**Chemical Bonding – Types of Bonds**

Question: What causes a chemical bond?

* The negative electron cloud of the atoms exert \_\_\_\_\_\_\_\_\_\_\_\_\_\_ forces on each other
* Each nucleus begins to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the approaching atom’s outer electron cloud
* If the attractive forces between the atoms are \_\_\_\_\_\_\_\_\_\_\_\_\_ than the repulsive forces, a chemical bond forms between them

*Atoms are like children when it comes to electrons…*

|  |  |
| --- | --- |
| **Sharing…** | **Not Sharing…** |
|  |  |

Ionic Bonding

Formed between two atoms with large differences in their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

An electronegativity **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** can be classified as an **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

In this case we can essentially say **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** from one atom to another

What compound is formed when the following elements combine?

Ca and Br \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Al and O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Be and O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

To determine the difference in electronegativity use the *Absolute value of the EN difference of the two elements. Do not take subscripts or charges into consideration*.

Covalent Bonding

Formed between two atoms with almost \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in their ionization energies and electronegativity’s

An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_can be classified as a covalent bond

**Warning!!!! Not everything is black and white!**

Ionic and covalent are the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of bonding. ***Think right wing and left wing extremists!***

Between these extremes are covalent bonds involving **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Polar Covalent Bonding**

Electrons are still shared between two atoms but \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Electrons are drawn closer to the atom with higher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

One side of the bond has a partially \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ “pole” and the other a partially \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ “pole” 🡪 creates a bond “dipole”

Example:

HCl



|  |  |
| --- | --- |
| **ΔEN**  | **Bond Type** |
| 0 | Non-Polar |
| < 0.5 | Covalent (Mostly Non-Polar) |
| 0.5– 1.6 | Polar Covalent |
| > 1.6 | Ionic |

1. Calculate the ΔEN value for the bonds in the following compounds. Then arrange the compounds in order from those containing bonds in which the electrons are ***shared most equally*** to those in which the electrons are ***shared most unequally***.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a. H2O | b. PCl3 | c. Cl4 | d. SiO2 | e. AlN |

1. Complete the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Elements** | **Formula** | **ΔEN value** | **Nature of Bonds** | **Atom Possessing Greater Electron Density** |
| C and S |  |  |  |  |
| B and Cl |  |  |  |  |
| Al and O |  |  |  |  |
| N and I |  |  |  |  |
| Ca and F |  |  |  |  |