INSTRUCTIONS FOR USING CONVERSION FACTOR TABLES

The tables that follow include conversion factors that are useful to the RCT. They are useful in making a single conversion from one unit to another by using the guide arrows at the top of the page in accordance with the direction of the conversion. However, when using the tables to develop equivalent fractions for use in unit analysis equations, a better understanding of how to read the conversion factors given in the table is required.

The conversions in the table have been arranged by section in the order of fundamental units, followed by derived units:

Length
Mass
Time
Area
Volume
Density
Radiological
Energy
Fission
Miscellaneous (Temperature, etc.)

The easiest way to read a conversion from the table is done as follows. Reading *left to right,* "one (1) of the units in the left column is equal to the number in the center column of the unit in the right column." For example, look at the first conversion listed under **Length**. This conversion would be read from left to right as "1 angstrom is equal to E-8 centimeters," or

$$1\text{Å} = 10^{-8}\ centimeters \Rightarrow \frac{1\ \text{Å}}{10^{-8}\ centimeters}$$

Another conversion would be read from left to right as "1 millimeter (mm) is equal to 1E-1 centimeters," or *1 mm = 0.1 cm*. This method can be applied to any of the conversions listed in these tables when reading *left to right*.

If reading *right to left*, the conversion should be read as "one (1) of the unit in the right column is equal to the inverse of (1 over) the number in the center column of the unit in the left column." For example, using the conversion shown previously, the conversion reading right to left would be "1 inch is equal to the inverse of 3.937E-5 (1/3.937E-5) micrometers," or

$$1inch = \frac{1}{3.937E-5\mu m} = 2.54E4\mu m$$

Multiply # of to obtain # of	**by by**	**to obtain # of Divide # of**
	Length	
angstroms (Å)	10^{-8}	Cm
Å	10^{-10}	M
micrometer (μm)	10^{-3}	Mm
μm	10^{-4}	Cm
μm	10^{-6}	M
μm	3.937×10^{-5}	in.
mm	10^{-1}	Cm
cm	0.3937	in.
cm	3.2808×10^{-2}	Ft
cm	10^{-2}	M
m	39.370	in.
m	3.2808	Ft
m	1.0936	Yd
m	10^{-3}	Km
m	6.2137×10^{-4}	Miles
km	0.62137	Miles
mils	10^{-3}	in.
mils	2.540×10^{-3}	Cm
in.	10^{3}	Mils
in.	2.5400	Cm
ft	30.480	Cm
rods	5.500	Yd
miles	5280	Ft
miles	1760	Yd
miles	1.6094	Km

Multiply # of to obtain # of	**by**	**to obtain # of Divide # of**
	Mass	
mg	10^{-3}	G
mg	3.527×10^{-5}	oz avdp
mg	1.543×10^{-2}	Grains
g	3.527×10^{-2}	oz avdp
g	10^{-3}	Kg
g	980.7	Dynes
g	2.205×10^{-3}	Lb
kg	2.205	Lb
kg	0.0685	Slugs
kg	9.807×10^{5}	Dynes
lb	4.448×10^{5}	Dynes
lb	453.592	G
lb	0.4536	Kg
lb	16	oz avdp
lb	0.0311	Slugs
dynes	1.020×10^{-3}	G
dynes	2.248×10^{-6}	Lb
u (unified--^{12}C scale)	1.66043×10^{-27}	Kg
amu (physical--^{16}0 scale)	1.65980×10^{-27}	Kg
oz	28.35	G
oz	6.25×10^{-2}	Lb

Note: Mass to energy conversions under miscellaneous

Multiply # of to obtain # of	**by by**	**to obtain # of Divide # of**
	Time	
days	86,400	Sec
days	1440	Min
days	24	Hours
years	3.15576×10^{7}	Sec
years	525,960	Min
years	8766	Hr
years	365.25	Days
	Area	
barns	10^{-24}	cm^2
circular mils	7.854×10^{-7}	$in.^2$
cm^2	10^{24}	Barns
cm^2	0.1550	$in.^2$
cm^2	1.076×10^{-3}	ft^2
cm^2	10^{-4}	m^2
ft^2	929.0	cm^2
ft^2	144	in^2
ft^2	9.290×10^{-2}	m^2
$in.^2$	6.452	cm^2
$in.^2$	6.944×10^{-3}	ft^2
$in.^2$	6.452×10^{-4}	m^2
m^2	1550	$in.^2$
m^2	10.76	ft^2
m^2	1.196	yd^2
m^2	3.861×10^{-7}	sq mi

Multiply # of to obtain # of	**by**	**to obtain # of Divide # of**
	Volume	
cm^3 (cc)	0.99997	Ml
cm^3	6.1023×10^{-2}	$in.^3$
cm^3	10^{-6}	m^3
cm^3	9.9997×10^{-4}	Liters
cm^3	3.5314×10^{-5}	ft^3
m^3	35.314	ft^3
m^3	2.642×10^{2}	Gal
m^3	9.9997×10^{2}	Liters
$in.^3$	16.387	cm^3
$in.^3$	5.787×10^{-4}	ft^3
$in.^3$	1.639×10^{-2}	Liters
$in.^3$	4.329×10^{-3}	Gal
ft^3	2.832×10^{-2}	m^3
ft^3	7.481	Gal
ft^3	28.32	Liters
ft^3	1728	$in.^3$
gal (U.S.)	231.0	$in.^3$
gal	0.13368	ft^3
liters	33.8147	fluid oz
liters	1.05671	Quarts
liters	0.26418	Gal
gm moles (gas)	22.4	liters (s.t.p.)

Multiply # of to obtain # of	**by**	**to obtain # of Divide # of**
	Density	
cm^3/g	1.602×10^{-2}	ft^3/lb
ft^3/lb	62.43	cm^3/g
g/cm^3	62.43	lb/ft^3
lb/ft^3	1.602×10^{-2}	g/cm^3
$lb/in.^3$	27.68	g/cm^3
lb/gal	0.1198	g/cm^3
	Radiological Units	
becquerel	2.703×10^{-11}	Curies
curies	3.700×10^{10}	dis/sec
curies	2.220×10^{12}	dis/min
curies	10^3	Millicuries
curies	10^6	Microcuries
curies	10^{12}	Picocuries
curies	10^{-3}	Kilocuries
curies	3.700×10^{10}	Becquerel
dis/min	4.505×10^{-10}	Millicuries
dis/min	4.505×10^{-7}	Microcuries
dis/sec	2.703×10^{-8}	Millicuries
dis/sec	2.703×10^{-5}	Microcuries
kilocuries	10^3	Curies
microcuries	3.700×10^4	dis/sec
microcuries	2.220×10^6	dis/min
millicuries	3.700×10^7	dis/sec
millicuries	2.220×10^9	dis/min
R	2.58×10^{-4}	C/kg of air
R	1	esu/cm^3 of air (s.t.p.)
R	2.082×10^9	ion prs/cm^3 of air (s.t.p.)

Multiply # of to obtain # of	**by by**	**to obtain # of Divide # of**
	Radiological Units (continued)	
R	1.610×10^{12}	ion prs/g of air
R (33.7 eV/ion pr.)	7.02×10^{4}	MeV/cm^3 of air (s.t.p.)
R (33.7 eV/ion pr.)	5.43×10^{7}	MeV/g of air
R (33.7 eV/ion pr.)	86.9	ergs/g of air
R (33.7 eV/ion pr.)	2.08×10^{-6}	g-cal/g of air
R (33.7 eV/ion pr.)	.98	ergs/g of soft tissue
rads	0.01	Gray
rads	0.01	J/kg
rads	100	ergs/g
rads	8.071×10^{4}	MeV/cm^3 or air (s.t.p.)
rads	6.242×10^{7}	MeV/g
rads	10^{-5}	watt-sec/g
rads (33.7 eV/ion pr.)	2.39×10^{9}	ion prs/cm^3 of air (s.t.p.)
gray	100	Rad
rem	0.01	Sievert
sievert	100	Rem
$\mu Ci/^3$ (μCi/ml)	2.22×10^{12}	dpm/m^3
$\mu Ci/cm^3$	2.22×10^{9}	dpm/liter
dpm/m^3	0.4505	pCi/m^3
	Energy	
Btu	1.0548×10^{3}	joules (absolute)
Btu	0.25198	kg-cal
Btu	1.0548×10^{10}	Ergs
Btu	2.930×10^{-4}	kW-hr
Btu/lb	0.556	g-cal/g
eV	1.6021×10^{-12}	Ergs

Multiply # of to obtain # of	**by by**	**to obtain # of Divide # of**
	Energy (continued)	
eV	1.6021×10^{-19}	joules (abs)
eV	10^{-3}	keV
eV	10^{-6}	MeV
ergs	10^{-7}	joules (abs)
ergs	6.2418×10^{5}	MeV
ergs	6.2418×10^{11}	eV
ergs	1.0	dyne-cm
ergs	9.480×10^{-11}	Btu
ergs	7.375×10^{-8}	ft-lb
ergs	2.390×10^{-8}	g-cal
ergs	1.020×10^{-3}	g-cm
gm-calories	3.968×10^{-3}	Btu
gm-calories	4.186×10^{7}	Ergs
joules (abs)	10^{7}	Ergs
joules (abs)	0.7376	ft-lb
joules (abs)	9.480×10^{-4}	Btu
g-cal/g	1.8	Btu/lb
kg-cal	3.968	Btu
kg-cal	3.087×10^{3}	ft-lb
ft-lb	1.356	joules (abs)
ft-lb	3.239×10^{-4}	kg-cal
kW-hr	2.247×10^{19}	MeV
kW-hr	3.60×10^{13}	Ergs
MeV	1.6021×10^{-6}	Ergs

Note: Mass to energy conversions under miscellaneous

Multiply # of to obtain # of	**by**	**to obtain # of Divide # of**
	Fission	
Btu	1.28×10^{-8}	grams ^{235}U fissioned[b]
Btu	1.53×10^{-8}	grams ^{235}U destroyed[b,c]
Btu	3.29×10^{13}	Fissions
fission of 1 g ^{235}U	1	megawatt-days
fissions	8.9058×10^{-18}	kilowatt-hours
fissions[b]	3.204×10^{-4}	Ergs
kilowatt-hours	2.7865×10^{17}	^{235}U fission neutrons
kilowatts per kilogram ^{235}U	2.43×10^{10}	average thermal neutron flu× in fuel[b,d]
megawatt-days per ton U	1.174×10^{-4}	% U atoms fissioned[e]
megawatts per ton U	$2.68 \times 10^{10}/E$[f]	average thermal neutron flu× in fuel[b]
neutrons per kilobarn	1×10^{21}	neutrons/cm^2
watts	3.121×10^{10}	fissions/sec

[b] At 200 MeV/fission.

[c] Thermal neutron spectrum ($\alpha = 0.193$).

[d] δ(fission = 500 barns).

[e] At 200 MeV fission, in ^{235}U-^{238}U mi×ture of low ^{235}U content.

[f] E = enrichment in grams ^{235}U/gram total. No other fissionable isotope present.

Multiply # of to obtain # of	by by	to obtain # of Divide # of
	Miscellaneous	
radians	57.296	Degrees
eV	1.78258×10^{-33}	Grams
eV	1.07356×10^{-9}	U
erg	1.11265×10^{-21}	Grams
proton masses	938.256	MeV
neutron masses	939.550	MeV
electron masses	511.006	keV
u (amu on ^{12}C scale)	931.478	MeV

Temperature

$$^{\circ}C = \frac{(^{\circ}F - 32)}{1.8} \qquad ^{\circ}C = (^{\circ}F - 32)\left(\frac{5}{9}\right)$$

$$^{\circ}F = 1.8(^{\circ}C) + 32 \qquad ^{\circ}F = \left(\frac{9}{5}\right)(^{\circ}C) + 32$$

$$^{\circ}K = ^{\circ}C + 273.16$$

Wavelength to Energy Conversion

$$\text{keV} = 12.40/\text{Å}$$
$$\text{eV} = 1.240 \times 10^{-6}/\text{m}$$