

Lab #5
Measuring the Coefficient of Linear Expansion for Cu, Al, and Steel

Follow the attached instructions carefully to set up the laboratory experiment and make the measurements.

Additional notes on procedure:

If you allow too much time to elapse before making your length measurement, the gauge rod will absorb heat, which will decrease the measured expansion. However, you must allow a fair amount of time for the thermistor temperature to stabilize (since the thermistor takes longer to reach equilibrium than the tube.) To get the best results despite these problems, record the maximum change in length recorded by the gauge and the minimum resistance recorded by the ohmmeter.

Make sure the gauge is placed so that there is ample allowance for measuring the expansion.

Interpolate the temperature to the nearest 0.1 °C.

In your calculations, always use the room temperature reading of the thermistor as the initial temperature of the rod, since you make the initial length measurements at room temperature. (Do not use the temperature registered by the thermistor before the rod is heated, since it may not have enough time to return to room temperature.)

When changing the rods, carefully remove the steam hose. Remove the insulating ring and the thermistor plug from the rod and tip the rod so that the condensed water drips into the drain pan. Use extra pieces of foam rubber or a napkin if the rod is hot to the touch.

Write-up:

This will be another formal report, and it will be due on **Thursday, October 19, 2006**. Make sure you discuss the accepted values of the linear expansion coefficients for each of your tubes. How well do the measured values match the accepted values? Are they systematically high or low? If there is a systematic effect, speculate on the possible causes and suggest ways to improve the experiment.