mass per mole of molecules, and the molar mass of an ionic compound is the mass per mole of formula units. A **formula unit** of an ionic compound is an assembly of ions corresponding to the chemical formula of the compound; so the formula unit NaCl consists of one Na^+ ion and one Cl^- ion. The names *atomic weight* and *molecular weight* are still widely used in place of molar mass (often with the units omitted), but we shall not use them in this text.

The **molar concentration** ('molarity') of a solute in a solution is the amount ofsubstance of the solute divided by the volume of the solution. Molar concentration is usually expressed in moles per decimetre cubed (mol dm^{-3} or mol L^{-1}; 1 dm^3 is identical to 1 L). A solution in which the molar concentration of the solute is 1 mol dm^{-3} is prepared by dissolving 1 mol of the solute in sufficient solvent to prepare 1 dm^3 of solution. Such a solution is widely called a '1 molar' solution and denoted 1 M. The term **molality** refers to the amount of substance of solute divided by the mass of solvent used to prepare the solution. Its units are typically moles of solute per kilogram of solvent (mol kg^{-1}).

Units

In the **International System** of units (SI, from the French *Système International d'Unités*), the units are formed from seven **base units** listed in Table A1.1. All other physical quantities may be expressed as combinations of these physical quantities and reported in terms of **derived units**. Thus, volume is $(\text{length})^3$ and may be reported as a multiple of 1 metre cubed (1 m^3), and density, which is mass/volume, may be reported as a multiple of 1 kilogram per metre cubed (1 kg m^{-3}).

A number of derived units have special names and symbols. The names of units derived from names of people are lower case (as in torr, joule, pascal, and kelvin), but their symbols are upper case (as in Torr, J, Pa, and K). Among the most important for our purposes are those listed in Table A1.2. In all cases (both for base and derived quantities), the units may be modified by a prefix that denotes a factor of a power of 10. In a perfect world, Greek prefixes of units are upright (as in μm) and sloping for physical properties (as in μ for chemical potential), but available typefaces are not always so obliging. Among the most common prefixes are those listed in Table A1.3. Examples of the use of these prefixes are

$$1\ \text{nm} = 10^{-9}\ \text{m} \qquad 1\ \text{ps} = 10^{-12}\ \text{s} \qquad 1\ \mu\text{mol} = 10^{-6}\ \text{mol}$$

Table A1.1 The SI base units

Physical quantity	Symbol for quantity	Base unit
Length	l	metre, m
Mass	M	kilogram, kg
Time	t	second, s
Electric current	I	ampere, A
Thermodynamic temperature	T	kelvin, K
Amount of substance	n	mole, mol
Luminous intensity	I	candela, cd