

# What Shape Is That Smell?

## Space-Filling Models

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

### Purpose

To find connections between molecular shape and smell.

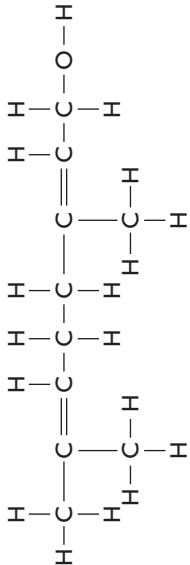
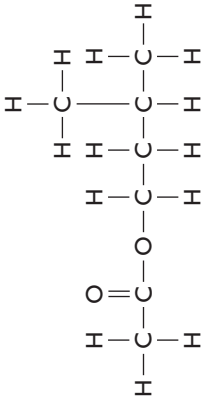
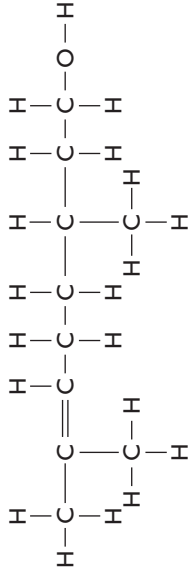
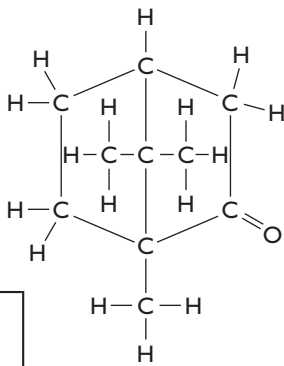
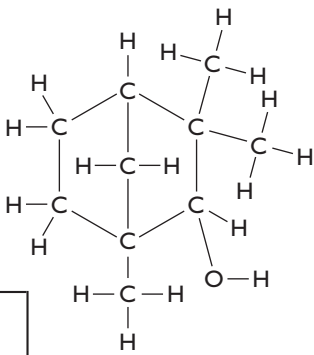
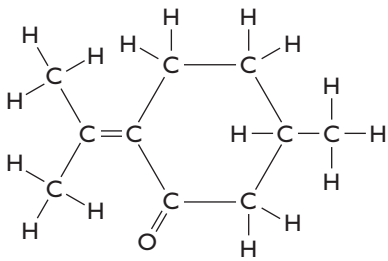
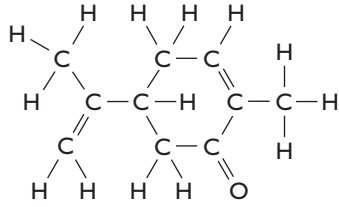
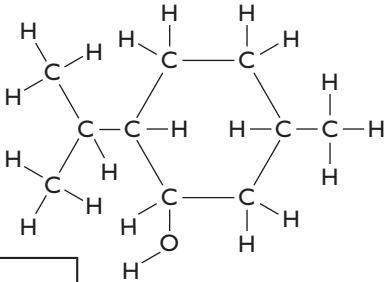
### Materials

- set of space-filling models of six smell molecules

### Instructions

You have space-filling models of six molecules. Match the space-filling models to the structural formulas here and on the next page. Put the number of the correct space-filling model in the corner of the box. (*Note:* Two boxes will be blank.)

1. Write the molecular formula of each compound next to its name in the table.
2. How are double bonds shown in a space-filling model? How can you figure out where a double bond is located in a space-filling model?
  
3. How is a space-filling model different from a ball-and-stick model? What new information does a space-filling model provide?
  
4. The following pairs of molecules smell similar. Sort the models into these three groups. Examine each pair of models and describe any structural similarities.  
citronellol and geraniol—smell sweet  
  
menthol and carvone—smell minty  
  
fenchol and camphor—smell medicinal
5. What words best describe the overall shape of the three types of smells?  
sweet-smelling                      minty-smelling                      camphor-smelling
6. Predict the smells of isopentyl acetate and pulegone, located in the table. On what did you base your prediction?

<p>geraniol</p>  <p><chem>CC(=C)CC(O)CC</chem></p>	<p>isopentyl acetate</p>  <p><chem>CC(=O)OCC(C)C</chem></p>	<p>citronellol</p>  <p><chem>CC(=C)CCOCC</chem></p>
<p>camphor</p>  <p><chem>O=C1C2CC3C(C2)C(=O)CC13</chem></p>	<p>fenchol</p>  <p><chem>O[C@@H]1C[C@H]2C[C@@H](O)C[C@H]12</chem></p>	<p>pulegone</p>  <p><chem>O=C1C2C=CC[C@H]1C2</chem></p>
<p>L-carvone</p>  <p><chem>O=C1C2C=CC[C@H]1C2</chem></p>	<p>menthol</p>  <p><chem>O[C@@H]1C[C@H]2C[C@@H](O)C[C@H]12</chem></p>	

**7. Making Sense** Do you think there is a connection between molecular shape and smell? Provide evidence to support your answer.