5.1 Introduction

The term *thermodynamics* is used here loosely and includes classical thermodynamics, statistical thermodynamics, thermal physics, and radiation processes. Notation in these subjects can be confusing and the conventions used here are those found in the majority of modern treatments. In particular:

- The internal energy of a system is defined in terms of the heat supplied *to* the system plus the work done *on* the system, that is, $\mathrm{d}U = đQ + đW$.
- The lowercase symbol p is used for pressure. Probability density functions are denoted by $\mathrm{pr}(x)$ and microstate probabilities by p_i.
- With the exception of *specific intensity*, quantities are taken as specific if they refer to unit mass and are distinguished from the extensive equivalent by using lowercase. Hence *specific volume*, v, equals V/m, where V is the volume of gas and m its mass. Also, the *specific heat capacity* of a gas at constant pressure is $c_p = C_p/m$, where C_p is the heat capacity of mass m of gas. Molar values take a subscript "m" (e.g., V_m for molar volume) and remain in upper case.
- The component held constant during a partial differentiation is shown after a vertical bar; hence $\left.\frac{\partial V}{\partial p}\right|_T$ is the partial differential of volume with respect to pressure, holding temperature constant.

The thermal properties of solids are dealt with more explicitly in the section on solid state physics (page 123). Note that in solid state literature *specific heat capacity* is often taken to mean heat capacity per unit volume.