

## 7.7: Standard States of Pure Substances

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It is often useful to refer to a reference pressure, the **standard pressure**, denoted  $p^\circ$ . The standard pressure has an arbitrary but constant value in any given application. Until 1982, chemists used a standard pressure of 1 atm ( $1.01325 \times 10^5$  Pa). The IUPAC now recommends the value  $p^\circ = 1$  bar (exactly  $10^5$  Pa). This e-book uses the latter value unless stated otherwise. (Note that there is no defined standard *temperature*.)

A superscript degree symbol ( $^\circ$ ) denotes a standard quantity or standard-state conditions. An alternative symbol for this purpose, used extensively outside the U.S., is a superscript Plimsoll mark ( $\ominus$ ). (The Plimsoll mark is named after the British merchant Samuel Plimsoll, at whose instigation Parliament passed an act in 1875 requiring the symbol to be placed on the hulls of cargo ships to indicate the maximum depth for safe loading.)

A **standard state** of a pure substance is a particular reference state appropriate for the kind of phase and is described by intensive variables. This e-book follows the recommendations of the IUPAC Green Book (E. Richard Cohen et al, *Quantities, Units and Symbols in Physical Chemistry*, 3rd edition, RSC Publishing, Cambridge, 2007, p. 61–62) for various standard states.

- Section 9.7 will introduce additional standard states for constituents of mixtures.

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