

Physical Science Refrigeration Systems

Objective: To learn the basic components of a refrigeration system, describe the function of each, and recognize applications in society.

Materials: Dehumidifier (or window air conditioner) with cover removed, can of liquid air for cleaning computer parts, Bicycle tire pump and inner tube.

Teacher directed discovery: Present dehumidifier to class as an example of a refrigeration system. Have cover removed and operating. Warn students about exposed electrical contacts and the rotating fan. Identify the 4 major components

- Compressor
- Expansion valve
- Evaporator coil
- Condenser coil

Draw schematic of fluid circuit on board

- Trace fluid flow and direction
- Emphasize opposite pairs of components (Compressor/Expansion Valve and Evaporator/Condenser)

Have student inflate inner tube with tire pump. Ask nearby students to feel the hose. It will be warm to the touch. (Feeling the hose avoids students thinking temperature increase is caused by friction in the pump.)

- Relate this phenomenon to the heating that occurs in a refrigeration system and the dissipation of this heat in the condenser coil.

Spray can of liquid air and have student feel the can and report to class. It will be cold.

- Relate this to the evaporative cooling that occurs through the expansion valve and the heat input to the evaporator coil.

Student development: (develop this into a worksheet)

Ask students to draw the schematic of the refrigeration system in their notes. Next to each leg of the circuit draw a thermometer showing the relative temperature of the fluid at that point. Also put Liquid or Gas next to each thermometer indicating the state at each point.

Describe three applications of refrigeration systems in your daily life. Sketch each device including the refrigeration circuit.

Describe the importance of the refrigeration system to food storage. What methods might have been used prior to the invention of the refrigeration system?