BASE UNITS

Bureau International des Poids et Mesures

THE SECOND

The second, symbol s, is the SI unit of time. It is defined by taking the fixed numerical value of the caesium frequency $\Delta\nu_{Cs}$, the unperturbed ground-state hyperfine transition frequency of the caesium-133 atom, to be 9 192 631 770 when expressed in the unit Hz, which is equal to s^{-1}.

THE METRE

The metre, symbol m, is the SI unit of length. It is defined by taking the fixed numerical value of the speed of light in vacuum c to be 299 792 458 when expressed in the unit $m\,s^{-1}$, where the second is defined in terms of the caesium frequency $\Delta\nu_{Cs}$.

THE KILOGRAM

The kilogram, symbol kg, is the SI unit of mass. It is defined by taking the fixed numerical value of the Planck constant h to be $6.626\,070\,15 \times 10^{-34}$ when expressed in the unit J s, which is equal to $kg\,m^{2}\,s^{-1}$, where the metre and the second are defined in terms of c and $\Delta\nu_{Cs}$.

THE AMPERE

The ampere, symbol A, is the SI unit of electric current. It is defined by taking the fixed numerical value of the elementary charge e to be $1.602\,176\,634 \times 10^{-19}$ when expressed in the unit C, which is equal to A s, where the second is defined in terms of $\Delta\nu_{Cs}$.

THE KELVIN

The kelvin, symbol K, is the SI unit of thermodynamic temperature. It is defined by taking the fixed numerical value of the Boltzmann constant k to be $1.380\,649 \times 10^{-23}$ when expressed in the unit $J\,K^{-1}$, which is equal to $kg\,m^{2}\,s^{-2}\,K^{-1}$, where the kilogram, metre and second are defined in terms of h, c and $\Delta\nu_{Cs}$.

THE MOLE

The mole, symbol mol, is the SI unit of amount of substance. One mole contains exactly $6.022\,140\,76 \times 10^{23}$ elementary entities. This number is the fixed numerical value of the Avogadro constant, N_{A}, when expressed in the unit mol^{-1} and is called the Avogadro number.

The amount of substance, symbol n, of a system is a measure of the number of specified elementary entities. An elementary entity may be an atom, a molecule, an ion, an electron, any other particle or specified group of particles.

THE CANDELA

The candela, symbol cd, is the SI unit of luminous intensity in a given direction. It is defined by taking the fixed numerical value of the luminous efficacy of monochromatic radiation of frequency 540×10^{12} Hz, K_{cd}, to be 683 when expressed in the unit $lm\,W^{-1}$, which is equal to $cd\,sr\,W^{-1}$, or $cd\,sr\,kg^{-1}\,m^{-2}\,s^{3}$, where the kilogram, metre and second are defined in terms of h, c and $\Delta\nu_{Cs}$.