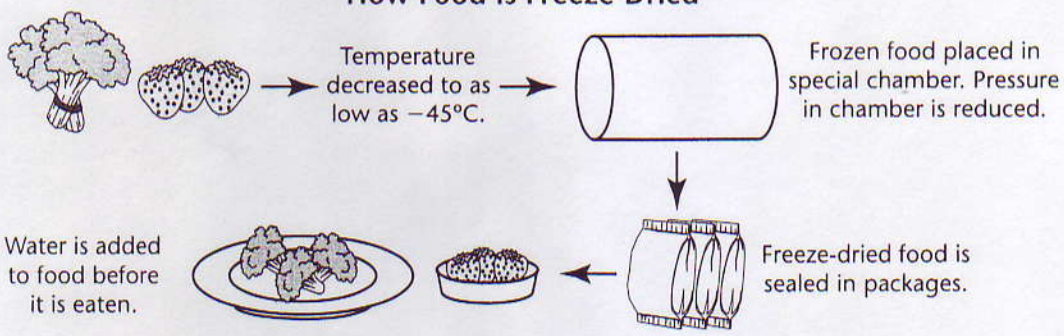
Freeze-Drying

Freeze-drying is a method of preserving food. In the first step of this process, the food is frozen, which converts the 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. About 98 percent of the water content of 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 bacteria 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 lightweight. Removing the water from food reduces its mass by about 90 percent. 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.

How Food Is Freeze-Dried



Answer the following questions on a separate sheet of paper.

1. What two changes of state are involved in freeze-drying?
2. Suppose you have 100 kg of fresh strawberries. What would be the approximate mass of the strawberries after freeze-drying?
3. Why do you think campers and soldiers use freeze-dried foods?
4. What is one advantage that freeze-dried foods have over frozen foods?
5. Is freeze-drying a physical change or a chemical change? Explain.