Unit Conversions

This appendix provides useful information on conversion factors for basic units of measure and fundamental fuel characteristics. Unless otherwise referenced, material is drawn from the American Petroleum Institute Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry, February 2001.

Global warming potentials for various greenhouse gases are presented in Figure 6-3 of Chapter 6.

Table A2-1: Conversion Factors

Mass		
1 pound (lb)	= 453.6 grams (g)	= 0.4536 kilograms
1 kilogram	= 2.205 pounds (lb)	= 1000 grams (g)
1 short ton (ton)	= 2000 pounds (lb)	= 907.2 kilograms
1 metric tonne (tonne)	= 2205 pounds (lb) = 1.1025 tons	= 1000 kilograms
Volume		
1 cubic foot (ft^3)	= 7.4805 gallons	
1 cubic foot (ft^3)	= 28.32 liters (L)	= 0.02832 cubic meters (m^3)
1 gallon (gal)	= 3.785 liters (L)	
1 barrel (bbl)	= 42 gallons (gal)	= 158.99 liters (L)
Length		
1 inch (in)	= 2.540 centimeters	
1 foot (ft)	= 0.3048 meters (m)	
1 mile	= 1.609 kilometers	
Power		
1 horsepower (hp)	= 0.707 Btu/second	= 0.7457 kilowatts (10^3 W)
Energy		
1 horsepower-hour (hp-hr)	= 2545 Btu	= 0.7457 kilowatt-hour
1 kilowatt-hour	= 3412 Btu	= 3600 kilo-Joules (10^3 J)
1 megawatt (10^6 W)	= 1000 kilowatts (10^3 W)	
1 Btu	= 1055 Joules (J)	
1 million Btu (10^6 Btu)	= 293 kilowatt-hours	
Heating Value		
1 pound/million Btu ($lb/10^6$ Btu)	= 430 grams/giga-Joule ($g/10^9$ J)	
Pressure		
1 atmosphere (atm)	= 14.696 pounds per square inch (psia)	= 760 millimeters mercury (Hg)
1 atmosphere (atm)	= 101.325 kilo-Pascals (10^3 Pa)	
1 pound per square inch (psi)	= 51.71 millimeters mercury (Hg)	

Notes:

psig = Gauge pressure.

psia = Absolute pressure (note psia = psig + atmospheric pressure).

Table A2-2: Unit Prefixes

SI Units		US Designation	
Unit/Symbol	**Factor**	**Unit/Symbol**	**Factor**
peta (P)	10^{15}	quadrillion (Q)	10^{15}
tera (T)	10^{12}	trillion (T)	10^{12}
giga (G)	10^{9}	billion (B)	10^{9}
mega (M)	10^{6}	million (MM)	10^{6}
kilo (k)	10^{3}	thousand (k or M)	10^{3}
hecto (h)	10^{2}		
deka (da)	10^{1}		
deci (d)	10^{-1}		
centi (c)	10^{-2}		
milli (m)	10^{-3}		
micro (m)	10^{-6}		
nano (n)	10^{-9}		
pico (p)	10^{-12}		

Table A2-3: Power Output to Energy Input Conversions

Fuel/Service	Btu/hp-hr	Data Source
Large uncontrolled natural gas turbine	8,000	AP-42, Table 3.1-1
Large uncontrolled gas turbine firing fuel oil (distillate)		(10/96)
Natural gas prime mover: turbine	7,700	AP-42, Table 3.2-1
Natural gas prime mover: 2-cycle lean burn	7,800	(10/96)
Natural gas prime mover: 4-cycle lean burn	7,700	
Natural gas prime mover: 4-cycle rich burn	8,600	
Gasoline industrial engine	7,000	AP-42, Table 3.3-1
Diesel industrial engine		(10/96)
Large (>600 hp) Diesel Engine		
Dual (natural gas/diesel) engine		

Table A2-4: Conversion from Weight Percents to Mole Percents in Mixtures

$$\text{Mole\%}_i = \text{Wt\%}_i \times \frac{\text{MW}_{\text{Mixture}}}{\text{MW}_i}$$

$$\text{MW}_{\text{Mixture}} = \frac{1}{100} \times \sum_{i=1}^{\#\text{ compounds}} (\text{Mole\%}_i \times \text{MW}_i)$$

$$\text{MW}_{\text{Mixture}} = 100 \div \sum_{i=1}^{\#\text{ compounds}} \frac{\text{Wt\%}_i}{\text{MW}_i}$$

$\text{Mole\%}_i$ = individual weight percentage

$\text{MW}_{\text{Mixture}}$ = Molecular weight of the mixture

MW_i = individual molecular weights