

## **Unit 4 Exam Review: Chapter 10 and Chapter 12**

### *Chapter 10: Chemical Bonding*

- Lewis Theory: Chemical bonds are formed when atoms transfer valence electrons (ionic bonding) or share valence electrons (covalent bonding) to attain noble gases electron configurations
- Molecular Shapes: The shapes of molecules can be predicted by combining Lewis Theory with Valence Shell Electron Pair Repulsion (VSEPR) theory, where electron groups around the central atom repel one another and determine the geometry of molecule
- Electronegativity: Electronegativity refers to the relative ability of elements to attract electrons within a chemical bond.
- Electronegativity increases as you move to the right across a period in the periodic table and decrease as you move down a column.

### *Chapter 12: Liquids, Solids, and Intermolecular Forces*

- Properties of Liquids
- Properties of Solids
- Manifestations of intermolecular forces: surface tension and viscosity
- Evaporation and Condensation
- Melting, Freezing, and Sublimation

#### Types of Intermolecular Forces:

**Dispersion Forces-** Dispersion forces occur between all molecules and atoms due to instantaneous fluctuations in electron charge distribution

**Dipole-Dipole Forces-** Dipole–dipole forces exist between molecules that are polar.

**Hydrogen Bonding-** Hydrogen bonding exists between molecules that have H-bonded directly to F, O, or N. Hydrogen bonds are the strongest of the three intermolecular forces.

#### Types of Crystalline Solids:

-Molecular Forces

-Ionic Solids

-Atomic Solids

**Water:** Because of its strong hydrogen bonding, water is a liquid at room temperature. Unlike most liquids, water expands when it freezes. Water is highly polar, making it a good solvent for many polar substances.

## Chapter 10: Chemical Bonding

1. How do we represent valence electrons?
2. How can the periodic table and electron configuration depict valence electrons?
3. What is the octet rule (duets)?
4. What are resonance structures?
5. What is the difference between electron groups and bonding groups?

### Steps for Drawing Lewis Structures:

1. Sum the valence electrons from all atoms
2. Write the symbols for the atoms to show which atoms are attached to which and connect them with a singular bond.
  - Hydrogen is always terminal
  - The halogens are always terminal
  - Carbon is often the central atom
3. Complete the octet of the atoms bonded to the central atom.
4. Place any leftover electrons on the central atom, even if doing so results in more than an octet.

5. If there are not enough atoms to ensure each element has a full octet, try multiple bonds.
- 

1. Discuss the rules of increasing atomic size and list the following elements in order of increasing atomic size.

Sc

N

Li

Cd

2. Describe what occurs when two nonmetals are bonded together.

3. Describe what occurs when one metal and one nonmetal are bonded together.

4. Write the Lewis structure for the following compounds, state their molecular geometry and their bond angles.





5. What is electronegativity?

6. Write the Lewis Structure for each element:

N

C

Cl

Ar

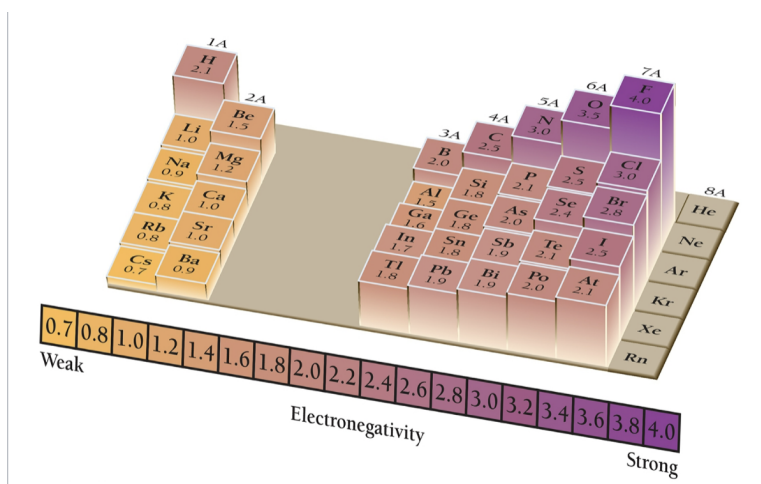
7. Compare bond strength.

8. Why do oil and water not mix?

## Electronegativity and Bond Character

Electronegativity	Bond Character
>1.7	
0.3 - 1.7	
0 - 0.29	

## The Electronegativity Periodic Table



## Use the table values to determine what type of bond will form

1. Cr and O \_\_\_\_\_
2. Sr and O \_\_\_\_\_
3. Cl and Br \_\_\_\_\_
4. H and F \_\_\_\_\_
5. Na and S \_\_\_\_\_
6. Br and Br \_\_\_\_\_
7. What is a dipole moment?

