Simulation: Intermolecular Forces

FOR THE TEACHER

Summary
In this simulation, students will learn about the different intermolecular forces. They will use the simulation to see how molecules in various species interact with one another.

Grade Level
High school

Objectives
By the end of this lesson, students should be able to
- Understand the different between the three intermolecular force types.
- Relate intermolecular forces to other physical properties of substances.

Chemistry Topics
This lesson supports students’ understanding of
- Intermolecular forces
- Physical properties

Time
Teacher Preparation: 20 minutes
Lesson: 30 minutes (teacher led); one class period (student groups)

Materials
- Computer with Odyssey software installed

Safety
There are no specific safety concerns involved with this activity.

Teacher Notes
- To complete this activity, you must have access to Odyssey software. If you’re using version 5.1, this pairs with Labs 59, 62, and 58. If you’re using version 5.0, this goes with Labs 77, 81, and 76.
- There is a lesson built into the software for each lab; this lesson is not the same. The software assignment collects students’ responses and this lesson is designed for students to have a pencil-and-paper experience.
- This activity could be done individually, in small groups, or as an entire class, depending on the resources available to the teacher.
- 1 & 2. Students should complete these from their prior knowledge.
- 3. The simulation is needed for this part. Make sure to activate the molecular motion by clicking on the “play” button. For dipole-dipole, you can alter the view so it’s either space filling or ball-and-stick models. For hydrogen bonds, you can either hide or show the IMFs. For LDFs, it’s best to use heptane as the example.
- 4. You can talk about other examples of substances that exhibit the various IMFs with students or have them do independent research and share their findings with the class.
**Lesson**

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Dipole-Dipole Forces</th>
<th>Hydrogen Bonds</th>
<th>London Dispersion Forces</th>
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</thead>
<tbody>
<tr>
<td>1. Describe the kind of molecules that would exhibit attraction based on each type of force and give an example of each. Draw a ball-and-stick diagram for each example.</td>
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<td>2. Rate the relative strength of each type of force.</td>
<td>Dipole-Dipole Forces</td>
<td>Elements with Hydrogen Bonding</td>
<td>Overview of Intermolecular Forces</td>
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<tr>
<td>3. Draw a particle diagram that represents the type of IMF as it is shown in the simulations. Use dotted lines or arrows to represent the forces between molecules.</td>
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<td>4. List some properties of substances with this type of force as their major source of cohesion. Include information about their state of matter at room temperature as well as melting and boiling points.</td>
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