

# INTERMEDIATE ACTIVITY: Natural Refrigeration

**GOAL:** To build a refrigerator that doesn't need electricity. (*This system is used by many desert dwellers in Africa who have no access to electricity.*)

## MATERIALS:

- |  |  |
|--|--|
| <input type="checkbox"/> 5 large earthenware flower pots | <input type="checkbox"/> 5 smaller earthenware flower pots that will fit inside large ones |
| <input type="checkbox"/> 5 small bags of sand            | <input type="checkbox"/> 5 lids to cover large flower pots (dinner plates will work)       |
| <input type="checkbox"/> 5 thermometers                  | <input type="checkbox"/> water   |
| <input type="checkbox"/> cardboard                       |  |

## PREPARATION:

1. Prepare five sets of materials listed above for five groups of students.
2. Make a copy of this page for each group.
3. Place the students into five groups.

## SCIENTIFIC CONCEPTS:

1. Thermal energy is required to change a liquid into a gas (heat of vaporization).
2. When water evaporates, it absorbs thermal energy from its surroundings.

## PROCEDURE:

1. If there is a hole in the bottom of the large flower pot, cover it with a piece of cardboard.
2. Pour a one centimeter layer of sand into the bottom of the large flower pot. Dampen the sand with water.
3. Place the smaller flower pot inside the larger pot. Fill in the space between the two pots with sand.
4. Dampen the sand with water.
5. Place the thermometer inside, cover the pots, and let stand for two minutes.
6. Remove the lid and record the temperature. Use this as your control temperature.
7. Place the thermometer back in the pot, cover, and place in a dry sunny place. Record the temperature after 10, 20, and 30 minutes.
8. Record the temperature every day for several days, noting the weather conditions and the dampness of the sand.
9. Compare your results with the results of the other groups of students.

## RESULTS:

## CONCLUSIONS:

**QUESTIONS:** Why did the experiment call for earthenware pots? Would metal, glass or plastic containers work as well?

