1−</td>
<td>2−</td>
</tr>
</tbody>
</table>
shielding effect: kernel e\(^-\) “shield” valence e\(^-\) from attractive force of the nucleus

As we go , shielding effect…

ionic radius:
cations
Ca atom Ca\(^{2+}\) ion
anions
Cl atom Cl\(^{1-}\) ion
**ionization energy**: the energy required to remove an $e^-$ from an atom

\[ \text{M} + 1^{\text{st}} \text{I.E.} \rightarrow \]

\[ \text{M}^{1+} + 2^{\text{nd}} \text{I.E.} \rightarrow \]

\[ \text{M}^{2+} + 3^{\text{rd}} \text{I.E.} \rightarrow \]

As we go \[ \downarrow \], 1\textsuperscript{st} I.E.\ldots  

As we go \[ \rightarrow \], 1\textsuperscript{st} I.E.\ldots

**electronegativity**: Linus Pauling quantified the electronegativity scale.

As we go \[ \downarrow \], electronegativity…

As we go \[ \rightarrow \], electronegativity…