

Sharing: A tug of war game Draft 1.1  
Polarity of covalent bonds  
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**Objective:** To understand and visualize a model for bond polarity in molecules.

**Target student audience:** YR. 1 GENERAL CHEMISTRY

**ChemSense user level:** Intermediate

**ChemSense tools used:** ANIMATION and DRAWING

**Specialized tools needed:** none

**Classroom implementation**

**Time:** Short class period (45-55 minutes)

**Student grouping:** Pairs

**Activity Type:** ANIMATION and DRAWING

**Chemistry concepts in activity (linked to CA standards & ChemSense 5 themes):**

Standard 2f- Students know how to predict the shape of simple molecules and their polarity from Lewis dot structures.

Standard 2g- Students know how electronegativity relates to bond formation.

**Prerequisite chemistry concepts:** Covalent and ionic bonding; Electronegativity; Valence electrons; Atoms; Molecules

**Inquiry skills (linked to NSES):**

Formulate and revise scientific explanations and models using logic and evidence (NSES).

**ACTIVITY Summary:**

1. ChemEquation: Watch animation as introductory explanation of polarity.
2. Discussion: Discus trends in electronegativity. Look at periodic table to make generalizations.
3. ChemCatalyst: Use ChemSense to practice predicting dipoles on covalent bonds.
4. ChemSynthesis: Do the following homework questions and use ChemSense to visually represent the answers.
5. Check in: Compare homework answers with the answers of other members in class.

**Sources:** Homework questions: Holt 2000, Chemistry: Visualizing Matter

**Application:**

Understanding polarity of molecules enhances the comprehension of dissolving matter. It also will illustrate the importance of considering polarity when choosing solvents. It is an important concept to know in order to understand the concept of intermolecular forces.

**Activity:**

1. ChemEquation- Before starting the lesson, students look at animation on ChemSense to start thinking about what is happening in a covalent bond. Mentally answer questions from animation and prepare to discuss them in larger group.
2. Discussion- Group discussion about covalent bonds. As a class, learn about electronegativity trends.
3. ChemCatalyst- According to the electronegativity trends just discussed, predict the direction of the dipole. Draw an arrow or partial positive/ partial negative signs on the various molecules consisting of oxygen. The four examples all include oxygen to show the difference when comparing one atom to atoms of different elements. After creating them, students publish and share their answers.
4. ChemSynthesis- Using ChemSense, classify the compounds as having nonpolar covalent, polar covalent or ionic bonds. Using the ChemSense tools, create models to show the bonding. Upon finishing the models, publish individual answers.
5. Check in: Evaluate other members' representations. Be ready to discuss answers in class for the following lesson.

**Rubrics for scoring:**

<b>Level:</b>	<b>Defining characteristics:</b>
Insufficient mastery	Molecules may have noticeable misconceptions. Non polar molecules inappropriately show a dipole. Polar molecules have insufficient representations for showing polarity.
Basic mastery	Molecules are properly represented, but problems with representing accurate polarity are found. (symbols not correct; atom having higher electronegativity not shown properly)
Exemplary mastery	Molecules meet the required rules and are properly represented. Dipoles are represented correctly with the appropriate symbols. Non polar molecules are differentiated from polar molecules in some form.

