CSUSM
STEM Success Center

Ch. 1 Dimensional Analysis

. What is dimensional analysis?

- Dimensional analysis is a useful method that can be used to mathematically cancel out units in order to obtain a desired unit.

. Conversion factors are useful for dimensional analysis (conversion factors are ratios or mathematical relations used to convert one unit to another i.e. g/mol or 1 ft = 12 in)

SI unit prefixes

Prefix	mega	kilo	deci	centi	milli	micro	nano	pico
Symbol	M	k	d	c	m	μ	n	p
Value	10^6	10^3	10^{-1}	10^{-2}	10^{-3}	10^{-6}	10^{-9}	10^{-12}

example: 1 g = 1000 mg

Common conversion factors

1 ft = 12 in	1 min = 60 s	1 mi = 1.609 km	1 mole = 6.02 x 10^{23} atoms (particles)

. Practice

A Nissan GTR R35 has a top speed of 196 mph. Convert this value to km/h.

$$\frac{196\ mi}{h} \times \frac{1.609\ km}{1\ mi} = 315\frac{km}{h}$$

. Practice

For an experiment you need 25 mg of NaCl, how many grams are there in 25 mg of NaCl?

$$25\ \text{mg NaCl} \times \frac{10^{-3}\ g}{1\ mg} = ?$$

. Practice

Convert 150 g to kg

$$150\ g \times \frac{1\ kg}{10^3\ g} = ?$$

. Practice

Convert 25 mg to g

CHEM 150 UNITS

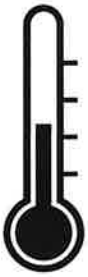
Examples -



Volume



Mass



Temperature

Common Units

meter	m	unit of length
liter	L	unit of volume
gram	g	unit of mass
mole	mol	unit of substance
Kelvin	K	unit of temperature

Avogadro's # = 6.02×10^{23}

Unit Prefixes

10^{12}	tera	T	1 000 000 000 000
10^{9}	giga	G	1 000 000 000
10^{6}	mega	M	1 000 000
10^{3}	kilo	k	1 000
10^{2}	hecto	h	100
10^{1}	deka	da	10
10^{-1}	deci	d	0.1
10^{-2}	centi	c	0.01
10^{-3}	milli	m	0.001
10^{-6}	micro	μ	0.000 001
10^{-9}	nano	n	0.000 000 001
10^{-12}	pico	p	0.000 000 000 001