Units of Pressure

A number of different units are used to measure pressure. Because atmospheric pressure is often measured by a mercury barometer, pressure can be expressed in terms of the height of a mercury column. *Thus, the common unit of pressure is* **millimeters of mercury,** *symbolized mm Hg.* A pressure of 1 mm Hg is also called 1 torr in honor of Torricelli for his invention of the barometer. The average atmospheric pressure at sea level at 0°C is 760 mm Hg.

Pressures are often measured in units of atmospheres. *One* **atmosphere of pressure** *(atm) is defined as being exactly equivalent to 760 mm Hg.*

In SI, pressure is expressed in derived units called pascals. The unit is named for Blaise Pascal, a French mathematician and philosopher who studied pressure during the seventeenth century. *One* **pascal** *(Pa) is defined as the pressure exerted by a force of one newton (1 N) acting on an area of one square meter.*

In many cases, it is more convenient to express pressure in kilopascals (kPa). The standard atmosphere (1 atm) is equal to $1.013\ 25 \times 10^5$ Pa, or 101.325 kPa. The pressure units used in this book are summarized in **Table 1.**

extension

Chemical Content

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Standard Temperature and Pressure

To compare volumes of gases, one must know the temperature and pressure at which the volumes are measured. *For purposes of comparison, scientists have agreed on standard conditions of exactly 1 atm pressure and 0°C.* These conditions are called *standard temperature and pressure* and are commonly abbreviated STP.

TABLE 1 ***Units of Pressure***

Unit	Symbol	Definition/relationship
pascal	Pa	SI pressure unit $1\ \text{Pa} = \frac{1\ \text{N}}{\text{m}^2}$
millimeter of mercury	mm Hg	pressure that supports a 1 mm mercury column in a barometer
torr	torr	1 torr = 1 mm Hg
atmosphere	atm	average atmospheric pressure at sea level and 0°C 1 atm = 760 mm Hg = 760 torr = $1.013\ 25 \times 10^5$ Pa = 101.325 kPa
pounds per square inch	psi	1 psi = $6.892\ 86 \times 10^3$ Pa 1 atm = 14.700 psi