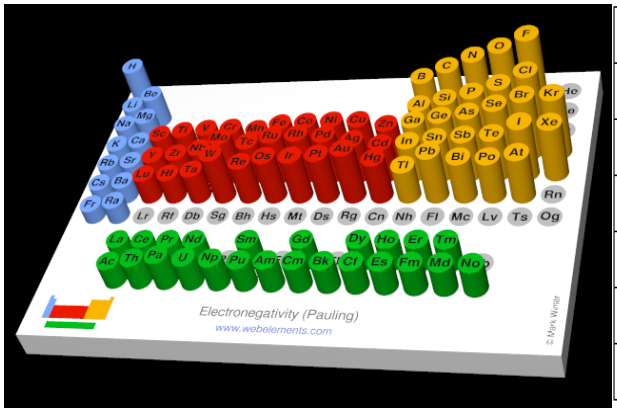
Day 7 – AP Biology – 8-26-24 to 8-27-24

NO CELL PHONES, EARBUDS, HEADPHONES - On Schoology: Submit WarmUp after completing.

WARMUP–Chemistry of Life #2–(5 min)



H 2.1																	He ---
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne ---
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.2	S 2.5	Cl 3.0	Ar ---
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe 2.6
Cs 0.7	Ba 0.9	La-Lu 1.1-1.2	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Tl 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn ---
Fr 0.7	Ra 0.9	Ac-No 1.1-1.7															

(Use Google to answer this question.)

What are the types of chemical bonds?

Submit work on Schoology as soon as completed.

What are the types of chemical bonds?

Chemical bonds are the forces that hold atoms together in compounds. They form under specific conditions depending on the nature of the atoms involved and their desire to achieve a stable electron configuration. Here's a detailed description of each type of chemical bond, along with the conditions under which they form:

1. Ionic Bonds

- **Formation**: Ionic bonds form between atoms that have a significant difference in electronegativity, typically between a metal and a nonmetal. The metal atom loses one or more electrons to become a positively charged ion (cation), while the nonmetal atom gains those electrons to become a negatively charged ion (anion). **The electrostatic attraction between these oppositely charged ions creates the ionic bond.**
- **When They Form**: Ionic bonds typically form when a metal from the left side of the periodic table (like sodium) reacts with a nonmetal from the right side (like chlorine). The metal, with low ionization energy, easily loses electrons, while the nonmetal, with high electron affinity, readily gains them.
- **Example**: Sodium chloride (NaCl), where sodium (Na) donates an electron to chlorine (Cl).

2. Covalent Bonds

- **Formation**: Covalent bonds occur when two atoms share one or more pairs of electrons. This bond forms between atoms with similar electronegativities, often between nonmetals. The shared electrons allow each atom to achieve a stable electron configuration, resembling that of the nearest noble gas.
- **When They Form**: Covalent bonds are common between nonmetal atoms. They form when neither atom is willing to completely give up or accept electrons, so they share them instead. Covalent bonding can result in single, double, or triple bonds, depending on the number of electron pairs shared.
- **Example**: Water (H_2O), where oxygen shares electrons with hydrogen atoms.

3. Metallic Bonds

- **Formation**: Metallic bonds are found in metals, where atoms share a "sea" of delocalized electrons. These electrons are free to move throughout the metal lattice, which consists of positive metal ions. The mobility of the electrons within the lattice is what gives metals their characteristic properties, such as conductivity and malleability.
- **When They Form**: Metallic bonds form in pure metals and alloys, where atoms of the same or different metals are packed closely together. Since all the atoms share their valence electrons

freely, this bond is characteristic of elements with low ionization energies, like those in the transition metals.
- **Example**: Copper (Cu), where the atoms share free electrons.

4. Hydrogen Bonds

- **Formation**: Hydrogen bonds are a type of weak intermolecular bond that occurs when a hydrogen atom covalently bonded to a highly electronegative atom (such as oxygen, nitrogen, or fluorine) is attracted to another electronegative atom in a different molecule. This bond is much weaker than ionic or covalent bonds but stronger than van der Waals forces.
- **When They Form**: Hydrogen bonds typically form in polar molecules where hydrogen is attached to a small, highly electronegative atom. These bonds are crucial in biological systems, where they play a key role in the structure of proteins and nucleic acids.
- **Example**: The hydrogen bonds between water molecules (H_2O) give water its unique properties.

5. Van der Waals Forces (including London Dispersion Forces and Dipole-Dipole Interactions)

- **Formation**: Van der Waals forces are weak intermolecular forces that arise from temporary shifts in electron density in molecules. These forces can be broken down into:
    - **London Dispersion Forces**: Present in all molecules, these forces are due to temporary dipoles that occur when electrons in two adjacent atoms occupy positions that make the atoms form temporary dipoles.
    - **Dipole-Dipole Interactions**: These occur between polar molecules, where the positive end of one molecule is attracted to the negative end of another.
- **When They Form**: Van der Waals forces are significant in nonpolar molecules, noble gases, and in large organic molecules where they influence the physical properties, such as boiling and melting points.
- **Example**: The weak forces between molecules of iodine (I_2) in its solid state, held together by London dispersion forces.

Each of these bonds forms under different conditions, dictated by the nature of the atoms involved, their electronegativity, and their electron configurations. Understanding these conditions helps predict the types of bonds that will form in different chemical reactions and the properties of the resulting compounds.