

Learning Objectives

The objectives of this laboratory are to...

- understand the concept of heat and joules.
- perform heat-gain and heat-loss calculations.

Background

Practically all chemical reactions either release or absorb energy, often in the form of heat. This is known as thermodynamics. This experiment is designed to introduce the student to some of the units, techniques and concepts associated with measuring heat during experiments

One of the important techniques which you will study in this experiment is known as calorimetry. A calorimeter is a device used to measure changes in heat within a system. It must be well insulated from the surroundings so that the heat changes for the reaction occurring within the system may be measured quantitatively.

The Law of Conservation of Energy implies that within the calorimeter the heat lost by one substance must be equal to the heat gained by something else within the system. The terms specific heat, heat capacity, heat of fusion, heat of combustion, calorimeter and Joules are defined and used.

Experiments are carried out involving:

- the heat associated with physical changes, such as heat loss and gain by mixing water at two different temperatures, or adding “dried” ice cubes to warm water and determining the temperature changes..
- the heat associated with chemical changes by burning a candle to heat a small can of water.
- using the relationship $q = (\text{sp.ht.})(g)(\Delta T)$ to calculate the heat values involved in each experiment.

Instructor Resources Provided

- Sample Report Sheets providing the format to organize the data collection with sample data.
- Questions to consider, answer and turn-in with suggested answers.
- Tips and Traps section to assist the instructor with potential problems and solutions.
- Sample *MicroLAB* screen shots and graphs, sample given below of a *MicroLAB* heating curve.
- Laboratory preparation per student station.

