

# Appendix: units and physical constants

Quantity	Name	Symbol	Units
Amount	mole	mol	
Electric charge	coulomb	C	
Mass	kilogram	kg	
Temperature	degree Kelvin	K	
Time	second	s	
Length	meter	m	
Force	newton	N	$\text{kg} \cdot \text{m} \cdot \text{s}^{-2}$
Energy	joule	J	$\text{N} \cdot \text{m}$
Pressure	pascal	Pa	$\text{N} \cdot \text{m}^{-2}$
Capacitance	farad	F	$\text{A} \cdot \text{s} \cdot \text{V}^{-1}$
Resistance	ohm	$\Omega$	$\text{V} \cdot \text{A}^{-1}$
Electric current	ampere	A	$\text{C} \cdot \text{s}^{-1}$
Conductance	siemen	S	$\text{A} \cdot \text{V}^{-1}$
Potential difference	volt	V	$\text{N} \cdot \text{m} \cdot \text{C}^{-1}$

Physical Constant	Symbol	Value
Boltzmann's constant	$k$	$1.381 \times 10^{-23} \text{ J K}^{-1}$
Planck's constant	$h$	$6.626 \times 10^{-34} \text{ J s}$
Avogadro's number	$N_A$	$6.02257 \times 10^{23} \text{ mol}^{-1}$
unit charge	$q$	$1.6 \times 10^{-19} \text{ C}$
gravitational constant	$g$	$9.78049 \text{ m/s}^2$
Faraday's constant	$F$	$9.649 \times 10^4 \text{ C mol}^{-1}$
permittivity of free space	$\epsilon_0$	$8.854 \times 10^{-12} \text{ F/m}$
universal gas constant	$R$	$8.315 \text{ J mol}^{-1} \text{ K}^{-1}$

**Lumen:** 1 lm = quantity of light emitted by  $\frac{1}{60} \text{ cm}^2$  surface area of pure platinum at its melting temperature (1770 degrees C), within a solid angle of 1 steradian.

**Angstrom:**  $1 \text{ \AA} = 10^{-10} \text{ m}$ .