

Teaching Entropy

T. Lankau, G. Job

The abstract nature of the quantity "entropy" as taught in most textbooks has been regarded as one of the greatest obstacles in understanding chemical thermodynamics. A more physical approach to this subject starts from a direct metrication of entropy.

A bottle filled with an ice-water mixture and closed with a capillary tube (ice calorimeter) can be used to measure directly the entropy exchange of the mixture with its surrounding. An entropy flow into the bottle is indicated by an decrease of the water level in the capillary tube, because the entropy uptake causes some ice to melt.

Such a device offers now the opportunity for students to measure small quantities of entropy in their laboratory period, which facilitates a more physical teaching of the subject. Once the entropy has been metricised it is possible to describe the heat energy as the potential energy of an entropy quantity in a temperature field.

The water calorimeter can be used to demonstrate another peculiarity: The flow of heat can cause heat by itself. Such an experiment as well as its possible physical realisation will be subject of the second part of the talk.