



This is “Appendix G: Physical Constants and Conversion Factors”, appendix 7 from the book [Principles of General Chemistry \(index.html\)](#) (v. 1.0M).

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## Chapter 31

### Appendix G: Physical Constants and Conversion Factors

Selected Physical Constants	
Atomic mass unit	$1 \text{ amu} = 1.6605389 \times 10^{-24} \text{ g}$
	$1 \text{ g} = 6.022142 \times 10^{23} \text{ amu}$
Avogadro's number	$N = 6.022142 \times 10^{23} / \text{mol}$
Boltzmann's constant	$k = 1.380651 \times 10^{-23} \text{ J/K}$
Charge on electron	$e = 1.6021765 \times 10^{-19} \text{ C}$
Faraday's constant	$F = 9.6485338 \times 10^4 \text{ C/mol}$
Gas constant	$R = 0.0820575 \text{ (L atm)/(mol K)}$
	$= 8.31447 \text{ J/(mol K)}$
Mass of electron	$m_e = 5.485799 \times 10^{-4} \text{ amu}$
	$= 9.109383 \times 10^{-28} \text{ g}$
Mass of neutron	$m_n = 1.0086649 \text{ amu}$
	$= 1.6749273 \times 10^{-24} \text{ g}$
Mass of proton	$m_p = 1.0072765 \text{ amu}$
	$= 1.6726217 \times 10^{-24} \text{ g}$
Pi	$\pi = 3.1415927$
Planck's constant	$h = 6.626069 \times 10^{-34} \text{ J s}$
Speed of light (in vacuum)	$c = 2.99792458 \times 10^8 \text{ m/s (exact)}$

Useful Conversion Factors and Relationships	
<b>Length</b>	<b>Energy (derived)</b>
<i>Si unit: meter (m)</i>	<i>Si unit: joule (J)</i>

<b>Useful Conversion Factors and Relationships</b>	
$1 \text{ km} = 0.62137 \text{ mi}$ $1 \text{ mi} = 5280 \text{ ft}$ $= 1.6093 \text{ km}$ $1 \text{ m} = 1.0936 \text{ yd}$ $1 \text{ in} = 2.54 \text{ cm (exact)}$ $1 \text{ cm} = 0.39370 \text{ in.}$ $1 \text{ \AA} = 10^{-10} \text{ m}$	$1 \text{ J} = 1 \text{ N} \cdot \text{m} = 1 (\text{kg} \cdot \text{m}^2) / \text{s}^2$ $1 \text{ J} = 0.2390 \text{ cal}$ $= 1 \text{ V} \times 1 \text{ C}$ $1 \text{ cal} = 4.184 \text{ J (exact)}$ $1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$
<b>Mass</b>	<b>Pressure (derived)</b>
<i>SI unit: kilogram (kg)</i>	<i>SI unit: pascal (Pa)</i>
$1 \text{ kg} = 2.2046 \text{ lb}$ $1 \text{ lb} = 453.59 \text{ g}$ $= 16 \text{ oz}$	$1 \text{ Pa} = 1 \text{ N/m}^2$ $= 1 \text{ kg/} (\text{m} \cdot \text{s}^2)$ $1 \text{ atm} = 101,325 \text{ Pa}$ $= 760 \text{ torr}$ $= 14.70 \text{ lb/in}^2$ $1 \text{ bar} = 10^5 \text{ Pa}$
<b>Temperature</b>	<b>Volume (derived)</b>
<i>SI unit: kelvin (K)</i>	<i>SI unit: cubic meter (m<sup>3</sup>)</i>
$0 \text{ K} = -273.15^\circ\text{C}$ $= 459.67^\circ\text{F}$ $\text{K} = ^\circ\text{C} + 273.15^\circ\text{C}$ $^\circ\text{C} = \frac{5}{9} (^\circ\text{F} - 32^\circ)$ $^\circ\text{F} = \frac{9}{5} ^\circ\text{C} + 32$	$1 \text{ L} = 10^{-3} \text{ m}^3$ $= 1 \text{ dm}^3$ $= 10^3 \text{ cm}^3$ $1 \text{ gal} = 4 \text{ qt}$ $= 3.7854 \text{ L}$ $1 \text{ cm}^3 = 1 \text{ mL}$