

Whose team do you play for? Are you a Non polar or polar member? December 2002
Molecular polarity
Alexi

Objective: To use knowledge of molecular shape and bond polarity to determine molecular polarity.

Target student audience: YR. 1, GENERAL CHEMISTRY

ChemSense user level: Intermediate

ChemSense tools used: ANIMATION, DRAWING

Specialized tools needed: Molecular model kit

Classroom implementation

Time: short period (45-55 minutes)

Student grouping: individual, 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 bonding; Molecular geometry (VSEPR); Bond polarity; Electronegativity

Inquiry skills (linked to NSES):

Recognize and analyze alternative explanations and models (NSES).

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

ACTIVITY Summary:

1. ChemEquation- Students use animation from ChemSense to become familiar with the concept of Molecular polarity.
2. Teacher-led discussion: Teacher defines and expands the concept of molecular polarity.
3. ChemSynthesis- Students use ChemSense to practice modeling the molecular polarity of various molecules.

4. Check-In: Students evaluate the accuracy of each other's models and are prepared to discuss reasons for their opinions

Sources: none

Application: Concept of molecular polarity is directly related to the idea of intermolecular forces. Having an awareness of molecular polarity will give students the ability to understand the molecular interactions of various substances. (Organic molecules, solutions, etc)

Activity:

1. ChemEquation- Students use the animation to begin to formulate answers to the following questions: What are polar bonds? How can the overall polarity of a molecule be determined? Can a molecule have polar bonds, but not have an overall dipole? How does the molecular geometry influence the overall polarity of a molecule? (5 minutes)
2. Teacher Led Discussion- Teacher facilitates and structures discussion based on the students' answers to the questions listed above. Uses drawings, animations, and pictures as necessary to visually demonstrate the idea of molecular polarity. (15 minutes)
3. ChemSynthesis- In pairs, students use their shapes from the molecular geometry lab to predict the molecular polarity. Students may use the molecular models to visualize the shapes and then use the ChemSense tools to create a visual model with appropriate dipoles. Upon finishing, students publish their representations for further review. (20 minutes)
4. Check-in- For homework, or after finishing individual representations, students evaluate each other's work for accuracy. Are the models representing accurate geometry? Do the dipoles cancel or are they creating an overall dipole for the entire molecule? Students prepare themselves to discuss the models.

Rubric for grading:

A = Shows bonding angles true to VSEPR prediction, accounts for nonshared electron pairs, effort to display three dimensional relations in a true manner, labels on all atoms, single double and triple bonds shown, resonance taken into account. Where requested, dipole moments shown on bonds.

B = Shows bonding at angles for electron repulsion but may not reflect continuity for molecule, three dimensional relationships sometimes lost or magnified. Shows bonds as single, double or triple. Where requested dipole moments sometimes missing.

C = Shows molecules from books copied or examples in class copied, three dimensionality missing, small simple structures, may substitute ion structures for molecular. Bond types are not appropriate or incorrect. Where requested Dipole moment sometimes provided.

D = Shows simple structures, errors in bonding order, molecule reflects a lack of three dimensional consideration and atoms not labeled. No bond types displayed.

F = Show simple structures, atoms or formula's missing, no indications of three dimensional consideration, no bond types used. Molecules show a lack of effort or time. Research not supported or demonstrated.