

18.1: Introduction

Most of these notes on heat and thermodynamics have been largely theoretical, and almost no attention has been given to laboratory measurements of the various quantities discussed. This is not because experiment is any less important than theory. Rather it is more the consequence of my own interests and personal lack of expertise in experiment. Indeed, laboratory physics equipment has a tendency to disintegrate as soon as I approach it. However, in this chapter we shall endeavour to describe, however inadequately, some of the early classical experimental measurements.

I am under the impression that today, in order to measure *any* physical quantity, you purchase some expensive equipment, attach one end of it to the thing to be measured, and the other end to a computer, and one instantaneously obtains a digital readout of the quantity in question, without necessarily having any idea how the equipment works. And I, certainly, have little idea how much of modern high technology works. Consequently I shall restrict this chapter to brief descriptions of some of the earlier classical historical determinations of thermal quantities, many of which were performed during the nineteenth century or the early twentieth century.

Of all the many experimental determinations of physical quantities in various branches in physics, accurate determinations in the laboratory of thermal quantities are among the most difficult classical measurements of all. It would be easy to dismiss the various early experiments that I shall describe in this chapter as quaint, crude and of no modern interest. Far from it. Some of these experiments were extremely difficult to carry out accurately, and it is astonishing how accurate many of the early measurements were, as a result of the careful design, attention to detail and allowance for heat losses. The early experimenters deserve our great admiration and our gratitude for the important fundamental contributions they made to our understanding of physical science.

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