CHEMISTRY

PROPERTIES OF POLAR MOLECULES

Trends in the Periodic Table

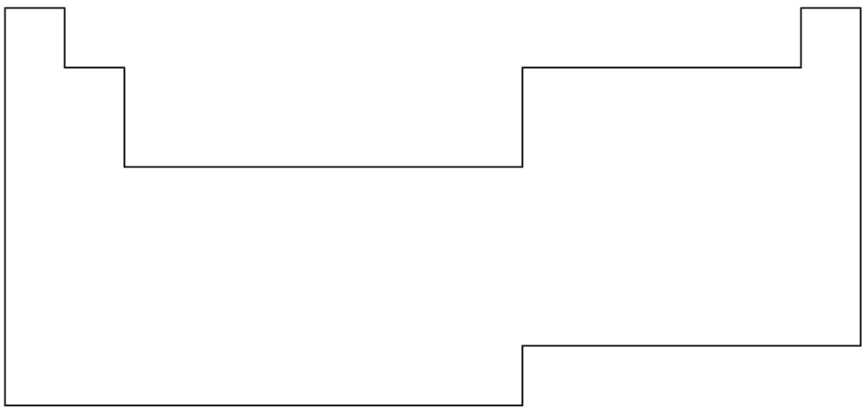
As we know, the Periodic Table is arranged in a set way. It is not merely random coincidence that dictates the location of each element.

Atomic Radius -

Ionization Energy -

Electron Affinity -

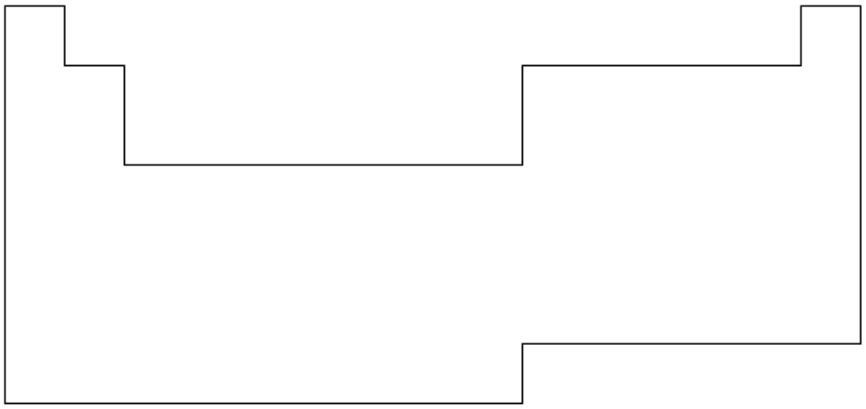
Electronegativity -



CHEMISTRY

PROPERTIES OF POLAR MOLECULES

Trends in the Periodic Table



Atomic Radius Increases from **Right** to **Left**
(the bigger elements are on the **Left**)

Atomic Radius Increases from **Top** to **Bottom**
(the bigger elements are on the **Bottom**)

Therefore, The Biggest element on the Periodic Table is Francium

The Smallest element on the periodic table is Helium
(Hydrogen is actually the smallest - Exception)

Electronegativity, **Ionization Energy** and **Electron Affinity** trend in the opposite direction to Atomic Radius with the elements with the **Highest** values for these properties existing in the **TOP LEFT** (**Lowest** values in the **BOTTOM RIGHT**).

CHEMISTRY

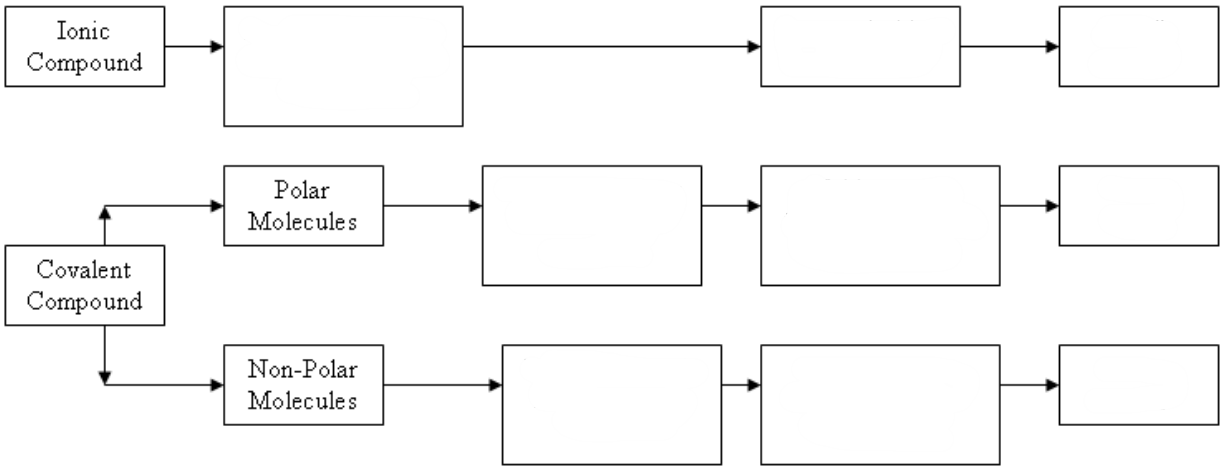
PROPERTIES OF POLAR MOLECULES

PROPERTIES OF POLAR AND NON-POLAR MOLECULES

Polar molecules have positive and negative ends that attract one another. For example, water tends to stick to itself. This means that it is harder to remove a polar molecule from a collection of polar molecules than it is removing non-polar molecules.

When a substance boils, energy is inputted into the liquid until enough thermal energy is acquired to break intermolecular bonds and eject molecules into a gaseous state. This is called the boiling point.

As you can imagine, because polar molecules tend to stick together, it requires more energy to split them apart, or boil them. As such, polar molecules have a higher boiling point than non-polar molecules (***have higher melting points as well***).



CHEMISTRY

PROPERTIES OF POLAR MOLECULES

Non-Polar Molecules with Polar Bonds

Not all molecules with polar bonds are polar molecules. If the molecule is symmetrical (no lone pairs, same elements), then charges will cancel out. If the charges cancel out, than the molecule is said to be non-polar.

Ex: Polar/Non-Polar Molecule

CS_2 _____

$AlCl_3$ _____

NH_3 _____

CHF_3 _____

CHEMISTRY

PROPERTIES OF POLAR MOLECULES

Properties of Polar Molecules

Which of these 2 polar molecules has the higher boiling point?

NI_3	NF_3

Rank the following molecules from highest boiling point to lowest boiling point:

CH_4,	SiF_4,	$CHCl_3$,	CHF_3

CHEMISTRY

PROPERTIES OF POLAR MOLECULES

Homework

Pg. 79

14. One compound has a melting point of 714°C. Another compound, which is similar in size and appearance, has a melting point of 146°C. How would you classify these compounds based on their melting points?

15. Why is it incorrect to refer to a "molecule" of a compound such as potassium iodide?

16. What is a dipole-dipole force?

17. Why do non-polar molecules have very low melting and boiling points?

Pg. 82

2. K/U Describe, on the level of individual particles, what happens to a substance when it is heated.

3. K/U What property of particles determines whether they will pull away from adjacent particles?

4. K/U How would you classify a compound that has a boiling point of −182°C? Explain your answer.

5. K/U Explain why compounds consisting of polar molecules are likely to have a higher melting point than compounds consisting of non-polar molecules.

6. T/I What would you predict about the melting point of a compound that will not dissolve in water? Explain your thinking.

9. C Use sketches to show how a non-polar molecule can have polar bonds.

16. T/I Two molecular compounds, X and Y, have similar masses. Compound X is solid at room temperature, has a melting point of 146°C, and is soluble in water. Compound Y is liquid at room temperature, has a melting point of −10°C, and is not soluble in water.

a. What would you predict about the polarities of compound X and compound Y?

b Based on your predictions, explain the differences in their melting points and solubilities.