

## PERIODIC TABLE TRENDS:

### Effective nuclear charge ( $Z_{\text{eff}}$ ):

$$Z_{\text{eff}} = \# \text{ protons} - \# \text{ NON valence electrons}$$

### Electron shielding:

### Atomic radii:

- Increases** down a group;
  - each element has one more energy level.
- Decreases** across a period
  - More protons in nucleus, means greater effective nuclear charge
  - All electrons in same energy level.

Pick the *larger atom*:            Be/ Sr            K / Se            Cl/ I

Pick the *smaller atom*:        B/ Al            P/ Cl            Cs/ Ba

### Ionization energy (I.E.):

- When you remove an electron, the atom turns into a positive ion (cation).
  - Ex:  $\text{Na} \rightarrow \text{Na}^{+1} + \text{e}^{-}$
- METALS tend to lose electrons therefore they are CATIONS.
- The greater the ionization energy, the more difficult it is to remove an electron.
- Metals tend to have **LOW** ionization energy because they want to lose an electron to be cations.
- Down a group, I.E. **decreases**, across a period, I.E **increases**.

\*\*What about ANIONS? Atoms that have gained electrons to be negatively charged.

- When you add an electron, the atom turns into a negative ion (anion).
  - Ex:  $\text{S} + 2\text{e}^{-} \rightarrow \text{S}^{-2}$
- NONMETALS tend to gain electrons therefore they are ANIONS.
- This is because nonmetals have **HIGH** electron affinities, meaning they have a liking to attract electrons.

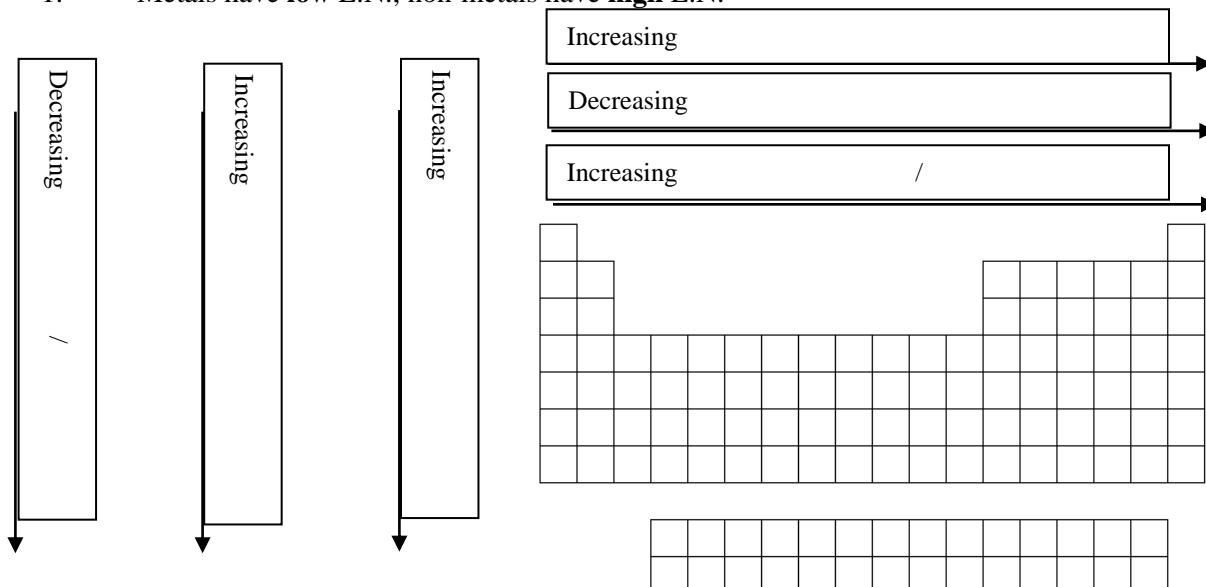
REVIEW:

Metals are Cations. Nonmetals are Anions.

Metals tend to lose electrons. Nonmetals tend to gain electrons.

### Electronegativity (E.N.):

- Metals have **low** E.N.; non-metals have **high** E.N.



# PERIODIC TABLE TRENDS HOMEWORK

## Nuclear charge, Atomic Radius, I.E, Electronegativity

- In your own words, define effective nuclear charge:
- Across a period, the effective nuclear charge tends to \_\_\_\_\_.
- Why do you see the above trend as you go across a period?
- In your own words, define electron shielding:
- Down a group, the electron shielding tends to \_\_\_\_\_.
- In your own words, define atomic radius:
- Down a group, as the atomic number of an element increases, the atomic radii \_\_\_\_\_.
- Across a period, as the atomic number of an element increases, the atomic radii \_\_\_\_\_.

*Circle the element that has the largest atomic radius:*

- |            |             |             |
|------------|-------------|-------------|
| 9. Mg / Na | 10. Al / B  | 11. F / N   |
| 12. K / Ca | 13. Br / Cl | 14. Ne / Ar |

- Metals will \_\_\_\_\_ electrons to form \_\_\_\_\_ which have a \_\_\_\_\_ charge.  
(gain/lose) (cations/anions) (positive/negative)
- Nonmetals will \_\_\_\_\_ electrons to form \_\_\_\_\_ which have a \_\_\_\_\_ charge.  
(gain/lose) (cations/anions) (positive/negative)

- In your own words, define ionization energy (IE):

*Circle the element that has the lower ionization energy:*

- |             |             |            |
|-------------|-------------|------------|
| 18. Li / Na | 19. Cs / Ba | 20. F / Ne |
|-------------|-------------|------------|

*Circle the particle with the highest electronegativity:*

- |           |             |            |
|-----------|-------------|------------|
| 21. P / S | 22. Na / Mg | 23. O / Te |
|-----------|-------------|------------|