

USEFUL CONSTANTS

(For a more complete list, see Appendix D)

Atomic mass unit	$1 \text{ amu} = 1.6606 \times 10^{-24} \text{ g}$
Avogadro's number	$N = 6.0221367 \times 10^{23} \text{ particles/mol}$
Electronic charge	$e = 1.60219 \times 10^{-19} \text{ coulombs}$
Faraday constant	$F = 96,485 \text{ coulombs/equivalent}$ $= 96,485 \text{ coulombs/mol } e^{-}$
Gas constant	$R = 0.08206 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} = 1.987 \frac{\text{cal}}{\text{mol} \cdot \text{K}}$ $= 8.3145 \frac{\text{J}}{\text{mol} \cdot \text{K}} = 8.3145 \frac{\text{kJ}}{\text{mol} \cdot \text{K}}$
Ion product for water	$K_w = 1.0 \times 10^{-14}$
Pi	$\pi = 3.1416$
Planck's constant	$h = 6.6262 \times 10^{-34} \text{ J} \cdot \text{s}$ $= 6.6262 \times 10^{-27} \text{ erg} \cdot \text{s}$
Speed of light (in vacuum)	$c = 2.99792458 \times 10^8 \text{ m/s}$

USEFUL RELATIONSHIPS

(For a more complete list, see Appendix C)

Mass and Weight

SI Base Unit: Kilogram (kg)

- 1 kilogram = 1000 grams = 2.205 pounds
- 1 gram = 1000 milligrams
- 1 pound = 453.59 grams
- 1 amu = $1.6606 \times 10^{-24} \text{ grams}$
- 1 gram = $6.022 \times 10^{23} \text{ amu}$
- 1 ton = 2000 pounds

Volume

SI Base Unit: Cubic Meter (m³)

- 1 liter = 0.001 cubic meter
- 1-liter = 1000 cubic centimeters = 1000 mL
- 1 liter = 1.056 quarts
- 1 quart = 0.9463 liter
- 1 milliliter = 0.001 liter = 1 cubic centimeter
- 1 cubic foot = 7.475 gallons = 28.316 liters
- 1 gallon = 4 quarts

Pressure

SI Base Unit: Pascal (Pa)

- 1 pascal = $1 \frac{\text{kg}}{\text{m} \cdot \text{s}^2} = 1 \text{ newton/m}^2$
- 1 atmosphere = 760 torr
- = 760 millimeters of mercury
- = $1.01325 \times 10^5 \text{ pascals}$
- = 14.70 pounds per square inch
- 1 torr = 1 millimeter of mercury

Length

SI Base Unit: Meter (m)

- 1 inch = 2.54 centimeters (exactly)
- 1 meter = 100 centimeters = 39.37 inches
- 1 yard = 0.9144 meter
- 1 mile = 1.609 kilometers
- 1 kilometer = 1000 meters = 0.6215 mile
- 1 Ångström = $1.0 \times 10^{-10} \text{ meters} = 1.0 \times 10^{-8} \text{ centimeters}$

Energy

SI Base Unit: Joule (J)

- 1 calorie = 4.184 joules = $4.129 \times 10^{-2} \text{ L} \cdot \text{atm}$
- 1 joule = $1 \frac{\text{kg} \cdot \text{m}^2}{\text{s}^2} = 0.23901 \text{ calorie}$
- 1 joule = $1 \times 10^7 \text{ ergs}$
- 1 electron volt = $1.6022 \times 10^{-19} \text{ joule}$
- 1 electron volt = 96.485 kJ/mol
- 1 L · atm = 24.217 calories = 101.325 joules

Temperature

SI Base Unit: Kelvin (K)

- 0 K = -273.15°C
- $? \text{ K} = ^\circ\text{C} + 273.15^\circ$
- $? ^\circ\text{F} = 1.8(^{\circ}\text{C}) + 32^\circ$
- $? ^\circ\text{C} = \frac{? ^\circ\text{F} - 32^\circ}{1.8}$