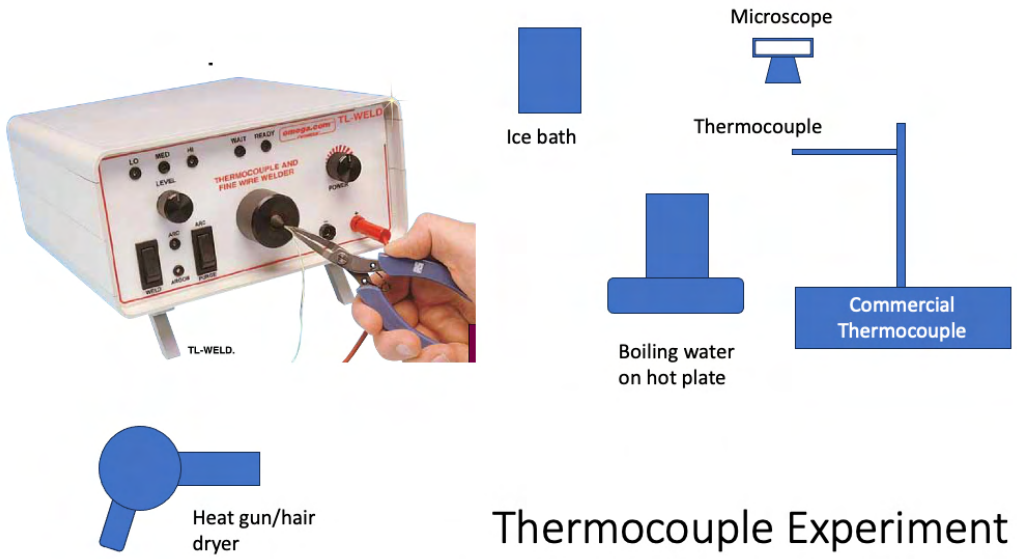
UCI CI-SS Laboratory Exercise

Thermocouples; fabrication and calibration

Thermocouples are ubiquitous and extremely reliable temperature measurement tools that rely on the Seebeck effect where an EMF is generated at the junction of dissimilar conductors. The judicious selection of the conductor material permits a nearly linear relationship between the temperature of the junction and voltage produced. Well known conductor pairs are given letter designations, with tradeoffs between temperature range and sensitivity. Accurate calibration of the temperature at the measurement junction requires a comparator junction held at a fixed temperature (or electronic equivalent – generally called the cold junction). There are a surprising number of subtleties in the use of thermocouples (e.g., radiation/conduction corrections, catalytic



Thermocouple Experiment

effects, time response), and this experiment is meant to introduce you to the foundation. As seen in the graphic, this experiment just brushes the surface of this important measurement skill. In keeping with the research theme, the tasks are not rigidly defined but are designed to encourage exploration within the parameters of various components.