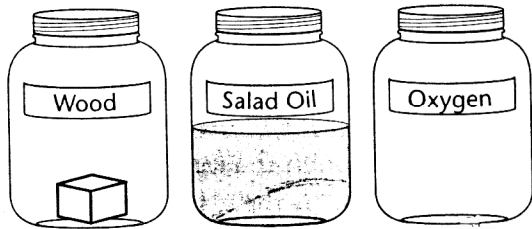


Section 2-1 Solids, Liquids, and Gases

Use the diagram to answer questions 1 through 3.



1. What is the state of matter of the wood? _____ oil? _____ oxygen? _____
2. What would happen to the **shape** of each substance if the jars were broken?
The shape of the wood would _____
The shape of the oil would _____
The shape of the oxygen would _____
3. What would happen to the **volume** of each substance if each were moved to a larger container?
The volume of the wood would _____
The volume of the oil would _____
The volume of the oxygen would _____

Write a definition for each of the following terms in the spaces provided.

4. solid _____

5. liquid _____

6. gas _____

7. viscosity _____

8. amorphous solid _____

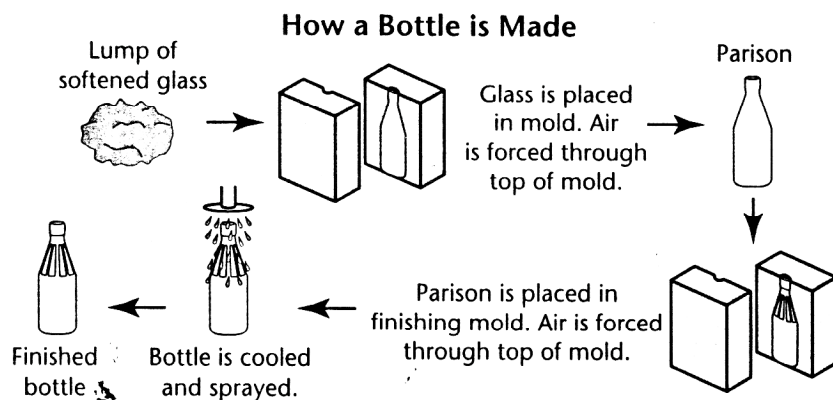
9. crystalline solid _____

10. fluid _____

Bottle-making

Read the following information and then answer the questions.

You learned in section 1 that glass is an amorphous solid. This property allows it to be molded into shapes such as bottles. Bottles are usually made with an *individual section (IS) machine*, which is actually a series of automated machines that carry out each step of the bottle-making process. First, very hot, softened glass exits a furnace. Next, the softened glass is cut into lumps, or sections. Each lump of glass moves through the machine to a mold. Air is blown into the mold with great force. This forms the glass inside the mold into a hollow shape called a *parison* (PAYR us suhn). Next, the parison is placed in a second mold called a finishing mold. Air is forced into the finishing mold to bring the bottle to its final shape. The entire molding process takes about 11 seconds. At this point, the bottle is still very hot. After leaving the finishing mold, it travels down a conveyor belt on which it cools and hardens. At the same time, a chemical is usually sprayed on the bottle to give it a hard coating that is resistant to scratches.



1. Why are bottles made from amorphous solids (instead of crystalline solids)?
2. The mold in which the bottle is formed is made of a certain material. Would the melting point of that material need to be higher or lower than the melting point of the glass? Explain
3. When the parison is placed in the second mold it doesn't yet have the shape of a finished bottle.
 - a) What must be done to the parison before it becomes the finished shape?
 - b) Would the viscosity of the parison be high or low? Base your answer on part (a) of this question and your definition of viscosity from the front of this sheet.

Section 2-4 Physical and Chemical Change

Check the type of change or changes that apply to each description

Description	Physical Change	Chemical Change
1. Occurs when energy is added or removed		
2. A new substance is produced.		
3. A substance changes form, but it remains the same substance.		
4. Freezing water is an example		

5. The total amount of energy **before** a physical change is (the same, greater than, less than) the total amount of energy **after** a physical change.
6. The total amount of energy **before** a *chemical* change is (the same, greater than, less than) the total amount of energy **after** a *chemcial* change.
7. Can energy be released during a chemical reaction? _____ Can it be absorbed? _____
Can a chemical reaction take place in which energy is neither absorbed nor released? _____

Building vocabulary

From the list below, choose the term that best completes each sentence.

chemical energy	melting	law of conservation of energy	sublimation
thermal energy	freezing	vaporization	boiling
condensation	evaporation	chemical reaction	

8. The higher the temperature of something, the greater its _____
9. The change in state from gas to liquid is called _____
10. Energy that comes from bonds within matter is called _____
11. The change in state from liquid to gas is called _____
12. Gas bubbles forming throughout the liquid is called _____
13. Liquid changing to gas only at the surface is called _____
14. The change in state from liquid to solid is called _____
15. The change in state from solid to liquid is called _____
16. The _____ states that during any change, the amount of energy stays the same. (Now recheck your answers to questions 5,6,and 7)
17. Another term for a chemical change is a(n) _____
18. In _____, particles pass directly from solid to gas.

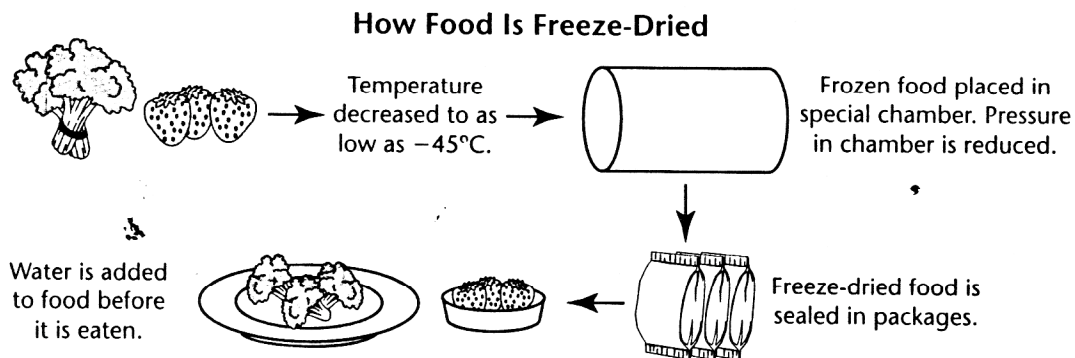
Freeze-Drying

Read the following information and then answer the questions.

Freeze-drying is a method of preserving food. In the first step of this process, the food is frozen, which changes the liquid water in the food to ice. Next, the frozen food is placed into a special chamber. Most of the air in this chamber is pumped out, causing the pressure inside to decrease. At low pressure, sublimation occurs. Sublimation is a change in state directly from a solid to a gas. About 98% of the water in the food can be removed with this method.

Freeze-dried foods are commonly eaten by campers and soldiers. One advantage of these foods is that they do not have to be refrigerated. Refrigeration slows the decay of food by organisms such as bacterial and fungi. Because these organisms cannot reproduce without water, however, freeze-dried foods can be stored at room temperature. Another advantage of freeze-dried foods is that they are light-weight. Removing the water from food reduces its mass by about 90%. In addition, freeze-dried foods are easy to prepare; they can be restored to their original composition just by adding water.

Other things besides food can also be freeze-dried. For example, florists sometimes freeze-dry flower arrangements to preserve them for up to three years. Scientists can freeze-dry cells, tissues, and other samples so that they can be used in research. In addition, books and other papers that have become wet due to flooding can sometimes be saved by the process of freeze-drying.



1. What two changes of state are involved in freeze-drying?
2. Suppose you have 100kg of fresh strawberries. What would be the approximate mass of the strawberries after freeze-drying?
3. What are two advantages that freeze-dried foods have over frozen foods?
 - a)
 - b)
4. Is freeze-drying a physical change or a chemical change? _____
Explain: