



INFORMATION RESOURCES

- 422 Conversion Factors
- 426 Abbreviations/Units
- 427 Ordering & Shipping Information
- 429 Terms & Conditions of Sale
- 432 Index
- 441 Tech Talk Index
- 442 Tech Profiles

VOLUME CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
acre-feet	43,560	cu. feet
acre-feet	325,900	gallons
bushels	35.24	liters
bushels	4	pecks
bushels	32	quarts (dry)
cubic centimeters	3.53E-05	cu. feet
cubic centimeters	0.06102374	cu. inches
cubic centimeters	2.64E-04	gallon (US liq.)
cubic centimeters	0.002113	pint (US liq.)
cubic centimeters	0.001057	quart (US liq.)
cubic feet	28,320	cu. cm
cubic feet	1,728	cu. inches
cubic feet	0.02832	cu. meters
cubic feet	0.03703704	cu. yards
cubic feet	7.48052	gallons (US liq.)
cubic feet	28.32	liters
cubic feet	59.84	pints (US liq.)
cubic feet	29.92	quarts (US liq.)
cubic inches	16.39	cu. cm
cubic inches	0.0005787	cu. feet
cubic inches	1.64E-05	cu. meters
cubic inches	2.14E-05	cubic yards
cubic inches	0.004329	gallons
cubic inches	0.03463	pints (US liq.)
cubic inches	0.01732	quarts (US liq.)
cubic meters	35.31	cubic feet
cubic meters	61,023	cubic inches
cubic meters	1.307951	cubic yards
cubic meters	264.2	gallons (US liq.)
cubic meters	2,113	pints (US liq.)

MULTIPLY	BY	TO OBTAIN
cubic meters	1,057	quarts (US liq.)
cubic yards	46,656	cubic inches
cubic yards	0.7646	cubic meters
cubic yards	202	gallons (US liq.)
cubic yards	764.6	liters
cups	236.588	cubic cm
gallons	3,785.412	cubic cm
gallons	0.1337	cubic feet
gallons	231	cu. inches
gallons	0.004951	cu. yards
gallons	3.785	liters
gallons (liq. British imp.)	1.20095	gallons (US liq.)
gallons (US)	0.83267	gallons (imp.)
liters	0.03531	cu. feet
liters	61.02	cu. inches
liters	0.2642	gallons (US liq.)
liters	2.113	pints (US liq.)
liters	1.057	quarts (US liq.)
ounces (fluid)	1.805	cu. inches
ounces (fluid)	0.02957	liters
pecks (US)	0.25	bushels
pints (US dry)	0.5506105	liters
pints (US liquid)	0.4731765	liters
quarts (dry)	67.2	cu. inches
quarts (liquid)	0.03342	cu. feet
quarts (liquid)	57.75	cu. inches
quarts (liquid)	0.9463	liters
tablespoons (US)	14.79	milliliters
teaspoons (US)	4.93	milliliters

PROPERTIES OF WATER

DENSITY OF FRESH WATER		DENSITY OF SEA WATER		DENSITY OF ICE	
TEMPERATURE (°F)	LBS PER CUBIC FOOT	TEMPERATURE (°F)	LBS PER CUBIC FOOT	TEMPERATURE (°F)	LBS PER CUBIC FOOT
32	62.410	30	64.250	-50	57.670
40	62.418	40	64.200	-40	57.625
50	62.401	50	64.170	-30	57.600
60	62.358	60	64.100	-20	57.582
70	62.293	70	64.020	-10	57.541
80	62.208	80	63.950	0	57.105
90	62.105	90	63.800	10	57.490
100	61.986	100	63.700	20	57.455

COMPOSITION OF DRY AIR AT SEA LEVEL

COMPONENT	% BY VOLUME	% BY WEIGHT
Nitrogen	78.084	75.5
Oxygen	20.946	23.2
Argon	.934	1.33
Carbon Dioxide	.035	.049

Molecular weight: 28.975 lbs/mol

Specific volume at 70°F and 1 atm: 13.346 ft³/lb (.8333m³/kg)

Specific gravity (gas): 1.000

Density at 70°F and 1 atm: .07492 lb/ft³

LENGTH CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
angstroms	3.94E-06	inches
centimeters	0.03281	feet
centimeters	0.3937	inches
centimeters	393.7	mils
centimeters	0.01094	yards
fathoms	1.828804	meter
fathoms	6	feet
feet	30.48	centimeters
feet	0.0003048	kilometers
feet	0.3048	meters
feet	0.0001645	miles (naut.)
feet	0.0001894	miles (stat.)
feet	304.8	millimeters
feet	12,000	mils
furlongs	0.125	miles (US)
furlongs	660	feet
inches	2.54	centimeters
inches	0.08333333	feet
inches	0.0254	meters

MULTIPLY	BY	TO OBTAIN
inches	0.00001578	miles
inches	25.4	millimeters
inches	1,000	mils
inches	0.02777778	yards
kilometers	3280.84	feet
kilometers	3.94E+04	inches
kilometers	0.6214	miles
kilometers	1.00E+06	millimeters
kilometers	1,094	yards
leagues	3	miles (approx.)
meters	3.281	feet
meters	39.37	inches
meters	5.40E-04	miles (nautical)
meters	6.21E-04	miles (statute)
meters	1.094	yards
miles (nautical)	6080.27	feet
miles (nautical)	1.853	kilometers
miles (statute)	5280	feet
miles (statute)	6.34E+04	inches

MULTIPLY	BY	TO OBTAIN
miles (statute)	1.609	kilometers
miles (statute)	1,609	meters
miles (statute)	0.8684	miles (nautical)
miles (statute)	1,760	yards
millimeters	3.28E-03	feet
millimeters	0.03937	inches
millimeters	39.37	mils
mils	2.54E-03	centimeters
mils	0.001	inches
rods	5.029	meters
rods	16.5	feet
spans	9	inches
yards	91.44	centimeters
yards	9.14E-04	kilometers
yards	0.9144	meters
yards	4.93E-04	miles (nautical)
yards	5.68E-04	miles (statute)
yards	914.4	millimeters

VELOCITY CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
centimeters/sec	1.969	feet/min
centimeters/sec	0.03281	feet/sec
centimeters/sec	0.036	kilometers/hr
centimeters/sec	0.01943	knots
centimeters/sec	0.6	meters/min
centimeters/sec	0.02237	miles/hr
centimeters/sec	0.0003728	miles/min
feet/min	0.508	cm/sec
feet/min	0.01667	feet/sec
feet/min	0.3048	meters/min
feet/min	0.01136	miles/hr
feet/sec	30.48	cm/sec
feet/sec	1.097	km/hr
feet/sec	0.5921	knots
feet/sec	18.29	meters/min
feet/sec	0.6818	miles/hr
feet/sec	0.01136	miles/min
kilometers/hr	27.78	cm/sec

MULTIPLY	BY	TO OBTAIN
kilometers/hr	54.68	feet/min
kilometers/hr	0.9113	feet/sec
kilometers/hr	0.5396	knots
kilometers/hr	16.67	meters/min
kilometers/hr	0.6214	miles/hr
knots	6,080	feet/hr
knots	1.8532	kilometers/hr
knots	1	nautical miles/hr
knots	1.151	statute miles/hr
knots	2,027	yards/hr
meters/min	1.667	cm/sec
meters/min	3.281	feet/min
meters/min	0.05468	feet/sec
meters/min	0.06	km/hr
meters/min	0.03238	knots
meters/min	0.03728	miles/hr
meters/sec	196.8	feet/min

MULTIPLY	BY	TO OBTAIN
meters/sec	3.281	feet/sec
meters/sec	3.6	kilometers/hr
meters/sec	0.06	kilometers/min
meters/sec	2.237	miles/hr
meters/sec	0.03728	miles/min
miles/hr	44.7	cm/sec
miles/hr	88	feet/min
miles/hr	1.467	feet/sec
miles/hr	1.609	km/hr
miles/hr	0.02682	km/min
miles/hr	0.8684	knots
miles/hr	26.82	meters/min
miles/hr	0.01667	miles/min
miles/min	2682	cm/sec
miles/min	88	feet/sec
miles/min	1.609	km/min
miles/min	60	miles/hr

PRESSURE CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
atmospheres	0.007348	tons/sq.inch
atmospheres	76	cm of mercury
atmospheres	33.9	ft of water
atmospheres	29.92	in. of mercury
atmospheres	1.0333	kg/sq.cm
atmospheres	10,332	kg/sq.meter
atmospheres	14.7	lbs/sq. inch
atmospheres	1.058	tons/sq.ft.
bars	0.9869	atmospheres
bars	1,000,000	dynes/sq.cm
bars	10,200	kg/sq. meter
bars	2,089	lbs/sq.ft.
bars	14.5	lbs/sq.inch
centimeters of mercury	0.01316	atmospheres
centimeters of mercury	0.4461	feet of water
centimeters of mercury	136	kg/sq. meter
centimeters of mercury	27.85	lbs/sq.ft.
centimeters of mercury	0.1934	lbs/sq.inch

MULTIPLY	BY	TO OBTAIN
feet of water	0.0295	amospheres
feet of water	0.8826	in. of mercury
feet of water	0.03048	kg/sq. cm
feet of water	304.8	kg/sq.meter
feet of water	62.43	lbs/sq.ft.
feet of water	0.4335	lbs/sq.in
grams/sq. cm	2.0481	lbs/sq. ft.
inches of mercury	0.03342	atmospheres
inches of mercury	1.133	feet of water
inches of mercury	0.03453	kg/sq.cm
inches of mercury	345.3	kg/sq.meter
inches of mercury	70.73	lbs/sq.ft.
inches of mercury	0.4912	lbs/sq.in.
inches of water	0.002458	atmospheres
inches of water	0.07355	inches of mercury
inches of water	0.00254	kg/sq.cm
inches of water	0.5781	ounces/sq.in.
inches of water	5.204	lbs/sq.ft.

MULTIPLY	BY	TO OBTAIN
inches of water	0.03613	lbs/sq.in.
kilograms/sq. cm	0.9678	atmospheres
kilograms/sq. cm	32.81	feet of water
kilograms/sq. cm	28.96	inches of mercury
kilograms/sq. cm	2,048	lbs/sq.ft.
kilograms/sq. cm	14.22	lbs/sq.in.
kilograms/sq. meter	9.68E-05	atmospheres
kilograms/sq. meter	9.81E-05	bars
lbs/sq. ft.	4.73E-04	atmospheres
lbs/sq. ft.	0.01602	feet of water
lbs/sq. ft.	0.01414	inches of mercury
lbs/sq. ft.	4.882	kg/sq meter
lbs/sq. ft.	6.94E-03	lbs/sq.in.
lbs/sq. in.	0.06804	atmospheres
lbs/sq. in.	2.307	feet of water
lbs/sq. in.	2.036	inches of mercury
lbs/sq. in.	703.1	kg/sq.meter
tons (short)/sq.ft.	9765	kg/sq.meter

AREA CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
acres	0.4047	hectares
acres	43,560	sq. ft.
acres	4,047	sq. meters
acres	0.001562	sq. miles
hectares	2.471	acres
hectares	107,639	sq. ft.
square centimeters	1.08E-03	sq. ft.
square centimeters	0.155	sq. in.
square centimeters	0.0001	sq. in.
square feet	929	sq. cm
square feet	0.0929	sq. meters
square feet	0.1111	sq. yards
square inches	6.452	sq. cm
square inches	645.2	sq. millimeters

MULTIPLY	BY	TO OBTAIN
square kilometers	247.1	acres
square kilometers	1.08E+07	sq. ft.
square kilometers	1.00E+06	sq. meters
square kilometers	0.3861	sq. miles
square meters	10.76	sq. ft.
square meters	1,550	sq. in.
square meters	3.86E-07	sq. miles
square meters	1.196	sq. yards
square miles	640	acres
square miles	2.79E+07	sq. ft.
square miles	2.59	sq. km
square millimeters	1.55E-03	sq. in.
square yards	8,361	sq. cm
square yards	0.8361	sq. meters

PROPERTIES OF PURE OXYGEN

Molecular weight: 31.999 lbs/mol
 One gallon liquid oxygen = 115 ft³ gas
 One liter liquid oxygen = .86 m³ gas
 1 lb liquid oxygen = 12.1 ft³ (gas)
 1 lb liquid oxygen = 342 liters (gas)
 1 cu. ft = 28.3 liters

Gas Phase

Specific volume at 70°F and 1 atm: 12.08 ft³/lb (.7513 m³/kg)
 Density at 70°F and 1 atm: .0828 lb/ft³
 Specific gravity: 1.1

Liquid Phase

Specific volume: .105 gal/lb (.877 l/kg)
 Density: 9.52 lbs/gal (1.141 kg/l)

FLOWRATE CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
cubic feet/min	472	ml/sec
cubic feet/min	0.125	gallons/sec
cubic feet/min	28.31	liters/min
cubic feet/min	1.699	m ³ /hr
cubic feet/min	0.1247	gallons/sec
cubic feet/min	0.472	liters/sec
cubic feet/min	62.43	lbs of water/min
cubic feet/min	4.72E-04	m ³ /s
cubic feet/sec	0.646317	million gallons/day
cubic feet/sec	448.831	gallons/min
cubic feet/sec	0.0283168	m ³ /s
cubic meter/min	0.0166667	m ³ /s
cubic meters/day	264.172	gallons/day
cubic meters/day	0.0002642	million gallons/day
cubic meters/sec	35.3147	cu.ft./sec
cubic meters/sec	22.8245	million gallons/day
cubic meters/sec	15,850.3	gallons/min
gallons/day	4.38E-08	m ³ /s
gallons/hr	63.1	ml/min
gallons/hr	0.134	cu.ft./hr
gallons/min	0.002228	cu.ft./sec
gallons/min	0.06308	liters/sec
gallons/min	8.0208	cu.ft./hr
gallons/min	0.227	m ³ /hr
gallons/min	3.785	liters/min
gallons/min	6.31E-05	m ³ /s
liters/hour	2.78E-07	m ³ /s
liters/min	1.67E-05	m ³ /s
liters/min	5.89E-04	cu.ft./sec
liters/min	4.40E-03	gallons/sec
liters/sec	22,824.5	gallons/day
liters/sec	0.0228	million gallons/day
million gallons/day	1.54723	cu.ft./sec
million gallons/day	694.4	gallons/min
oz/min	29.57	ml/min

MASS CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
grams	5	carat
grams	15.43	grains
grams	0.03527396	ounces (avoirdupois)
grams	0.03215075	ounces (troy)
grams	0.00220462	pounds
kilograms	2.205	pounds
kilograms	9.84E-04	tons (long)
kilograms	1.10E-03	tons (short)
milligrams	0.01543236	grains
ounces	437.5	grains
ounces	28.349523	grams
ounces	0.0625	pounds
ounces	0.9115	ounces (troy)
ounces	2.79E-05	tons (long)
ounces	2.84E-05	tons (metric)
pounds	7,000	grains
pounds	453.5924	grams
pounds	0.4536	kilograms
pounds	16	ounces
pounds	14.5833	ounces (troy)
pounds	32.17	poundals
pounds	1.21528	pounds (troy)
pounds	0.0005	tons (short)
pounds (troy)	373.24177	grams
tons (long)	1,016	kilograms
tons (long)	2,240	pounds
tons (long)	1.12	tons (short)
tons (metric)	2,205	pounds
tons (short)	907.1848	kilograms
tons (short)	32,000	ounces
tons (short)	2,000	pounds
tons (short)	0.89287	tons (long)
tons (short)	0.90718	tons (metric)

SATURATED VAPOR PRESSURE OF FRESH WATER

TEMPERATURE (°F)	LBS PER SQUARE INCH	TEMPERATURE (°F)	LBS PER SQUARE INCH
32	.089	70	.363
40	.122	80	.507
50	.178	90	.698
60	.256	100	.950

DENSITY OF AIR (1 ATM)

TEMPERATURE (°F)	LBS PER CUBIC FOOT	TEMPERATURE (°F)	LBS PER CUBIC FOOT
-10	.088	50	.078
0	.086	60	.076
10	.085	70	.075
20	.083	80	.074
30	.081	90	.072
40	.079	100	.071

A	ampere(s)	G.L.A.	gamma-linolenic acid	oz	ounce(s)
ABS	acrylonitrile-butadiene-styrene copolymer	GLP	good laboratory practice	oz t	troy ounce(s)
Abs	absorbance	gn	grain(s)	PAES	Pentair Aquatic Eco-Systems, Inc.
AES	[Pentair] Aquatic Eco-Systems, Inc.	gpd	gallon(s) per day	PB	polybutylene
AES/B	Aeration Efficiency Standard	gpm	gallon(s) per minute	pc(s)	piece(s)
AES/B ampl(s)	absolute efficiency standard for biofilters	H	height or high	PC	power compact
ANSI	American National Standards Institute	HCFC	hydrochlorofluorocarbon	PE	polyethylene
ARA	arachidonic acid	HCl	hydrochloric acid	pH	potenz (power) H (hydrogen)
ASD	average strand diameter	HDPE	high-density polyethylene	pk(s)	pack(s)
ATC	automatic temperature compensation	HID	high intensity discharge	pkg(s)	package(s)
atm	atmosphere(s)	hp	horsepower	PL stage	post-larval stage
AWG	American wire gauge	HO	high output	P/No.	part number
BNC	bayonet Neill-Concelman	H₂O	water	PP	polypropylene
BOD	biochemical oxygen demand	HPS	high-pressure sodium	ppb	part(s) per billion
BOD₅	five-day biochemical oxygen demand	HQI	mercury-quartz-iodide	ppm	part(s) per million
BP	barometric pressure	hr(s)	hour(s)	ppt	part(s) per thousand
BTU	British thermal unit	H₂S	hydrogen sulfide	psi	pound(s) per square inch
CaCO₃	calcium carbonate	HUFA	highly unsaturated fatty acids	pt	pint(s)
cc	cubic centimeter	Hz	hertz = cycles per second	PVC	polyvinyl chloride
CCD	charge-coupled device	I/C	industrial/commercial	PVDF	polyvinylidene fluoride
CD	corona discharge	I.D.	inside diameter	qt	quart(s)
CE	meets European safety standards	in	inch(es)	R&D	research and development
cfh	cubic foot (feet) per hour	in²	square inch(es)	RBC	rotating biological contactor
cfm	cubic foot (feet) per minute	in³	cubic inch(es)	Repl	replacement
cm	centimeter(s)	I/O	input/output	RH	relative humidity
CNS	Chinese national standards	ISE	ion selective electrode	R/O	reverse osmosis
CO₂	carbon dioxide	K	degrees Kelvin	rpm	revolution(s) per minute
COD	chemical oxygen demand	kcal	kilocalorie(s)	SAE	standard aeration efficiency or Society of Automotive Engineers
conc.	concentration	KCl	potassium chloride	SAN	styrene-acrylonitrile copolymer
CPVC	chlorinated polyvinyl chloride	kg	kilogram(s)	scfh	standard cubic foot (feet) per hour
Cs	case(s)	KH	carbonate hardness	scfm	standard cubic foot (feet) per minute
CSA	Canadian Standards Association	kPa	kilopascal(s)	sec	second(s)
ct	carat(s)	kW	kilowatt(s)	sq.ft.	square foot (feet)
cu.ft.	cubic foot (feet)	kWh	kilowatt-hour(s)	sq.in.	square inch(es)
cu.in.	cubic inch(es)	L	liter(s) or length	SG	specific gravity = density
cu.yd.	cubic yard(s)	L.A.	linolenic acid	SOD	sediment oxygen demand
D	diameter	lb(s)	pound(s)	SPDT	single pole, double throw
dB	decibel(s)	LCD	liquid crystal display	Spig	spigot
DHA	docosahexanoic acid	LDPE	low-density polyethylene	SS	stainless steel
Dia	diameter	LED	light-emitting diode	STP	standard temp and pressure
DI	deionized or deionization	Lpm	liter(s) per minute	TAB	total aerobic bacteria
DIN	Deutsche Industrie Normen	LSB	low-space bioreactor	TAN	total ammonia-nitrogen
DIY	do-it-yourself	lux	lumen(s) per square meter	TCBS	thiosulfate citrate bile sucrose
dKH	degree(s) of carbonate hardness	m	meter(s)	TDH	total dynamic head
DLS	double layer spiral	m²	square meter(s)	TDS	total dissolved solids
D.O.	dissolved oxygen	m³h	cubic meter(s) per hour	TEFC	totally enclosed, fan-cooled
DOT	Department of Transportation	mA	milliamper(e)s	Temp	temperature
dP	differential total dissolved gas pressure	Max	maximum	TGP	total dissolved gas pressure
D:S ratio	distance to size ratio	MDM	membrane diffusion method	TSA	tryptone soy agar
dwt	pennyweight	meq	milliequivalent(s)	tsp	teaspoon
DWV	drain-waste-vent	mg	milligram(s)	TSV	Taura syndrome virus
EC	electrical conductivity	MGHT	male garden hose thread	TXV	thermostatic expansion valve
EDTA	ethylenediaminetetraacetic acid	MH	metal halide	UL	Underwriters Laboratories, Inc.
EGB	expanded granular biofilter	milliamp(s)	milliamper(e)s	USB	universal serial bus
EMC	electromagnetic compatibility	min	minute(s) or minimum	UV	ultraviolet
EPA	ecosapentanoic acid or Environmental Protection Agency	mL	milliliter(s)	V	volt(s)
EPDM	ethylene propylene diene monomer	mm	millimeter(s)	VA	volt-amp(s)
EVA	ethylene-vinyl-acetate copolymer	mmHg	millimeter(s) of mercury	VAC	volt(s), alternating current
fc	foot-candles	MNPT	male national pipe thread	VCO	voltage controlled oscillator
FDA	Food and Drug Administration	mol	mole(s)	VDC	volt(s), direct current
FGHT	female garden hose thread	mps	meter(s) per second	VHO	very high output
FIPT	female inside pipe thread	MPT	male pipe taper	VOC	volatile organic compound
FLA	full load amperage	N	newton(s)	W	width or watt(s)
fl.oz.	fluid ounce(s)	NA	numerical aperture	WP	wound polypropylene
FNPT	female national pipe thread	N.C.	normally closed	WSSV	white spot syndrome virus
FOB	free on board (shipping origin)	NEMA	National Electrical Manufacturers Association	Wt	weight
FOV	field of view	NFT	nutrient film technique	yd(s)	yard(s)
fps	foot (feet) per second	NiCad	nickel cadmium	YHV	yellow head virus
FPT	female pipe taper	nm	nanometer(s)	°C	degrees Celsius/Centigrade
FRP	fiberglass reinforced plastic	No.	number	°F	degrees Fahrenheit
ft	foot (feet)	N.O.	normally open	"	inch(es)
ft²	square foot (feet)	NPSH	net positive suction head	μ	micron(s)
ft³	cubic foot (feet)	NPT	national pipe thread	μS	microsiemens(s)
g	gram(s)	NSF	National Science Foundation	μWs	microwatt-second(s)
gal	gallon(s)	NST	national standard thread	Ω	ohm(s)
GFCI	ground fault circuit interrupter = GFI	NTU	nephelometric turbidity unit(s)	ø	phase(s)
GH	general hardness	OAL	overall length	π	
g/hr	gram(s) per hour	O.D.	outside diameter		
		ODP	open dripproof		
		ORP	oxidation/reduction potential		