

# SI (International System) or *Système International d'Unités*

## SI base units:

Quantity	Unit	Symbol
length	meter	m
mass	kilogram	kg
time	second	s
electric current*	ampere	A
thermodynamic temperature	kelvin	K
amount of substance	mole	mol
luminous intensity*	candela	cd

SI is built on seven fundamental standards called *base units*.

\*not used often in chemistry

## SI prefixes:

*Prefixes* are short names and letter symbols for numbers (powers of ten). A prefix is attached to the front of a unit, without a space. Prefixes are easier to write and say than powers of ten, ordinary notation, or traditional number names.

Symbol	Prefix	Power of Ten	Ordinary Notation	U.S. Name
Y	yotta	$10^{24}$	1 000 000 000 000 000 000 000 000	
Z	zetta	$10^{21}$	1 000 000 000 000 000 000 000	
E	exa	$10^{18}$	1 000 000 000 000 000 000	
P	peta	$10^{15}$	1 000 000 000 000 000	
T	tera	$10^{12}$	1 000 000 000 000	trillion
G	giga	$10^9$	1 000 000 000	billion
M	mega	$10^6$	1 000 000	million
k	kilo	$10^3$	1 000	thousand
h	hecto	$10^2$		100 hundred
da	deka	$10^1$		10 ten
		$10^0$		1 one
d	deci	$10^{-1}$	0.1	tenth
c	centi	$10^{-2}$	0.01	hundredth
m	milli	$10^{-3}$	0.001	thousandth
$\mu$	micro	$10^{-6}$	0.000 001	millionth
n	nano	$10^{-9}$	0.000 000 001	billionth
p	pico	$10^{-12}$	0.000 000 000 001	trillionth
f	femto	$10^{-15}$	0.000 000 000 000 001	
a	atto	$10^{-18}$	0.000 000 000 000 000 001	
z	zepto	$10^{-21}$	0.000 000 000 000 000 000 001	
y	yocto	$10^{-24}$	0.000 000 000 000 000 000 000 001	

## Derived units:

All other SI units are *derived* by simply multiplying or dividing these base units in various ways. Derived units are defined with the same equation as the quantity they measure.

Quantity	Derived Unit	Symbol
Temperature	degrees Celsius	°C
Liquid volume	liter	L
Solid volume	cubic centimeter	cm <sup>3</sup>
Density	Grams per cubic centimeter	g/cm <sup>3</sup>

For example, speed ( $v$ ) is defined as distance per time ( $v = d/t$ ). The word "per" means "divided by." So the SI unit of speed is a meter per second--the unit of distance divided by the unit of time. In symbols, you can show division three ways: a slash, horizontal bar, or negative exponent. For example, 8 meters per second may be written:

$$8 \text{ m/s} \quad \frac{8 \text{ m}}{\text{s}} \quad 8 \text{ m} \cdot \text{s}^{-1}$$

To multiply units, use a raised dot ( $\cdot$ ) but don't pronounce it or spell it out:

$$15 \text{ N} \cdot \text{m} \quad (\text{pronounced and spelled out: 15 newton meters})$$

## WHY WE USE METRIC !

