**Standard 1:**

1. What does VSEPR state? What determines the shape of a molecule?

repulsion between electron pairs and bonds causes the molecules to change shape so that the valence-electron pairs are as far apart as possible; number of atoms bonded and # of lone pairs

1. ****What is the following shape? How many lone pairs and atoms bonded does it have? Why is there a downward angle to the molecule rather than being flat?

Trigonal pyramidal; 1 lone pair and 3 atoms; lone pair of e- on the central atom repelling the bonds downwards

**Standard 2:**

1. Describe a polar molecule including charge and electron distribution. How can a molecule with polar bonds be nonpolar?

A molecule with a dipole (positive and negative end) from an unequal distribution of e-

Does not have both a positive and negative end/ no dipole

1. ****Add polarity arrows/symbols to HOCl as needed. What shape is it? Is HOCl polar or nonpolar? Why is it polar or nonpolar?

bent; polar because it has dipole (positive and negative end)

**Standard 3-4:**

1. Explain why intermolecular forces are not chemical bonds like intramolecular forces.

Inra is a chemical bond because it involves electrons inside the molecule and inter is a physical attraction between molecules based on charge distribution

1. Define the three intermolecular forces.

London dispersion forces: forces from temporarily induced dipoles

Dipole-dipole: attraction between oppositely charged dipoles or ends of molecules

Hydrogen bonding: A special type of attraction between molecules containing **H** bonded to **F**, **N**, or **O**

1. Fill in the following chart

|  |  |  |
| --- | --- | --- |
| Type of IMF | Type of molecule that experiences this forces | Relative strength  |
| Dispersion Forces | All molecules | Weak |
| Dipole-Dipole  | Polar molecules | Medium |
| Hydrogen Bonding | Molecules with H-F, H-N, and H-O bonds | Strong |

1. How does the type of force affect boiling points? Why does it have this effect?

The stronger the force the higher the boiling point; more energy is required to break apart the stronger forces

1. Identify the intermolecular forces for SeBr2 or AsCl3. Which substance would you expect to have a higher boiling point? Explain why. AsCl3 hasLDF and dipole-dipole forces; SeBr2 ­only has LDF; AsCl3 has stronger forces making its boiling point higher than SeBr2
2. How can solubility determine polarity? Explain why a polar and nonpolar molecule are not soluble using intermolecular forces.

Like dissolves like so polar is soluble with polar; they have different intermolecular forces so the polar with dipole-dipolar forces is more attracted to itself than to the nonpolar molecule with only dispersion forces

1. Answer the following questions based off the chart below:

|  |  |  |  |
| --- | --- | --- | --- |
| Compound | Boiling point | Surface tension | Soluble with water  |
| **A** | -5oC | Low | No |
| **B** | 35oC | Medium | No |
| **C** | 65oC | High | Yes |

* 1. Which substance(s) would likely be polar? C
	2. Which substance(s) would you expect to be soluble with oil? A and B
	3. Rank the substances from weakest to strongest intermolecular forces A, B, C
1. Define the three special properties of water. Explain why water has each property.

Density as a solid: ice is less dense than water; when water freezes it spreads out into a honeycomb pattern because of hydrogen bonding

Surface tension: inward force to minimize surface area because of its strong attractions to itself from hydrogen bonding

Capillary action: ability for water to “pull” itself up a tube or porous substance; the adhesive force is stronger than the cohesive force both of which are strong because of hydrogen bonding

1. Why is water polar?

Has a dipole from having polar bonds in a bent shape

**Standard 1-3 Lewis Structure Practice**

1. Draw the Lewis structure for the following including polarity arrows/charges. Identify the **shape**, state if the molecule is **polar or nonpolar,** and the **types of intermolecular forces.**
2. SiO32-

O 2- trigonal planar; nonpolar; LDF (dispersion)

Si

 O O

1. ICN

I C N linear, polar; LDF, dipole-dipole

1. H2O

O bent; polar; LDF, dipole-dipole, hydrogen bonding

 H H