

Gizmos #1 – Polarity and Intermolecular Forces

Remember – things can have nonpolar or polar bonds, and once you look at the entire molecule shape the molecule as a whole can be polar or nonpolar.

PART 1 – BOND Polarity

1. Log into Gizmos www.explorellearning.com
2. Click the tab at the top that says “Bond Polarity”
3. Build the molecules by dragging them into the center area, press play. (When done, drag back to the bottom to start over).
4. Based on what you are observing, decide if each one is Ionic, Polar, or Nonpolar. Drag into the boxes and record on this worksheet also. It will tell you at the bottom of the boxes if you are correct or not! Only do the ones in the chart below.

Build these molecules: Na ₂ O, NaCl, MgO, MgCl ₂ , K ₂ O, KCl, CaO, CaCl ₂ , H ₂ , NH ₃ , H ₂ O, CO, CO ₂ , N ₂ , O ₂ , OCl ₂		
Ionic BOND	Polar BOND	Nonpolar BOND

PART 2 – MOLECULAR Polarity

1. Click the tab at the top that says “Molecular Polarity”
2. Put NH₃ into the center area and click “Turn on electric field”
3. Record what happens.
4. Repeat with the other compounds listed. (Skip NCl₃)
5. Using what you are observing, and your understanding of polarity, drag the molecules into the Polar or Nonpolar boxes and list it on this worksheet also. It will tell you at the bottom of the boxes if you are correct or not! Only do the ones in the chart below.

Polar BONDS	Observations	Nonpolar BONDS	Observations
NH ₃		CH ₄	
H ₂ O		Cl ₂	
OCl ₂		H ₂	
CO		N ₂	
CO ₂		O ₂	
CCl ₄			

Polar MOLECULE	Nonpolar MOLECULE

***Question: Circle the correct one** Did everything with a polar BOND end up a polar MOLECULE? YES or NO

PART 3 – Intermolecular Forces

1. Click the tab at the top that says “Intermolecular Forces”
2. **You will need to put two of each molecule in the center area this time**
3. Press play and watch for a few moments.
4. Using what you are observing, and your understanding of IMFs, drag the molecules into the Dipole-Dipole or London dispersion boxes (we are NOT using the Dipole-induced dipole box). List it on this worksheet also. It will tell you at the bottom of the boxes if you are correct or not! Only do the ones in the chart below.

See what kind of IMFs these molecules have: NH ₃ , H ₂ O, OCl ₂ , CO, CH ₄ , CO ₂ , H ₂ , O ₂ , N ₂ , Cl ₂ , CCl ₄	
Dipole-Dipole	London Dispersion

***Questions: Circle the correct one**

The molecules that make Dipole-Dipole IMFs are:

POLAR molecules or NONPOLAR molecules

The molecules that make only London Dispersion IMFs are:

POLAR molecules or NONPOLAR molecules

The Dipole-Dipole molecules have:

PERMANENT dipoles or TEMPORARY dipoles

The London Dispersion molecules have:

PERMANENT dipoles or TEMPORARY dipoles

***Question: Circle the correct one**

The IMFs that were occurring were all

PERMANENT interactions or TEMPORARY interactions

Gizmos #2 – Sticky Molecules

Remember – the more/stronger your IMFs, the higher your properties get!

1. Log into Gizmos www.explorellearning.com
2. Go through the experiments in this order:
 - a. Polarity
 - b. Drop Diameter
 - c. Tilt Angle
 - d. Surface Tension
 - e. Capillary Rise
3. You will need to drag a liquid dropper bottle and a tool into the center and perform some kind of action with them (grabbing the dropper bottle and putting some liquid into the dish for example).
4. Record your findings in the chart on Gizmos AND on your paper.
5. BE CAREFUL and get GOOD DATA!

Property	Water	Hexane	Glycerin	Mineral Oil
Polarity (P or NP)				
Drop Diameter (mm)				
Tilt Angle (°)				
Force to break surface tension (mN)				
Capillary rise (mm)				

***Question:** Rank the substances from lowest to highest IMFs (as always, these things are a huge generalization!)

_____ < _____ < _____ < _____
Lowest IMFs *Highest IMFs*

***Question:** Summarize what this activity demonstrates about the polarity of molecules and their properties. Go through and highlight key words or ideas to make them “pop” off the page. You should make sure you reference the following things

- | | | |
|---|---|---|
| <input type="checkbox"/> Polar vs. nonpolar | <input type="checkbox"/> The five different properties that were tested in the gizmo activity | <input type="checkbox"/> General description of what you noticed during the activity. |
| <input type="checkbox"/> The types of IMFs | <input type="checkbox"/> The four different substances that were tested | <input type="checkbox"/> Your final conclusion about the ranking of IMFs in the substances. |
| <input type="checkbox"/> How properties change with increasing IMFs and WHY | | |