

Appendix B

Units and Conversion Factors

Length

1 centimeter (cm)
= 0.3937 inches

1 inch (in)
= 2.540 centimeters

1 meter (m)
= 3.281 feet

1 foot (ft) = 12 inches
= 0.3048 meters

1 kilometer (km)
= 0.6214 miles

1 mile = 5280 feet
= 1.609 kilometers

Area

1 square centimeter (cm²)
= 0.1550 square inches

1 square inch (in²)
= 6.452 square centimeters

1 square meter (m²)
= 10.76 square feet

1 square foot (ft²)
= 0.09290 square meters

1 hectare (ha) = 10,000 square meters
= 2.471 acres

1 acre = 43,560 square feet
= 0.4047 hectares

1 square kilometer (km²) = 100 hectares
= 0.3861 square miles

1 square mile = 640 acres
= 2.590 square kilometers

Volume

1 cubic centimeter (cm³) = 1 milliliter (ml)
= 0.06102 cubic inches

1 cubic inch (in³)
= 16.39 cubic centimeters

1 liter (l) = 1,000 cubic centimeters
= 0.2642 gallons (liquid, U.S.)

1 gallon (liquid, U.S.) = 231.0 cubic inches
= 3.785 liters

1 cubic meter (m³) = 1,000 liters
= 35.31 cubic feet

1 cubic foot (ft³) = 7.481 gallons (liquid, U.S.)
= 0.02832 cubic meters

1 barrel (bbl) (oil, US) = 42 gallons (liquid, US)
= 159.0 liters

1 cord (U.S.) = 128.0 cubic feet
= 3.625 cubic meters

1 gram (g)
= 0.03527 ounces

1 kilogram (kg)
= 2.205 pounds

1 metric tonne (t) = 1,000 kilograms
= 1.1023 short tons (U.S.)

1 joule (J)
= 0.2388 calories (International Table)

1000 joules (J)
= 0.9479 Btu

1 kilowatthour (kWh) = 3.600 x 10⁶ joules
= 3,412 British thermal units

1 watt (W) = 1 joule per second
= 3.412 British thermal units per hour

1 kilowatt (kW)
= 0.9478 British thermal units per second
= 1.341 horsepower (imperial)

From Centigrade(°C) to Fahrenheit(°F):
 $(^{\circ}\text{C} \times 9/5) + 32 = ^{\circ}\text{F}$

Weight

1 ounce (oz)
= 28.35 grams

1 pound (lb) = 16 ounces
= 0.4536 kilograms

1 short ton (U.S.) = 2,000 pounds
= 0.9072 metric tonnes

Energy

1 calorie (International Table)
= 4.187 joules

1 British thermal unit (Btu) = 252.0 calories
= 1055 joules

1 quad = 1 x 10¹⁵ British thermal units
= 2.931 x 10¹¹ kilowatthours

Power

1 British thermal unit per hour (Btu/h)
= 0.2931 watts

1 British thermal unit per second (Btu/s)
= 1.055 kilowatts

1 horsepower (hp) (imperial) = 0.7068 British thermal units per second
= 0.7457 kilowatts

Temperature

From Fahrenheit(°F) to Centigrade(°C):
 $(^{\circ}\text{F} - 32) \times 5/9 = ^{\circ}\text{C}$

Prefixes in the International System of Units

Multiplier	Symbol	Prefix
10^{18}	E	exa
10^{15}	P	peta
10^{12}	T	tera
10^9	G	giga
10^6	M	mega
10^3	k	kilo
10^2	h	hecto
10^1	da	deca
10^{-1}	d	deci
10^{-2}	c	centi
10^{-3}	m	milli
10^{-6}	μ	micro
10^{-9}	n	nano

Approximate Carbon and Thermal Conversion Factors

Fuel	Density (kg/liter)	Carbon ^a (kg C/GJ)	Energy
Coal (bituminous)		24.4	20.5 MMBtu/ton 23.8MJ/kg
Oil (crude)	0.744	18.9	5.8 MMBtu/Bbl
Natural Gas	1000 cubic feet = 19.18 kg	13.6	1025 Btu/cf
Ethanol	0.792	17.8	26.8 MJ/kg
Wood	0.7-0.8	NA	18-20 MJ/kg

^a 1 kilogram of carbon is equivalent to 3.667 kgs. Of carbon dioxide measures at full molecular weight