Class Starters & Enders

Making the Most of Instructional Time
Five Minute Lessons

Class Starters and Enders help utilize the last minutes of class when a lesson ends but there is not enough time to start another, or for an interest approach at the beginning of class. Mini-lessons correlate to GPS in the programs areas below.

Keeping it Cool

Program Areas: Nutrition and Food Science, Healthcare Science, Engineering and Technology, Agricultural Science, Culinary Arts, Climate Control Systems Technology

Instructions: Read the material and make notes of important points, answer questions, and be ready to discuss this topic.

Refrigeration has many applications including household refrigerators, industrial freezers, air conditioning, heat pumps and cryogenics. Cryogenics, a word derived from the Greek language meaning "the production of freezing cold", can produce temperatures as low as −238 °F. Applications of cryogenics range from storing blood to use for rocket fuels.

The importance of refrigeration centers on the fact we can keep food safe and conserve it for later consumption. Although it is important to realize refrigeration does not preserve food as freezing does, it protects food by slowing the growth of bacteria. Bacteria reproduce most rapidly in the 40 to 140 °F temperature range, so a refrigerator set at 40 °F or below is necessary to safely protect most foods.

Refrigerators are a modern convenience that help protect our food from bacteria and prolongs its storage.

Today, the refrigerator is one of the most common pieces of equipment found in the kitchen and possibly the most important for keeping food safe. These electric units have become so common that it is difficult to imagine a time without them in our everyday lives; however today refrigerator is a relatively modern appliance. The history of refrigeration began when man found that after a hunt the game would keep longer if stored at cooler temperatures, such as being packed in snow. Storing food this way would allow it to be kept for times when food was not readily available.

Ice was eventually manufactured to refrigerate food. The ice box, used by most households until the end of the 19th century was finally replaced by the refrigerator consisting of a mechanical compressor and refrigerant. Of course the rich were all that could afford such technology at for quite some time. Later, people would add chemicals such as sodium nitrate or potassium nitrate to decrease the temperature of water for prolonged storage. Wine cooling via this method was documented as early as 1550, the same year as the first recorded use of the words "to refrigerate'.

The science of refrigeration continues to evolve. Until very recently the refrigerant most known and commonly used was "Freon", a trade name for HCFC-22 (also known as R-22), but in 1992 the Montreal Protocol, an international environmental agreement, was amended and established a schedule for the phase out of all HCFCs (hydro chlorofluorocarbons). HCFCs contributes to ozone depletion, so Freon is being phased out and replaced with alternative refrigerants less injurious to the ozone and still as effective in keeping food cold.

Review Questions

1. What are the applications of refrigeration other than household use?
2. Cryogenics can produce temperatures as low as _____?
3. At what temperature range do bacteria grow most rapidly?
4. At what temperature should a household refrigerator be set?
5. Why is the use of Freon, a HCFC, being phased out?

Science Connection

Have students research different chemical substances used as refrigerants.

Math Connection

Students can practice converting the temperatures in this lesson to degrees Celsius.