

he is surrounded. But there is an instrument to which we shall have frequent occasion to refer, as the means by which many philosophical principles have been determined; and it would be impossible to describe its use, or the principles of its construction, to the individual who was not acquainted with the general laws of the expansion which substances suffer when their temperature is raised. It would, therefore, be possible to justify the propriety of introducing in this work some remarks upon the laws which govern the expansion of bodies, if there were no other object in view than the explanation of that instrument, the thermometer.

#### THE THERMOMETER.

Almost any substance might, under certain conditions, be employed as a thermometer. Solids and gases, however, would, from a casual consideration, appear to be best suited for this purpose, as they are more uniform in their expansions than liquids; but this deduction is not found to be practically true. The increase in magnitude of solids is so small, that they cannot be employed without mechanical contrivances; and the dilatation of gases is so great, that their use is attended with great practical inconvenience when adapted to the measurement of high temperatures. Liquids are best suited for thermometers. But liquids have, in general, an irregular expansion when they approach the boiling and freezing temperature; and, therefore, that one must be chosen whose freezing and boiling points are separated by the greatest interval, at the same time comprising those temperatures which it is commonly most necessary to determine. Alcohol freezes at a very low temperature, but it is readily vaporized; the oils are vaporized at a very high temperature, but they are easily solidified. Neither of these substances, therefore, can be used for common purposes, as thermometers, though they are useful under certain circumstances. Mercury has been very generally employed, and it may be necessary to give the reader such particulars as may enable him to construct the instrument, should he wish to test the accuracy of the information which is given in this volume, or to commence a series of experiments by which the boundaries of science may be extended.

The mercury to be used for thermometrical purposes must be pure, that is, must be free from admixture with any other