Basic Chemistry Review

AND

Properties of Water

TEKS

- No high school TEKS for properties of water
- You need to know them to understand how water helps to create a phospholipid bilayer (Cell/Plasma Membrane) for TEKS 4B

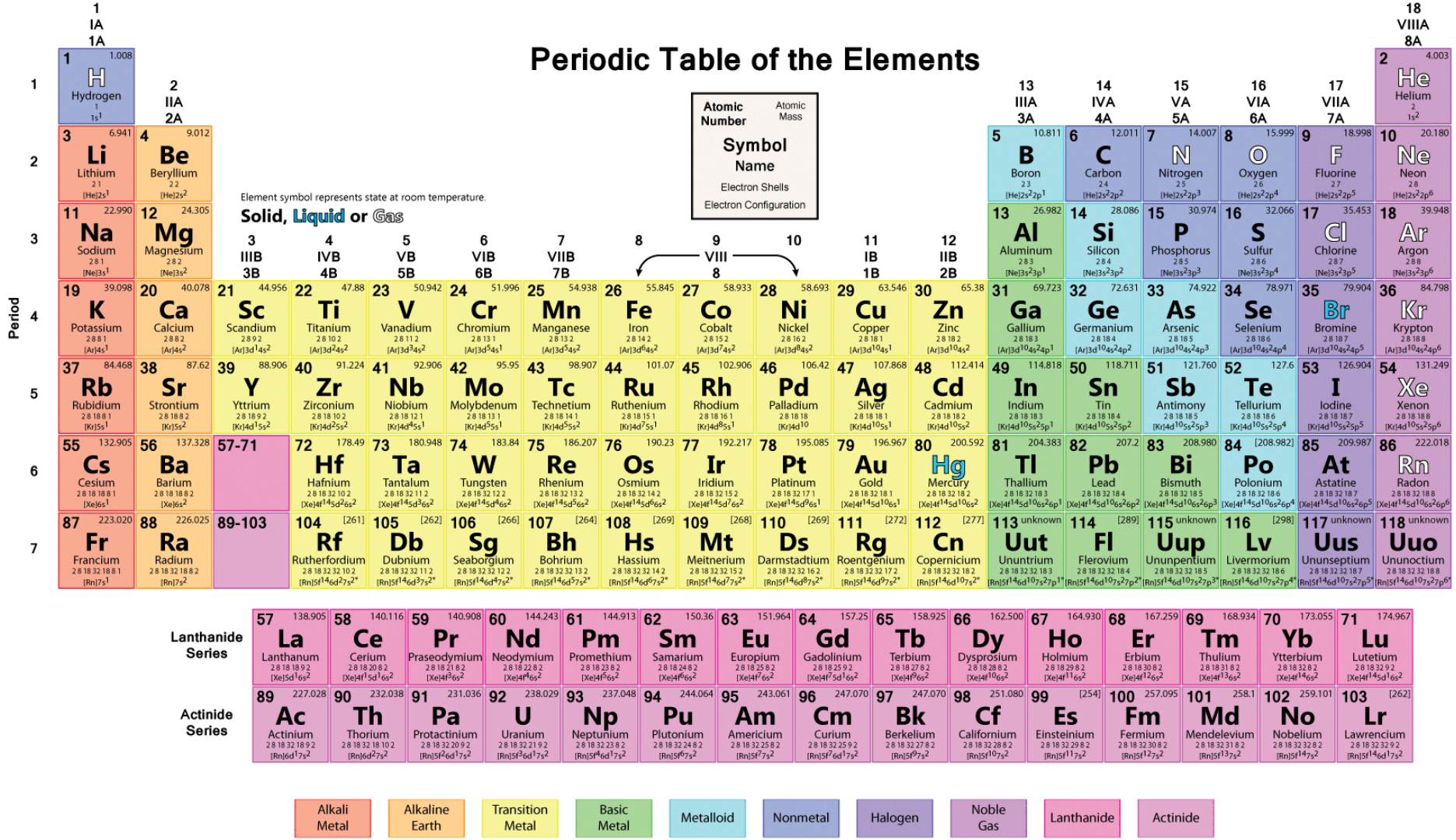
Vocabulary

- Valence Electron
- Polar/Polarity
- Hydrogen Bonding
- Cohesion
- Adhesion
- Hydrophobic
- Hydrophilic

Prerequisite Questions

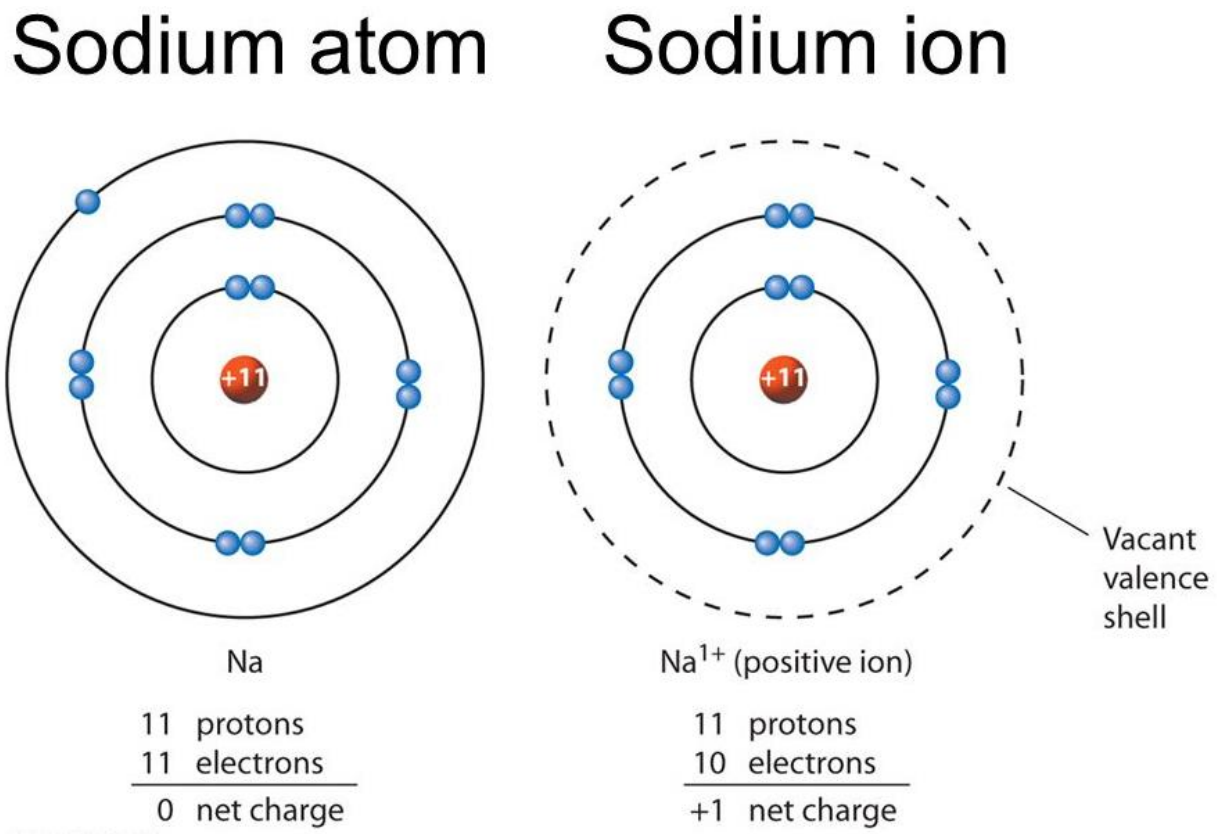
- What is the chemical formula for Water?
- What are the 3 states of matter? (What do you call water at each state?)
- What happens to a chemical when it moves from one state to another at the molecular level?
- What can you state about two oppositely charged particles?
- What about two similarly charged particles?

Periodic Table Review



Octet Rule

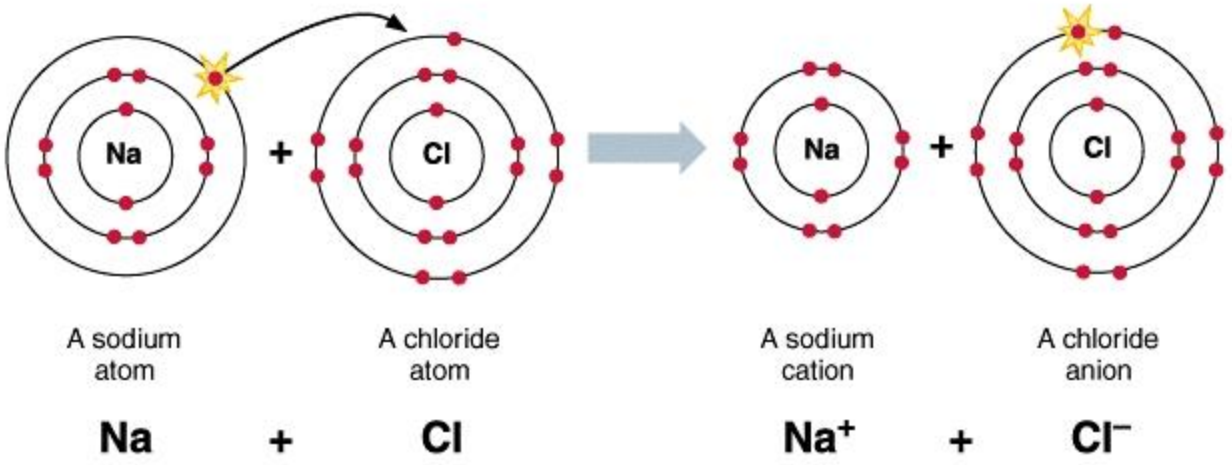
- Most Main Group elements are electrically more comfortable with a full outer valence shell



Formation of Salt (Ionic Bonding)

- Sodium will give away its outermost valence electron because it can fall back on a full inner shell. (Completes the octet rule)

- Chlorine will accept one more electron to complete its valence shell.

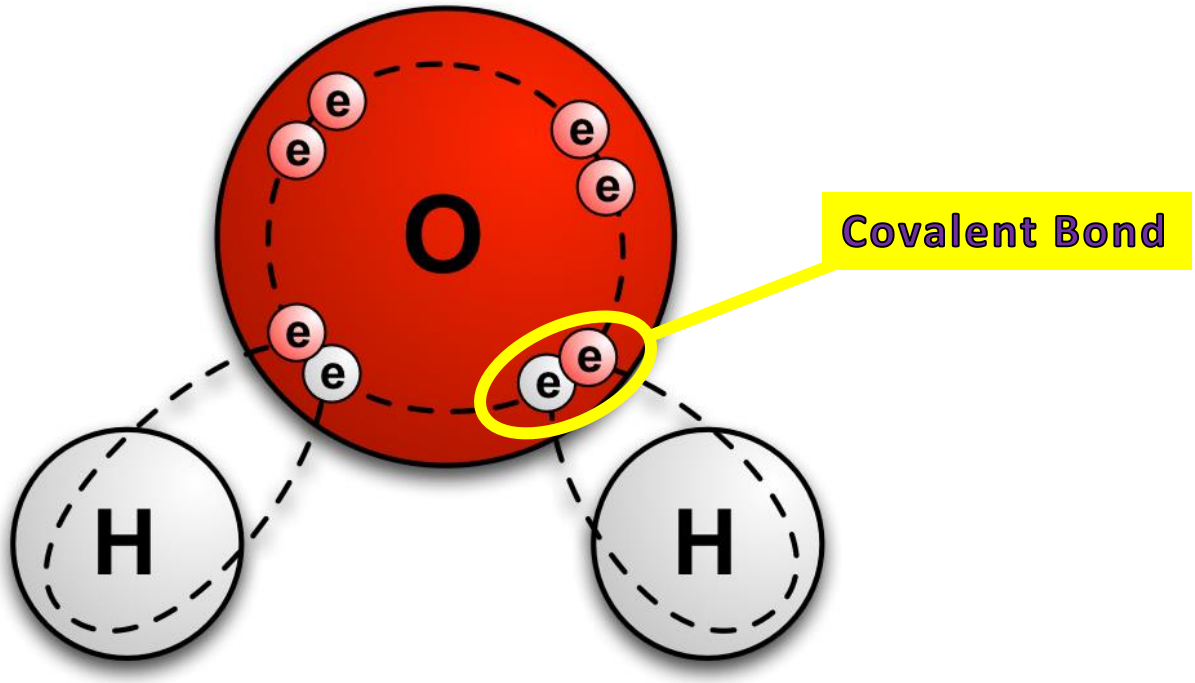


Covalent Bonding

- Covalent bonds form between two atoms sharing electrons.
- A single covalent bond is made of 2 shared electrons.

- Oxygen's electrons are **pink** in the picture.

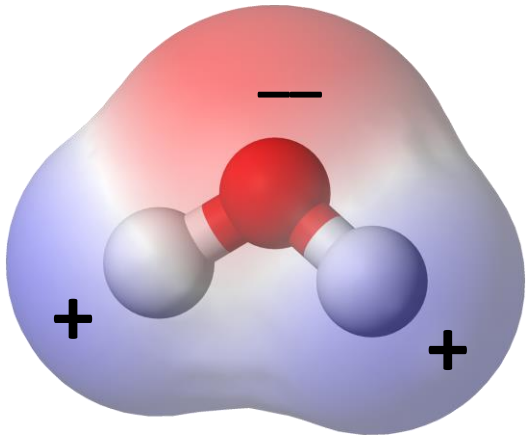
- Hydrogen's electrons are white in the picture

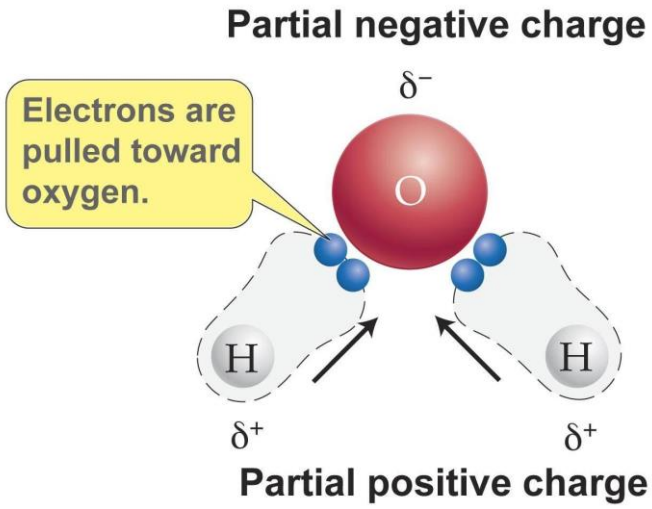


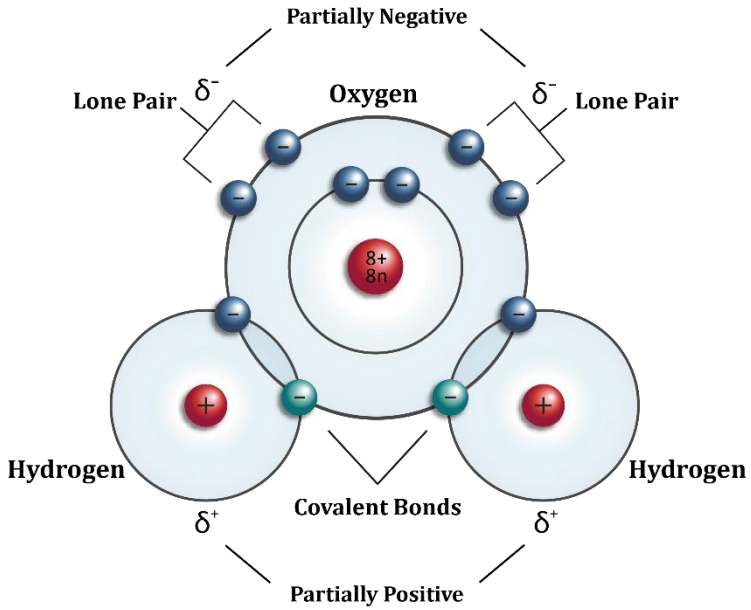
Water is a Polar Molecule

- The electrons in a water molecule spend more time around the Oxygen nucleus than the other two Hydrogen nuclei.

- That makes the oxygen region of a water molecule more negative, while the hydrogen regions are more positive.

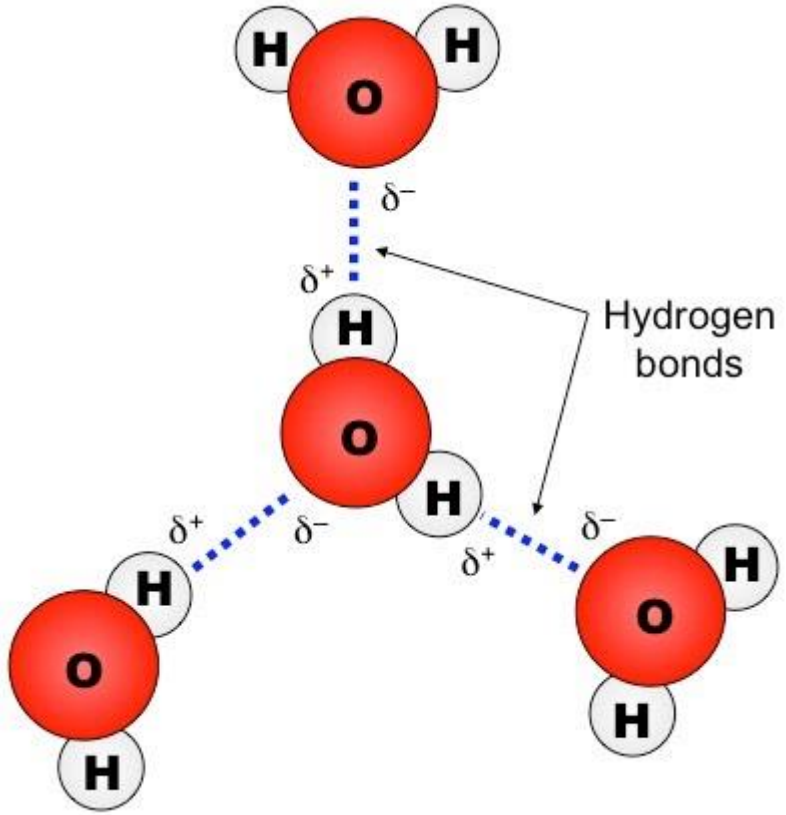






Cohesion

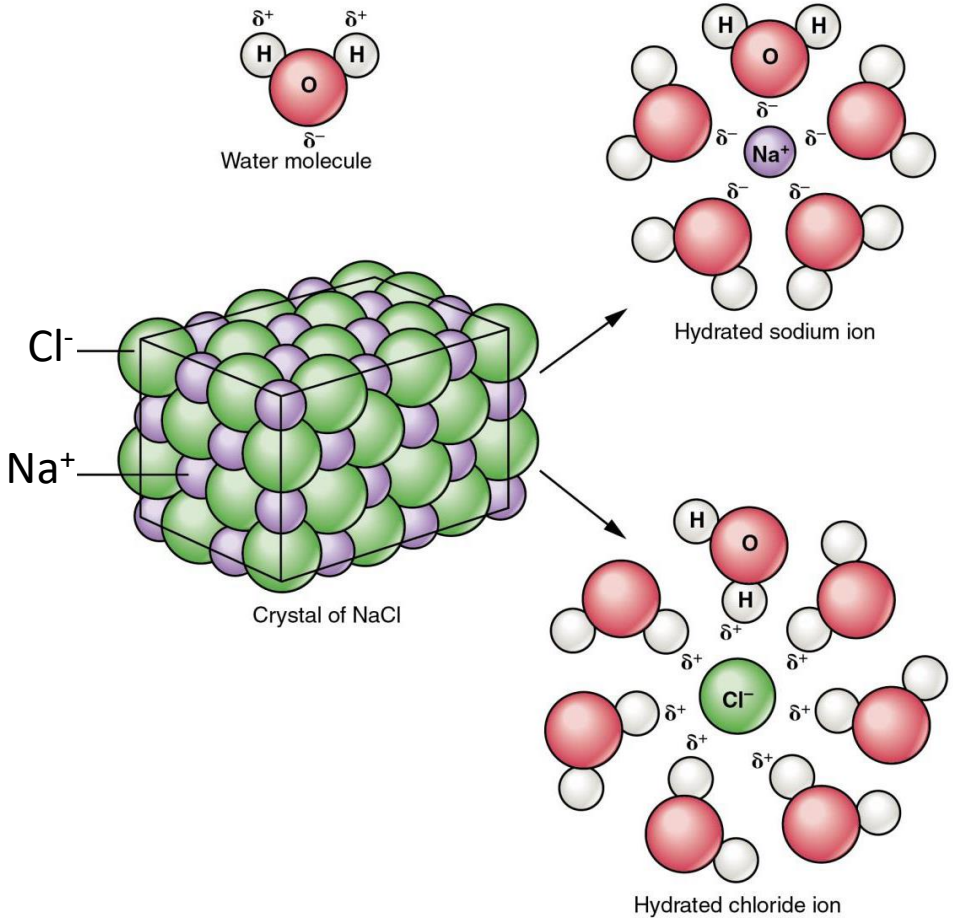
- Due to water's polar nature, the oppositely charged poles want to attract to other charged molecules (especially other waters)
- When a water molecule is attracted to other water molecules, it is called **Cohesion**.
- The bonds between the water's hydrogen and another negative molecule are called **Hydrogen Bonds** *(shown as dotted lines)*



Adhesion

- When a water molecule is attracted to something other than water, the process is called **Adhesion**.

- This is especially important when water acts as a Solvent to dissolve another substance (ex: salt, NaCl)



pH Scale

- The pH scale measures amount of free protons (H^+) that are released into solution.

- The more protons (H^+) that are in solution, the more acidic the solution is, the smaller the pH value.

- The fewer protons (H^+) that in in solution, the more basic the solution is, the higher the pH value.

pH Scale

- **Acids** have a pH less than 7
- Neutral (water) is 7
- **Bases** have a pH larger than 7