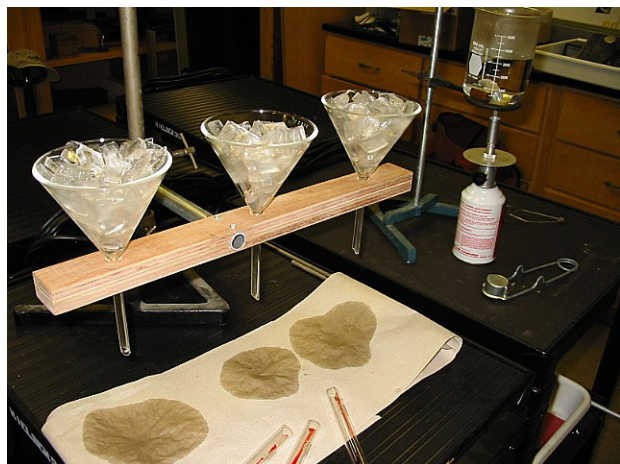
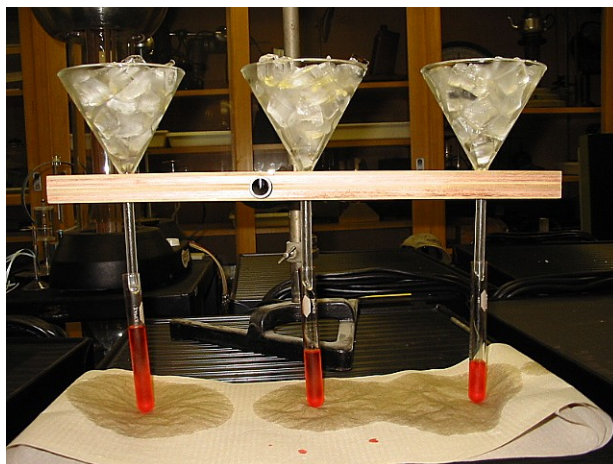


Specific Heat



Ready to Go



Result: Al, Cu, Pb

Purpose: Demonstrates the heat energy contained in materials.

This demo shows the relative amounts of heat energy contained in three different materials. Cylinders of Al, Cu, and Pb (all with the same mass = 29 g) are heated to 100°C , and the amount of ice each can melt is compared visually.

Note: Mount the funnels in their holder, and adjust the height so that the test tubes can be inserted from below. The funnels should support the tubes. Place some paper towels below. Heat some water to boiling in the beaker with the three samples. Meanwhile, fill the funnels with ice and allow them to cool (and drip onto the towels). Place a drop of food coloring in each test tube. When the water boils, quickly place a test tube under a funnel and place the hot sample in the ice. (The test-tube holder is for picking the rods out of the hot water.)

One sees that the aluminum melts a lot more water than the lead, and the copper is middle of the road. So *per unit mass*, Al must hold more available heat than the others.

The astute student may observe that bigger samples seem to contain more energy. Perhaps energy is stored uniformly per unit volume? For these metals, it turns out that the heat energy stored *per atom* is roughly constant.

For the record:

| | C cal/g°C ¹ | C cal/cc°C | C cal/mole°C |
|----|---------------------------|---------------|-----------------|
| Al | 0.215 | 0.58 | 5.8 |
| Cu | 0.093 | 0.83 | 5.9 |
| Pb | 0.031 | 0.35 | 6.3 |

¹At room temperature.

Extra Equipment: Ring stand, 600 ml beaker, food coloring, butane torch.

Location: Shelf D3