

Name: _____ Period: _____ Date: _____

Title: **Periodic Trends Packet**

Video: 5.2

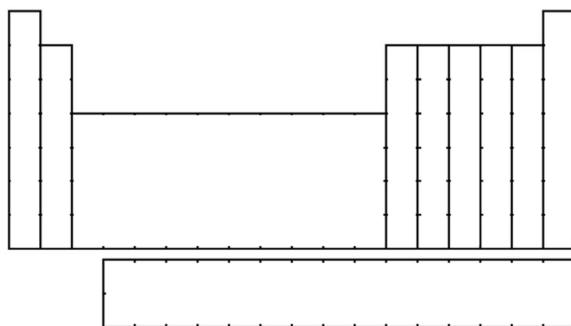
Textbook: 5.3 (pp 149+)

TEKS: 5B-Use the Periodic Table to *identify* and *explain* the properties of chemical families, including alkali metals, alkaline earth metals, halogens, noble gases, and transition metals; **5C**-Use the Periodic Table to *identify* and *explain* periodic trends, including atomic and ionic radii, electronegativity, and ionization energy.

The organization of elements on the periodic table leads to many trends that we can observe. In the following sections you will *define*, *identify*, and *explain* periodic trends based on element location on the periodic table.

Trend # 1: Valence Electrons

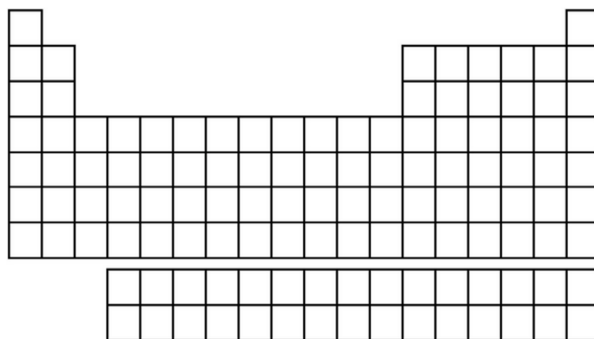
1. What is a valence electron?
2. Label the periodic table of elements with the number of valence electrons. →
3. Shade the areas of the PT where you cannot predict the number of valence electrons.
4. How many valence electrons do the following elements have? (*You can determine this by the location of the elements.*)



- | | | |
|---------------|---------------|---------------|
| a. Na = _____ | f. Cs = _____ | k. Fr = _____ |
| b. Cl = _____ | g. Al = _____ | l. P = _____ |
| c. As = _____ | h. H = _____ | m. Xe = _____ |
| d. Po = _____ | i. He = _____ | |
| e. Rb = _____ | j. In = _____ | |

Trend # 2: Atomic Radii

5. Define atomic radii:
6. Label the PT with vertical and horizontal arrows that represents the **increasing** atomic radii of atoms in groups and periods.
7. Circle the element below that has the largest atomic radius: (*You can determine this by the location of the elements.*)



- | | | |
|-------------|-------------|-------------|
| a. H or He | f. Pb or Si | k. Ac or No |
| b. Sr or Sb | g. Re or Ta | l. Ga or Ge |
| c. Ba or Mg | h. Pa or Cm | m. K or Kr |
| d. Cs or Fr | i. Hg or Zn | |
| e. O or Te | j. Sc or Y | |

8. Explain why the atomic radii trend increases as it does on the periodic table.

(Left/Right) Across a period-

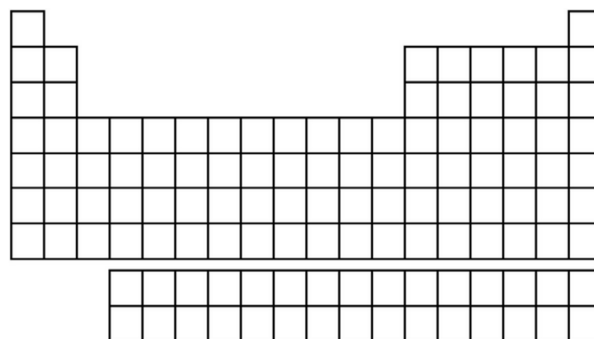
(Up/Down) In a group-

Trend # 3: Ionization Energy

8. Define ionization energy:

9. Label the PT with vertical and horizontal arrows that represents the **increasing** ionization energy in atoms in groups and periods.

10. Circle the element below that has the largest ionization energy: (Hint: You are circling the element that wants to hold on to their electrons the most.... Keep in mind that some elements want to give one (or more) electrons away and some elements (like the noble gases) don't want to give any away because they have a full octet.)



a. K or Ca

f. Ne or Ar

k. Nb or Ru

b. Ba or Cs

g. Fr or Li

l. Si or Cl

c. Ga or Se

h. Ca or As

m. He or H

d. S or Te

i. Po or Pb

e. F or Br

j. O or Se

9. Explain why the ionization energy trend increases as it does on the periodic table.

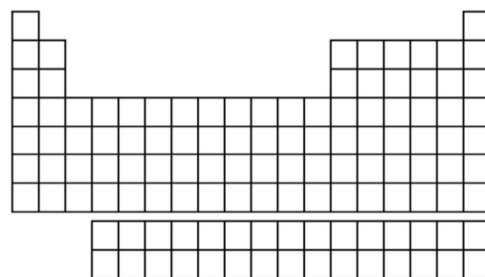
(Left/Right) Across a period-

(Up/Down) In a group-

Trend # 4: Electron Affinity

11. Define electron affinity:

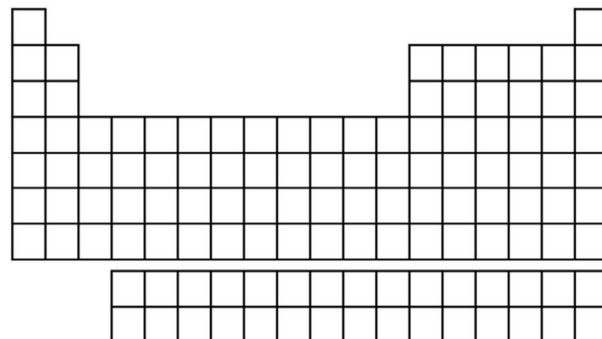
12. Electron affinity *is very similar* to ionization energy. Ionization energy is basically how tightly an atom holds on to its “first” or one electron and electron affinity is the energy change that occurs when an electron is acquired by a neutral atom. Label the PT with vertical and horizontal arrows that represents the ***increasing*** electron affinity in groups and periods.



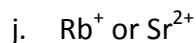
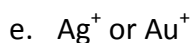
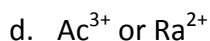
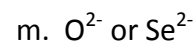
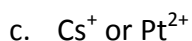
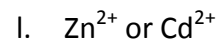
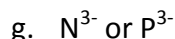
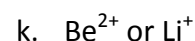
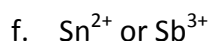
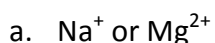
Trend # 5: Ionic Radii

13. Define ionic radii:

14. Label the PT with vertical and horizontal arrows that represents the ***increasing*** ionic radii in the groups and periods. It is important to recognize that the trend resets when you change from cations (+ ions, the metals) to the anions (- ions, the nonmetals). *All cations are larger than their regular atoms because they have fewer electrons than protons, the remaining electrons are held closer by the nucleus. Anions, on the other hand, are larger than their regular atoms because they have extra electrons and the protons in the nucleus can't hold them as close since the electrons outnumber the protons.*



15. Circle the element below that has the largest ionic radius. (*Hint: You are comparing the ionic radius of one ion to the ionic radius of another ion.*)



16. Why don't the noble gases have an ionic radius listed? _____

17. Explain why the ionic radii trend increases as it does on the periodic table.

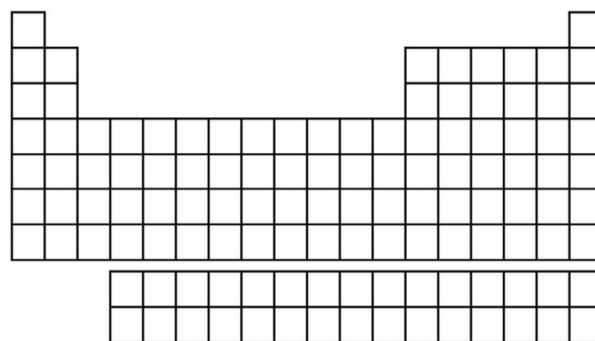
(Left/Right) Across a period-

(Up/Down) In a group-

Trend # 6: Electronegativity

18. Define electronegativity:

19. Label the PT with vertical and horizontal arrows that represents the ***increasing*** electronegativity in the groups and periods.



20. What is the most electronegative element? _____

21. What is the least electronegative element? _____

22. Circle the element below that has the highest electronegativity:

a. F or Cl

e. Mn or Ge

i. Cd or Sn

b. Pd or Ag

f. Er or Tm

j. Pb or C

c. Y or Sn

g. Be or Ra

k. Na or P

d. At or Br

h. Si or Cl

l. Mn or Co

23. *Explain* why the electronegativity trend increases as it does on the periodic table.

(Left/Right) Across a period-

(Up/Down) In a group-