

Unit Conversion Factors

Gas Constant:	R =	10.731573 ft ³ ·psia/°R·lb.mol 82.057338 (cm ³ ·atm)/(K·g.mol) 0.083144598 (L·bar)/(K·g.mol) 8.3144598 (m ³ ·Pa)/(K·g.mol) 1.9858746 Btu/(°R·lb.mol) 1.9858746 cal/(K·g.mol) 8.3144598 J/(K·g.mol)
Temperature:	0 F =	459.67 R
	0 C =	273.15 K
	1 K =	1.8 R
Pressure:	1 atm =	14.69594878 psia
	1 atm =	101.325 kPa
	1 atm =	1.01325 bar
	1 atm =	760 mmHg
	1 psi =	6.894757293 kPa
	1 bar =	100 kPa
	1 inH ₂ O =	0.036091191 psi
	1 mmHg =	0.019336775 psi
Gas Gravity:	M _{air} =	28.9586
Liquid Gravity:	1 SG =	8.33719 lb/gal
	1 SG =	62.3665 lb/ft ³
	1 SG =	0.999016 g/cm ³
	1 SG =	999.016 kg/m³
	1 SG =	0.999016 kg/L
Length:	1 in =	2.54 cm
	1 ft =	12 in
	1 ft =	30.48 cm
	1 ft =	0.3048 m
	1 m =	3.280839895 ft
Area:	1 in ² =	6.4516 cm ²
	1 ft ² =	144 in ²
	1 ft ² =	929.0304 cm ²
	1 ft ² =	0.09290304 m ²
	1 acre =	43560 ft²
	1 m ² =	10.76391042 ft ²

Mass:	1	lb =	453.59237 g
	1	lb =	0.45359237 kg
	1	lb	7000 gr
	1	kg =	2.204622622 lb
	1	ton =	2000 lb
	1	longton =	2240 lb
	1	tonne	2204.622622 lb
	1	lb =	7000 grain
Volume:	1	gal =	231 in3
	1	gal =	3.785411784 L
	1	gal =	0.003785412 m3
	1	bbl =	42 gal
	1	ft3 =	1728 in3
	1	ft3 =	28316.84659 cm3
	1	ft3 =	7.480519481 gal
	1	ft3 =	0.178107607 bbl
	1	ft3	0.028316847 m3
	1	m3 =	35.31466672 ft3
	1	m3 =	264.1720524 gal
	1	m3 =	6.28981077 bbl
Density:	1	g/cm3 =	62.42796058 lb/ft3
	1	lb/ft3 =	0.133680556 lb/gal
	1	lb/ft3 =	16.01846337 kg/m3
	1	lb/ft3 =	0.016018463 g/cm3
	1	kg/m3 =	0.062427961 lb/ft3
Energy:	1	Btu =	251.9958 cal
	1	Btu =	1055.0558526 J
	1	Btu =	778.1693 ft-lbf
	1	cal =	4.1868 J
	1	cal =	0.003968321 Btu
	1	J =	0.0009478171 Btu
Force:	1	lbf =	4.448221615 N
	1	lbf =	444822.1615 dyne
Power:	1	Hp =	550 ft-lbf/sec
	1	W =	1 J/sec
	1	kW =	1.34102209 Hp
	1	kW =	3412.141633 Btu/hr
	1	kcal/hr	3.968320719 Btu/hr

Viscosity:	1	P =	1 dyne-sec/cm²
	1	P =	100 cP
	1	P =	1.45038E-05 lbf-sec/in ²
	1	P =	0.067196898 lb/ft-sec
	1	cP =	1.45038E-07 lbf-sec/in ²
	1	cP =	0.000671969 lb/ft-sec

Other:	$g_c =$	9.80665 kg_m·m/(kg_f·sec²)
	=	32.17405 lb _m ·ft/(lb _f ·sec ²)

Ideal Gas Molar Volumes at Standardized Conditions

<u>Standard</u>	60	F	
	1	atm =>	379.4840 scf/lb.mol
ANSI Z132.1 Standard	60	F	
	14.7	psia =>	378.6067 ft ³ /lb.mol
Other	60	F	
	14.5	psia =>	384.5326 ft ³ /lb.mol
<u>Normal</u> (IUPAC, STP)	0	C	
	1	bar =>	0.0227109 Nm ³ /g.mol
<u>Normal</u> (IUPAC, SATP)	25	C	
	1	bar =>	0.0247896 Nm ³ /g.mol
<u>Normal</u> (NIST, NTP)	0	C	
	1	atm =>	0.0224140 Nm ³ /g.mol

Approximate Heating Values for Common Fuels (Liquid Volume Basis), Btu/gal

	LHV	HHV
Crude Oil	129,670	138,350
Conventional Gasoline	116,090	124,340
U.S. Conventional Diesel	128,450	137,380
Methanol	57,250	65,200
Ethanol	76,330	84,530
Butanol	99,837	108,458
Renewable Gasoline	115,983	124,230
Fischer-Tropsch diesel (FTD)	123,670	130,030

Atmospheric Air Composition - 13th ed. GPSA Databook

Mass Ratio N ₂ /O ₂ =	3.2629
Molar Ratio N ₂ /O ₂ =	3.7271

	Mol.Wt.	Mole Percent	Mass Percent
N ₂	28.01348	78.12	75.570
O ₂	31.9988	20.96	23.160
A	39.948	0.92	1.269
	28.95860	100	100.000
	28.9586		