

# Thermo #3: Canned Heat

<b>OBJECTIVE</b>	Show light and dark colored objects absorb the sun's radiation at different rates.
<b>OVERVIEW</b>	The demonstration will show that water in a dark colored can will have a higher temperature after exposure to the sun than water in a shiny can.
<b>TOTAL TIME</b>	2 hours
<b>SUPPLIES</b>	Two empty coffee cans, (3 lbs size) Thermometer "Flat Black" spray paint
<b>PRINTED/AV MATERIAL</b>	None
<b>TEACHER PREPARATION</b>	One coffee can needs to have a shiny metallic surface inside and out. The other can should be painted flat black inside and out.

## Background

Different colored objects absorb energy at different rates. That is partially due to albedo. Albedo is the amount of reflection from a surface.

## Procedure

1. Fill the two cans with about two inches of water.
2. Measure the temperature of the water in each can. (The readings should be the same.)
3. Remove the thermometer and place the cans in a sunny location where they will not be disturbed and receive two hours of sunlight.
4. After two hours, measure the temperature of the water in each can.

## Discussion

The darker and duller the object, the more energy that object absorbs. The lighter colored or the shinier the object is, the less energy that it absorbs. Since more energy was reflected from the shiny can, less energy is absorbed than in the black painted can. But how does the water become warmer?

The water is heated by the energy emitted by the cans. Some objects, like glass, seem to absorb light hardly at all - the light goes through. For a shiny metallic surface, the light isn't absorbed either, it gets reflected. For a black material, light and heat are almost completely absorbed.

Heated bodies radiate energy, operating in reverse. The more an object absorbs, the more it radiates. The water in the shiny can was not as warm as in the black can because it absorbed less energy and therefore has less energy to radiate into the water. This is called "black body radiation".

NOAA – National Weather Service