MULTIPLY	BY	TO OBTAIN
Acres	160	Square rods
	4840	Square yards
	43.560	Square feet
Acres Inches	27,154	Gallons
Acres Inch/Hour	452	GPM
Atmospheres (Std.)		
760 MM of Mercury at 32°F	14.696	Pounds/square inch
	76.0	Cms. of mercury
	29.92	Inches of mercury
	33.90	Feet of water
	1.0333	Kgs./square cm.
	14.70	Lbs./square inch
	1.058	Tons/square foot
Barrels-Oil	42	Gallons-Oil
Barrels (Beer)	31.5	Gallons
(Wine)	31.0	Gallons
BTU (British Therm. Units)	0.2520	Kilogram-calories
	777.5	Foot-pounds
	3.927×10^{-4}	Horsepower-hours
	107.5	Kilogram-meters
	2.928×10^{-4}	Kilowatt-hours
BTU/Minute	12.96	Foot-pounds/second
	0.02356	Horsepower
	0.01757	Kilowatts
	17.57	Watts
Centares (Centiares)	1	Square Meters
Centigrams	0.01	Grams
Centiliters	0.01	Liters
Centimeters	0.3937	Inches
	0.03280	Feet
	0.01	Meters
	10	Millimeters
Centimeters of Mercury	0.01316	Atmospheres
	0.4461	Feet of water
	136.0	Kgs./square meter
	27.85	Lbs./square foot
	0.1934	Lbs./square inch
Centimeters/Second	1.969	Feet/minute
	0.03281	Feet/second
	0.036	Kilometers/hour
	0.6	Meters/minute
	0.02237	Miles/hour
	3.728×10^{-4}	Miles/minute
Centimeters/Sec./Sec.	0.03281	Feet/second/second
Cubic Centimeters	3.531×10^{-5}	Cubic feet
	6.102×10^{-2}	Cubic inches

MULTIPLY	BY	TO OBTAIN
Cubic Centimeters cont.	10^{-6}	Cubic meters
	1.308×10^{-6}	Cubic yards
	2.642×10^{-4}	Gallons
	10^{-3}	Liters
	2.113×10^{-3}	Pints (liquid)
	1.057×10^{-3}	Quarts (liquid)
Cubic Feet	2.832×10^{4}	Cubic centimeters
	1728	Cubic inches
	0.02832	Cubic meters
	0.03704	Cubic yards
	7.48052	U.S. Gallons
	6.23	Imperial Gallons
	28.32	Liters
	59.84	Pints (liquid)
	29.92	Quarts (liquid)
Cubic Feet/Minute	472.0	Cubic cms./second
	0.1247	Gallons/second
	0.4720	Liters/second
	62.43	Lbs. of water/minute
Cubic Feet/Second	0.646317	Million gallons/day
	448.831	Gallons/minute
Cubic Foot Water	62.4	Pounds
	998.8	Ounces
	28.315	Kilograms
Cubic Inches	16.39	Cubic centimeters
	5.787×10^{-4}	Cubic feet
	1.639×10^{-5}	Cubic meters
	2.143×10^{-5}	Cubic yards
	4.329×10^{-3}	Gallons
	1.639×10^{-2}	Liters
	0.03463	Pints (liquid)
	0.01732	Quarts (liquid)
Cubic Meters	10^{6}	Cubic centimeters
	35.31	Cubic feet
	61,023	Cubic inches
	1.308	Cubic yards
	264.2	U.S. Gallons
	10^{3}	Liters
	220	Imperial Gallons
	2113	Pints (liquid)
	1057	Quarts (liquid)
Cubic Yards	7.646×10^{5}	Cubic centimeters
	27	Cubic feet
	46,656	Cubic inches
	0.7646	Cubic meters
	202.0	Gallons
	764.6	Liters
	1616	Pints (liquid)
	807.9	Quarts (liquid)

MULTIPLY	BY	TO OBTAIN
Cubic Yards/Minute	0.45	Cubic feet/second
	3.367	Gallons/second
	12.74	Liters/second
Decigrams	0.1	Grams
Deciliters	0.1	Liters
Decimeters	0.1	Meters
Degrees (Angle)	60	Minutes
	0.01745	Radians
	3600	Seconds
Degrees/Second	0.01745	Radians/second
	0.1667	Revolutions/minute
	0.002778	Revolutions/second
Dekagrams	10	Grams
Dekaliters	10	Liters
Dekameters	10	Meters
Drams	27.34375	Grains
	0.0625	Ounces
	1.771845	Grams
Fathoms	6	Feet
Feet	30.48	Centimeters
	12	Inches
	0.3048	Meters
	3	Yards
Feet of Water	0.02950	Atmospheres
	0.8826	Inches of mercury
	0.03048	Kgs./sq. centimeter
	62.43	Pounds/square feet
	0.4335	Pounds/square inch
Feet/Minute	0.5080	Centimeters/second
	0.01667	Feet/second
	0.01829	Kilometers/hour
	0.3048	Meters/minute
	0.01136	Miles/hour
Feet/Second/Second	30.48	Centimeters/sec./sec.
	0.3048	Meters/sec./sec.
Foot-Pounds	1.286×10^{-3}	BTUs
	5.050×10^{-7}	Horsepower-hours
	3.241×10^{-4}	Kilograms-calories
	0.1383	Kilogram-meters
	3.766×10^{-7}	Kilowatt-hours
Foot-Pounds/Minute	1.286×10^{-3}	BTU/min.
	0.01667	Foot-pounds/sec.
	3.030×10^{-5}	Horsepower
	3.241×10^{-4}	Kg.-calories/minute
	2.260×10^{-5}	Kilowatts

MULTIPLY	BY	TO OBTAIN
Foot-Pounds/Second	7.717×10^{-2}	BTU/minute
	1.818×10^{-3}	Horsepower
	1.945×10^{-2}	Kg.-calories/minute
	1.356×10^{-3}	Kilowatts
Gallons, U.S.	3785	Cubic centimeters
	0.1337	Cubic feet
	231	Cubic inches
	3.785×10^{-3}	Cubic meters
	4.951×10^{-3}	Cubic yards
	128	Fluid ounces
	3.785	Liters
	8	Pints (liquid)
	4	Quarts (liquid)
	0.83267	Imperial gallons
Gallons, Imperial	1.20095	U.S. Gallons
	277.3	Cubic inches
	0.16	Cubic feet
	4.546	Liters
	0.00454	Cubic meters
Gallons Water (U.S.)	8.3453	Pounds of water
	3.785	Kilograms
Gallons Water (Imperial)	10.02	Pounds
	4.54	Kilograms
Gallons/Minute	2.228×10^{-3}	Cubic feet/second
	0.06308	Liters/second
	8.0208	Cubic feet/hour
Gallons Water/Minute	6.0086	Tons water/24 hours
Grains (Troy)	1	Grains (avoirdupois)
	0.06480	Grams
	0.04167	Pennyweights(troy)
	2.0833×10^{-3}	Ounces (troy)
Grains/U.S. Gallons	17.118	Parts/million
	142.86	Lbs./million gallons
Grains/Imperial Gallons	14.286	Parts/million
Grams	980.7	Dynes
	15.43	Grains
	.001	Kilograms
	1000	Milligrams
	0.03527	Ounces
	0.03215	Ounces (troy)
	2.205×10^{-3}	Pounds
Grams/Centimeters	5.600×10^{-3}	Pounds/inch
Grams/Cubic Centimeters	62.43	Pounds/cubic foot
	0.03613	Pounds/cubic inch
Grams/Liters	58.417	Grains/gallon
	8.345	Lbs./1000 gallons
	0.062427	Pounds/cubic foot
	1000	Parts/million

MULTIPLY	BY	TO OBTAIN
Hectograms	100	Grams
Hectoliters	100	Liters
Hectometers	100	Meters
Hectowatts	100	Watts
Horsepower	42.44	BTU/min.
	33,000	Foot-lbs./minute
	550	Foot-lbs./second
	1.014	Horsepower(metric)
	10.70	Kg.-calories/minute
	0.7457	Kilowatts
	745.7	Watts
Horsepower (Boiler)	33,479	BTU/hour
	9.803	Kilowatts
Horsepower-Hours	2547	BTU
	1.98×10^{6}	Foot-pounds
	641.7	Kilogram-calories
	2.737×10^{5}	Kilogram-meters
	0.7457	Kilowatt-hours
Inches	2.540	Centimeters
	25.4	Millimeters
	.0254	Meters
	.0833	Foot
Inches of Mercury	0.03342	Atmospheres
	1.133	Feet of water
	0.03453	Kgs./square cm.
	70.73	Lbs./square feet
	0.4912	Lbs./square inch
Inches of Water	0.002458	Atmospheres
	0.07355	Inches of mercury
	0.002540	Kgs./square cm.
	0.5781	Ounces/square inch
	5.202	Lbs./square foot
	0.03613	Lbs./square inch
Kilograms	980,665	Dynes
	2.205	Pounds
	1.102×10^{-3}	Tons (short)
	10^{3}	Grams
Kilograms/Meters	0.6720	Pounds/foot
Kilograms/Sq. Centimeters	0.9678	Atmospheres
	32.81	Feet of water
	28.96	Inches of mercury
	2048	Lbs./square foot
	14.22	Lbs./square inch
Kilograms/Sq. Millimeters	10^{6}	Kgs./square meter
Kiloliters	10^{3}	Liters
Kilometers	10^{5}	Centimeters

MULTIPLY	BY	TO OBTAIN
Kilometers cont.	3281	Feet
	10^3	Meters
	0.6214	Miles
	1094	Yards
Kilometers/Hour	27.78	Cms./second
	54.68	Feet/minute
	0.9113	Feet/second
	0.5396	Knots
	16.67	Meters/minute
	0.6214	Miles/hour
Kilometers/Hour/Second	27.78	Cms./sec./sec.
	0.9113	Feet/sec./sec.
	0.2778	Meters/sec./sec.
Kilopascals	20.885434	Lbs./square foot
	.145038	Lbs./square inch
	.296134	Ins. of mercury @ 60°F
	4.018647	Ins. of water @ 60°F
Kilowatts	56.92	BTU/minute
	4.425×10^4	Foot-lbs./minute
	737.6	Foot-lbs./second
	1.341	Horsepower
	14.34	Kg.-calories/minute
	10^3	Watts
Kilowatts-Hour	3415	BTU
	2.655×10^8	Foot-pounds
	1.341	Horsepower-hour
	860.5	Kilogram-calories
	3.671×10^5	Kilogram-meters
Liters	10^3	Cubic centimeters
	0.03531	Cubic feet
	61.02	Cubic inches
	10^{-2}	Cubic meters
	1.308×10^{-3}	Cubic yards
	0.2642	Gallons
	2.113	Pints (liquid)
	1.057	Quarts (liquid)
Liters/Minute	5.886×10^{-4}	Cubic/feet/second
	4.403×10^{-3}	Gallons/second
Lumber Width (Inch) x Thickness (Inch) / 12	Length (feet)	Board feet
Meters	100	Centimeters
	3.281	Feet
	39.37	Inches
	10^{-3}	Kilometers
	10^3	Millimeters
	1.094	Yards
Meters/Minute	1.667	Centimeters/second

MULTIPLY	BY	TO OBTAIN
Meters/Minute cont.	3.281	Feet/minute
	0.05468	Feet/second
	0.06	Kilometers/hour
	0.03728	Miles/hour
Meters/Second	196.8	Feet/minute
	3.281	Feet/second
	3.6	Kilometers/hour
	0.06	Kilometers/minute
	2.237	Miles/hour
	0.03728	Miles/minute
Metric Tons	2204.6	Pounds
	1.1023	Short tons
Microns	10^{-6}	Meters
Miles	1.609×10^5	Centimeters
	5280	Feet
	1.609	Kilometers
	1760	Yards
Miles/Hour	44.70	Centimeters/second
	88	Feet/minute
	1.467	Feet/second
	1.609	Kilometers/hour
	0.8684	Knots
	26.82	Meters/minute
Miles/Minute	2682	Centimeters/seoond
	88	Feet/second
	1.609	Kilometers/minute
	60	Miles/hour
Milliers	10^3	Kilograms
Milligrams	10^{-3}	Grams
Milliliters	10^{-3}	Liters
Millimeters	0.1	Centimeters
	0.03937	Inches
Milligrams/Liter	1	Parts/million
Million Gallons/Day	1.54723	Cubic feet/second
Minutes (Angle)	2.909×10^{-4}	Radians
Ounces	16	Drams
	137.5	Grains
	0.0625	Pounds
	28.349527	Grams
	0.9115	Ounces (troy)
	2.790×10^{-5}	Tons (long)
	2.835×10^{-5}	Tons (metric)
Ounces, Troy	480	Grains
	20	Pennyweights (troy)
	0.08333	Pounds (troy)
	31.103481	Grams

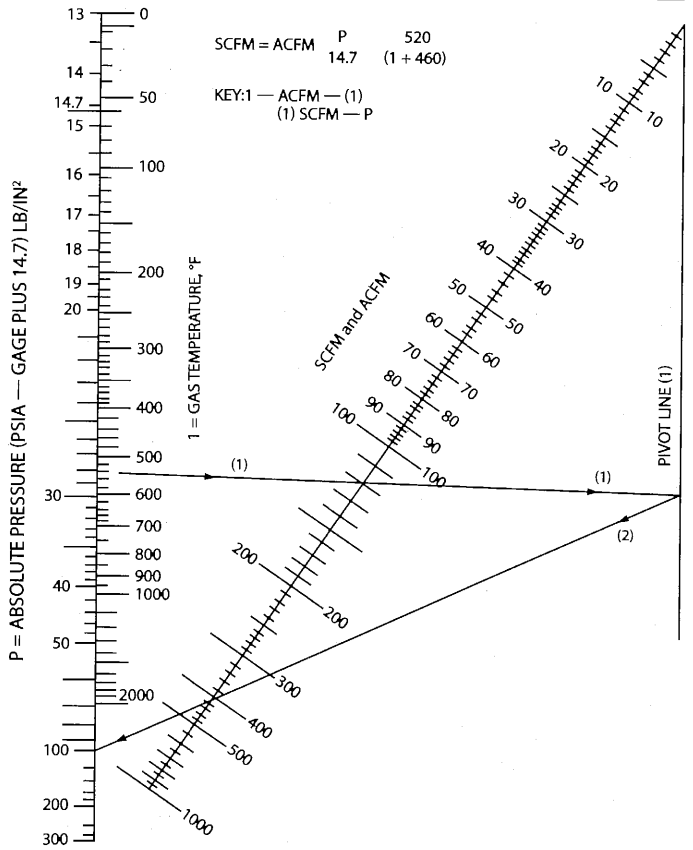
MULTIPLY	BY	TO OBTAIN
Ounces, Troy cont.	1.09714	Ounces, (avoirdupois)
Ounces (Fluid)	1.805	Cubic inches
	0.02957	Liters
Ounces/Square Inch	0.0625	Pounds/square inch
Parts/Million	0.0584	Grains/U.S. gallon
	0.07016	Grains/Imp. gallon
	8.345	Pounds/million gallon
Pennyweights (Troy)	24	Grains
	1.55517	Grams
	0.05	Ounces (troy)
	4.1667×10^{-3}	Pounds (troy)
Pints	0.4732	Liter
Pounds (Avoirdupois)	16	Ounces
	256	Drams
	7000	Grains
	0.0005	Tons (short)
	453.5924	Grams
	1.21528	Pounds (troy)
	14.5833	Ounces (troy)
	0.454	Kilograms
Pounds (Troy)	5760	Grains
	240	Pennyweights (troy)
	12	Ounces (troy)
	373.24177	Grams
	0.822857	Pounds (avoir.)
	13.1657	Ounces (avoir.)
	3.6735×10^{-4}	Tons (long)
	4.1143×10^{-4}	Tons (short)
	3.7324×10^{-4}	Tons (metric)
Pounds of Water	0.01602	Cubic feet
	27.68	Cubic inches
	0.1198	Gallons
	0.10	Imperial gallons
Pounds of Water/Minute	2.670×10^{-4}	Cubic feet/second
Pounds/Cubic Foot	0.01602	Grams/cubic cm.
	16.02	Kgs./cubic meter
	5.787×10^{-4}	Lbs./cubic inch
Pounds/Cubic Inch	27.68	Grams/cubic cm.
	2.768×10^{4}	Kgs./cubic meter
	1728	Lbs./cubic foot
Pounds/Foot	1.488	Kgs./meter
	178.6	Grams/centimeter
Pounds/Square Foot	6.945×10^{-3}	Pounds/square inch
	.014139	Ins.of mercury @ 32°F
	0.01602	Ft.of water @ 39.1°F
	.04788	Kilopascals
	4.883×10^{-4}	Kgs./sq. centimeter

MULTIPLY	BY	TO OBTAIN
Pounds/Square Inch	0.06804	Atmospheres
	144	Pounds/square foot
	2.036	Ins. of mercury @ 62°F
	2..307	Feet of water @ 62°F
	6.894757	Kilopascals
	0.07031	Kgs./sq. centimeter
Quarts (Dry)	67.20	Cubic inches
Quarts (Liquid)	57.75	Cubic inches
Qunital	101.28 (Argentine)	Pounds
	129.54 (Brazil)	Pounds
	101.43 (Castile, Peru)	Pounds
	101.41 (Chile)	Pounds
	101.47 (Mexico)	Pounds
	220.46 (Metric)	Pounds
$\frac{1}{\text{Sq. Ft./ Gal./Min.}}$	8.0208	Overflow rate (ft./hr.)
Temperature		
°C + 273	1	Absolute °C
°C + 17.78	1.8	°F
°F + 460	1	Absolute °F
°F - 32	$^5/_9$	°C
Tons (Long)	1016	Kilograms
	2240	Pounds
	1.12	Tons (short)
Tons (Metric)	10^3	Kilograms
	2205	Pounds
Tons (Short)	2000	Pounds
	32000	Ounces
	907.18486	Kilograms
	2430.56	Pounds (troy)
	0.89287	Tons (long)
	29166.66	Ounces (troy)
	0.90718	Tons (metric)
Tons of Water/24 Hours	83.333	Pounds water/hour
	0.16643	Gallons/minute
	1.3349	Cubic feet/hour
Watts	0.05692	BTU/minute
	44.26	Foot-pounds/minute
	.7376	Foot-pounds/second
	1.341×10^{-3}	Horsepower
	0.01434	Kg.-calories//minute
	10^{-3}	Kilowatts
Watt-Hours	3.415	BTU
	2655	Foot pounds
	1.341×10^{-3}	Horsepower/hours
	0.8605	Kilogram-calories
	367.1	Kilogram-meters
	10^{-3}	Kilowatt-hours

NOTE: The numbers in boldface refer to the temperature in degrees, either Centigrade or Fahrenheit, which it is desired to convert into the other scale. If converting from Fahrenheit to Centigrade degrees, the equivalent temperature will be found in the left column while if converting from degrees Centigrade to degrees Fahrenheit, the answer will be found in the column on the right.

Centigrade		Fahrenheit	Centrigrade		Fahrenheit
—73.3	**—100**	—148.0	2.8	**37**	98.6
—67.8	**—90**	—130.0	3.3	**38**	100.4
—62.2	**—80**	—112.0	3.9	**39**	102.2
—59.4	**—75**	—103.0	4.4	**40**	104.0
—56.7	**—70**	—94.4	5.0	**41**	105.8
—53.9	**—65**	—85.0	5.6	**42**	107.6
—51.1	**—60**	—76.0	6.1	**43**	109.4
—48.3	**—55**	—67.0	6.7	**44**	111.2
—45.6	**—50**	—58.0	7.2	**45**	113.0
—42.8	**—45**	—49.0	7.8	**46**	114.8
—40.0	**—40**	—40.0	8.3	**47**	116.6
—37.2	**—35**	—31.0	8.9	**48**	118.4
—34.4	**—30**	—22.0	9.4	**49**	120.2
—31.7	**—25**	—13.0	10.0	**50**	122.0
—28.9	**—20**	—4.0	10.6	**51**	123.8
—26.1	**—15**	5.0	11.1	**52**	125.6
—23.3	**—10**	14.0	11.7	**53**	127.4
—20.6	**—5**	23.0	12.2	**54**	129.2
—17.8	**0**	32.0	12.8	**55**	131.0
—17.2	**1**	33.8	13.3	**56**	132.8
—16.7	**2**	35.6	13.9	**57**	134.6
—16.1	**3**	37.4	14.4	**58**	136.4
—15.6	**4**	39.2	15.0	**59**	138.2
—15.0	**5**	41.0	15.6	**60**	140.0
—14.4	**6**	42.8	16.1	**61**	141.8
—13.9	**7**	44.6	16.7	**62**	143.6
—13.3	**8**	46.4	17.2	**63**	145.4
—12.8	**9**	48.2	17.8	**64**	147.2
—12.2	**10**	50.0	18.3	**65**	149.0
—11.7	**11**	51.8	18.9	**66**	150.8
—11.1	**12**	53.6	19.4	**67**	152.6
—10.6	**13**	55.4	20.0	**68**	154.4
—10.0	**14**	57.2	20.6	**69**	156.2
—9.4	**15**	59.0	21.1	**70**	158.0
—8.9	**16**	60.8	21.7	**71**	159.8
—8.3	**17**	62.6	22.2	**72**	161.6
—7.8	**18**	64.4	22.8	**73**	163.4
—7.2	**19**	66.2	23.3	**74**	165.2
—6.7	**20**	68.0	23.9	**75**	167.0
—6.1	**21**	69.8	24.4	**76**	168.8
—5.6	**22**	71.6	25.0	**77**	170.6
—5.0	**23**	73.4	25.6	**78**	172.4
—4.4	**24**	75.2	26.1	**79**	174.2
—3.9	**25**	77.0	26.7	**80**	176.0
—3.3	**26**	78.8	27.2	**81**	177.8
—2.8	**27**	80.6	27.8	**82**	179.6
—2.2	**28**	82.4	28.3	**83**	181.4
—1.7	**29**	84.2	28.9	**84**	183.2
—1.1	**30**	86.0	29.4	**85**	185.0
—0.6	**31**	87.8	30.0	**86**	186.8
0.0	**32**	89.6	30.6	**87**	188.6
0.6	**33**	91.4	31.1	**88**	190.4
1.1	**34**	93.2	31.7	**89**	192.2
1.7	**35**	95.0	32.2	**90**	194.0
2.2	**36**	96.8	32.8	**91**	195.8

Centigrade		Fahrenheit	Centrigrade		Fahrenheit
33.3	**92**	197.6	293	**560**	1040
33.9	**93**	199.4	299	**570**	1058
34.4	**94**	201.2	304	**580**	1076
35.0	**95**	203.0	310	**590**	1094
35.6	**96**	204.8	316	**600**	1112
36.1	**97**	206.6	321	**610**	1130
36.7	**98**	208.4	327	**620**	1148
37.2	**99**	210.2	332	**630**	1166
37.8	**100**	212.0	338	**640**	1184
43	**110**	230	343	**650**	1202
49	**120**	248	349	**660**	1220
54	**130**	266	354	**670**	1238
60	**140**	284	360	**680**	1256
66	**150**	302	366	**690**	1274
71	**160**	320	371	**700**	1292
77	**170**	338	377	**710**	1310
82	**180**	356	382	**720**	1328
88	**190**	374	388	**730**	1346
93	**200**	392	393	**740**	1364
99	**210**	410	399	**750**	1382
100	**212**	414	404	**760**	1400
104	**220**	428	410	**770**	1418
110	**230**	446	416	**780**	1436
116	**240**	464	421	**790**	1454
121	**250**	482	427	**800**	1472
127	**260**	500	432	**810**	1490
132	**270**	518	438	**820**	1508
138	**280**	536	443	**830**	1526
143	**290**	554	449	**840**	1544
149	**300**	572	454	**850**	1562
154	**310**	590	460	**860**	1580
160	**320**	608	466	**870**	1598
166	**330**	626	471	**880**	1616
171	**340**	644	477	**890**	1634
177	**350**	622	482	**900**	1652
182	**360**	680	488	**910**	1670
188	**370**	698	493	**920**	1688
193	**380**	716	499	**930**	1706
199	**390**	734	504	**940**	1724
204	**400**	752	510	**950**	1742
210	**410**	770	516	**960**	1760
216	**420**	788	521	**970**	1778
221	**430**	806	527	**980**	1796
227	**440**	824	532	**990**	1814
232	**450**	842	538	**1000**	1832
238	**460**	860	566	**1050**	1922
243	**470**	878	593	**1100**	2012
249	**480**	896	621	**1150**	2102
254	**490**	914	649	**1200**	2192
260	**500**	932	677	**1250**	2282
266	**510**	950	704	**1300**	2372
271	**520**	968	732	**1350**	2462
277	**530**	986	760	**1400**	2552
282	**540**	1004	788	**1450**	2642
288	**550**	1022	816	**1500**	2732



EXAMPLE:

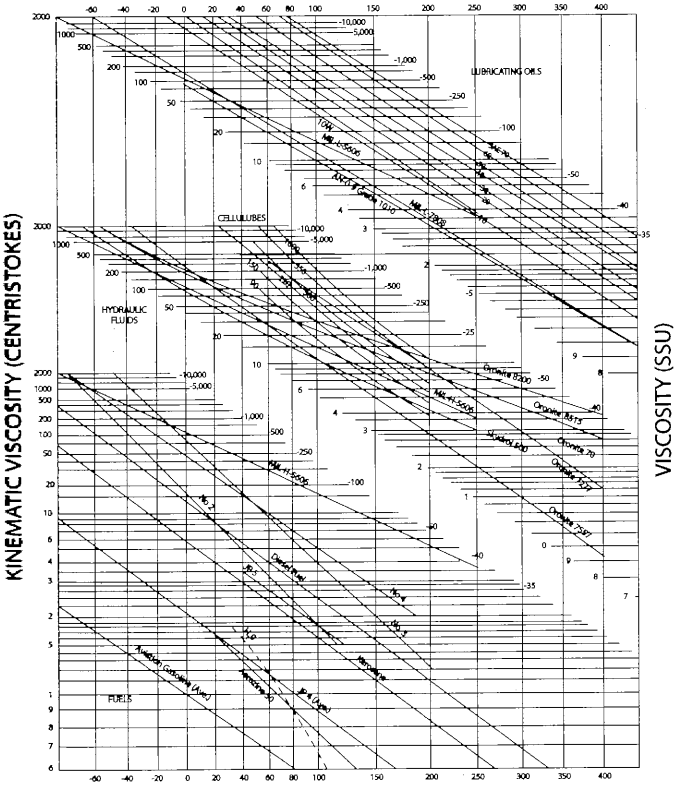
A dryer can handle 120 ACFM gas at 540°F and 1000 psia. What is its SCFM capacity?

SOLUTION:

Align t = 540°F with ACFM = 120 and mark (1); align (1) with P = 1000–(10)•100 and read SCFM = (10)•425–4250

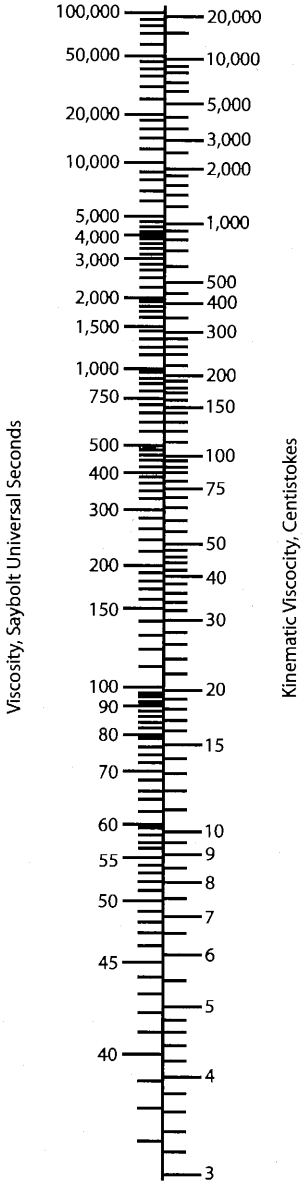
NOTE:

If P scale is multiplied by 10, 100, etc., multiply SCFM scale by same number. Also, SCFM and ACFM scales can be simultaneously multiplied by the same factor.



Conversion of Centistokes to Saybolt Universal Seconds

$$\text{centistokes} = \frac{\text{centipoise}}{\text{specific gravity}}$$

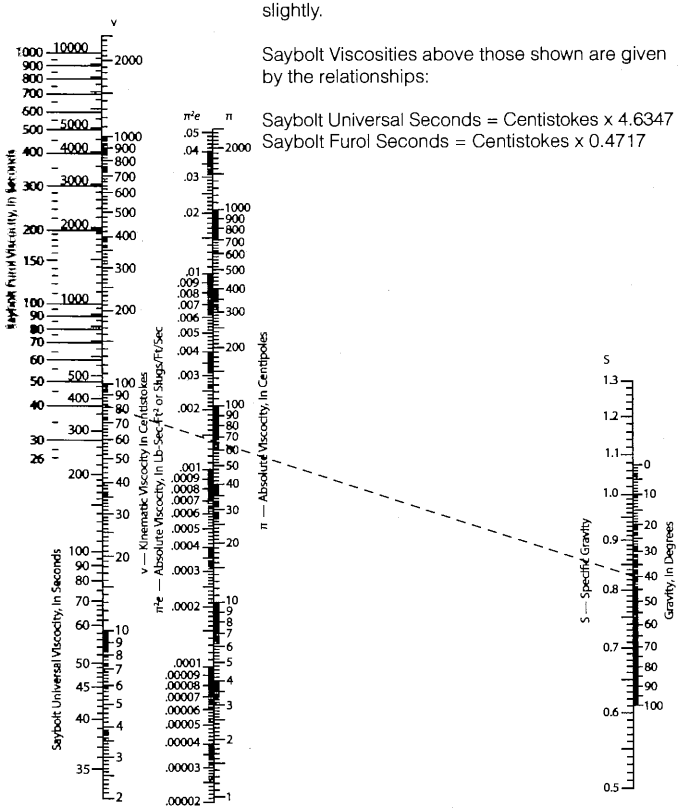


$$\mu = \nu\rho' = \nu S$$

The empirical relation between Saybalt Universal Viscosity and Saybolt Furol Viscosity at 100°F and 122°F, respectively, and Kinematic Viscosity is taken from A.S.T.M. D2161-63T. At other temperatures, the Saybolt Viscosities vary only slightly.

Saybolt Viscosities above those shown are given by the relationships:

Saybolt Universal Seconds = Centistokes x 4.6347
Saybolt Furol Seconds = Centistokes x 0.4717



Example 1

To determine the absolute viscosity of an oil which has a kinematic viscosity of 82 centistokes and a specific gravity of 0.83, connect 82 on the kinematic viscosity scale with 0.83 on the specific gravity scale; read 67 centipoise at the intersection on the absolute viscosity scale.

Example 2

To determine the absolute viscosity of an oil having a specific gravity of 0.83 and a Saybolt Furol viscosity of 40 seconds, connect 0.83 on the specific gravity scale with 40 seconds on the Saybolt Furol scale; read 67 centipoise at the intersection on the absolute viscosity scale.

LIQUID	SPECIFIC GRAVITY	VISCOSITY SSU				
		40°F	60°F	80°F	100°F	120°F	140°F	160°F
TRANSMISSION OILS—AUTO TRANSMISSION GEAR LUBRICANTS								
SAE 90	.880 - .935	14,000	5,500	2,200	1,100	650	380	240
SAE140	.880 - .935	35,000	12,000	5,000	2,200	1,200	650	400
SAE 250	.880 - .935	160,000	50,000	18,000	7,000	3,300	1,700	1,000
OTHER OILS								
Castor Oil	.960	36,000	9,000	3,000	1,400	900	400	300
Chinawood	.943	4,000	1,800	1,000	580	400	300	200
Cocoanut	.925	1,500	500	250	140	100	70	60
Cod	.928	1,800	600	300	175	110	80	70
Corn	.924	1,600	700	400	250	175	100	80
Cotton Seed	.880 - .925	1,500	600	300	176	125	80	70
Cylinder	.820 - .950	60,000	14,000	6,000	2,700	1,400	1,000	400
Navy No. 1 Fuel Oil	.989	4,000	1,100	600	380	200	170	90
Navy No. 2 Fuel Oil	1.000	—	24,000	8,700	3,500	1,500	900	480
Gas	.887	180	90	60	50	45	—	—
Insulating	—	350	150	90	65	50	45	40
Lard	.912 - .925	1,100	600	380	287	180	140	90
Linseed	.925 - .939	1,500	500	250	143	110	85	70
Raw Menhadden	.933	1,500	500	250	140	110	80	70
Neats Foot	.917	—	1,000	430	230	160	100	80
Olive	.912 - .918	1,500	550	320	200	150	100	80
Palm	.924	1,700	700	380	221	160	120	90
Peanut	.920	1,200	500	300	195	150	100	80
Quenching	—	2,400	900	450	250	180	130	90
Rape Seed	.919	2,400	900	450	250	180	130	90
Rosin	.980	28,000	7,800	3,200	1,500	900	500	300
Rosin (Wood)	1.090	Extremely Viscous		Extremely Viscous			Extremely Viscous	
Sesame	.923	1,100	500	290	184	130	90	60
Soya Bean	.927 - .980	1,200	475	270	165	120	80	70
Sperm	.883	360	250	170	110	90	70	60
Turbine (Light)	.910	500	350	230	150	—	—	—
Turbine (Heavy)	.910	3,000	1,400	700	330	200	150	100
Whale	.925	900	450	275	170	140	100	80
MISCELLANEOUS LIQUIDS								
Water	1.00	31.5	31.5	31.5	31.5	31.5	31.5	31.5
Gasoline	.68 - .74	30	30	30	30	30	30	30
Jet Fuel	.74 - .85	35	35	35	35	35	35	35
Kerosene	.78 - .82	42	38	34	33	31	30	30
Turpentine	.86 - .87	34	33	32.8	32.6	32.4	32	32
Varnish Spar	.90	3,500	1,600	1,000	650	530	250	230
CRANKCASE OILS—AUTOMOBILE LUBRICATING OILS								
SAE 10	.88 - .935	1,500-2,400	600-900	300-400	170-220	110-130	75-90	60-65
SAE 20	.88 - .935	2,400-9,000	900-3,000	400-1,100	220-550	130-280	90-170	65-110
SAE 30	.88 - .935	9,000-14,000	3,000-4,400	1,100-1,800	550-800	280-400	170-240	110-150
SAE 40	.88 - .935	14,000-19,000	4,400-6,000	1,800-2,400	800-1,100	400-550	240-320	150-200
SAE 50	.88 - .935	19,000-45,000	6,000-10,000	2,400-4,000	1,100-1,800	550-850	320-480	200-280
SAE 60	.88 - .935	45,000-60,000	10,000-17,000	4,000-6,000	1,800-2,500	850-1,200	480-580	280-380
SAE 70	.88 - .935	60,000-120,000	17,000-45,000	6,000-10,000	2,500-4,000	1,200-1,800	580-900	380-500

Viscosity and Gravity of Common Liquids

LIQUID	SPECIFIC GRAVITY	VISCOSITY SSU				
		40°F	60°F	80°F	100°F	120°F	140°F	160°F
FUEL OIL AND DIESEL OIL								
No. 1 Fuel Oil	.82 - .95	40	38	35	33	31	30	30
No. 2 Fuel Oil	.82 - .95	70	50	45	40	—	—	—
No. 3 Fuel Oil	.82 - .95	90	68	53	45	40	—	—
No. 5A Fuel Oil	.82 - .95	1,000	400	200	100	75	60	40
No. 5B Fuel Oil	.82 - .95	1,300	600	490	400	330	290	240
No. 6 Fuel Oil	.82 - .95	—	70,000	20,000	5,600	1,900	900	500
No. 2D Diesel Fuel Oil	.82 - .95	100	68	53	45	40	36	35
No. 3D Diesel Fuel Oil	.82 - .95	200	120	80	60	50	44	40
No. 4D Diesel Fuel Oil	.82 - .95	1,600	600	280	140	90	68	54
No. 5D Diesel Fuel Oil	.82 - .95	15,000	5,000	2,000	900	400	260	160

LIQUID	SPECIFIC GRAVITY	VISCOSITY SSU		
		70°F	100°F	130°F
SUGAR, SYRUPS, MOLASSES, ETC.				
Corn Syrups	1.40 - 1.47	—	5,000-500,000	1,500-60,000
Glucose	1.35 - 1.44	—	35,000-100,000	10,000-13,000
Honey (Raw)	—	—	340	—
Molasses	1.40 - 1.49	—	1,300-250,000	700-75,000
Corn Starch 22 Baumé	1.18	150	130	—
Corn Starch 24 Baumé	1.20	600	440	—
Corn Starch 25 Baumé	1.21	1,400	800	—
Ink—Printers	1.00 - 1.38	—	2,500-10,000	1,100-3,000
Ink—Newspapr	—	—	5,500-8,000	2,400
Tallow	.918	56 SSU @ 212°F	56 SSU @ 212°F	
TARS				
Coke Oven—Tar	1.12+	3,000-8,000	650-1,400	—
Gas House—Tar	1.16 - 1.3	15,000-300,000	2,000-20,000	—
CRUDE OILS				
Texas, Oklahoma	.810 - .916	100-700	34-210	—
Wyoming, Montana	.860 - .880	100-1,100	46-320	—
California	.780 - .920	100-4,500	34-700	—
Pennsylvania	.800 - .850	100-200	38-86	—
GLYCOL				
Propylene	1.038	240.6	—	—
Triethylene	1.125	185.7	—	—
Diethylene	1.120	149.7	—	—
Ethylene	1.125	88.4	—	—
Glycerine (100%)	1.260	2,900	813	—
Phenol (Carbolic Acid)	.95 - 1.00	60	—	—
Silicate of Soda	—	—	365-640	—
Sulfuric Acid (100%)	1.830	75	—	—

API Gravity	Baumé Gravity	Specific Gravity	Lbs. Per U.S. Gal.	U.S. Gals. Per Lb.
0	10.247	1.0760	8.962	0.1116
1	9.223	1.0679	8.895	0.1124
2	8.198	1.0599	8.828	0.1133
3	7.173	1.0520	8.762	0.1141
4	6.148	1.0443	8.698	0.1150
5	5.124	1.0366	8.634	0.1158
6	4.099	1.0291	8.571	0.1167
7	3.074	1.0217	8.509	0.1175
8	2.049	1.0143	8.448	0.1184
9	1.025	1.0071	8.388	0.1192
10	10.00	1.0000	8.328	0.1201
11	10.99	0.9930	8.270	0.1209
12	11.98	0.9861	8.212	0.1218
13	12.97	0.9792	8.155	0.1226
14	13.96	0.9725	8.099	0.1235
15	14.95	0.9659	8.044	0.1243
16	15.94	0.9593	7.989	0.1252
17	16.93	0.9529	7.935	0.1260
18	17.92	0.9465	7.882	0.1269
19	18.90	0.9402	7.830	0.1277
20	19.89	0.9340	7.778	0.1286
21	20.88	0.9279	7.727	0.1294
22	21.87	0.9218	7.676	0.1303
23	22.86	0.9159	7.627	0.1311
24	23.85	0.9100	7.578	0.1320
25	24.84	0.9042	7.529	0.1328
26	25.83	0.8984	7.481	0.1337
27	26.82	0.8927	7.434	0.1345
28	27.81	0.8871	7.387	0.1354
29	28.80	0.8816	7.341	0.1362
30	29.79	0.8762	7.296	0.1371
31	30.78	0.8708	7.251	0.1379
32	31.77	0.8654	7.206	0.1388
33	32.76	0.8602	7.163	0.1396
34	33.75	0.8550	7.119	0.1405
35	34.73	0.8498	7.076	0.1413
36	35.72	0.8448	7.034	0.1422
37	36.71	0.8398	6.993	0.1430
38	37.70	0.8348	6.951	0.1439
39	38.69	0.8299	6.910	0.1447
40	39.68	0.8251	6.870	0.1456
41	40.67	0.8203	6.830	0.1464
42	41.66	0.8155	6.790	0.1473
43	42.65	0.8109	6.752	0.1481
44	43.64	0.8063	6.713	0.1490
45	44.63	0.8017	6.675	0.1498
46	45.62	0.7972	6.637	0.1507
47	50.61	0.7927	6.600	0.1515
48	50.60	0.7883	6.563	0.1524
49	50.59	0.7839	6.526	0.1532
50	50.58	0.7796	6.490	0.1541

API and Baumé Gravities and Weight Factors

API Gravity	Baumé Gravity	Specific Gravity	Lbs. Per U.S. Gal.	U.S. Gals. Per Lb.
51	50.57	0.7753	6.455	0.1549
52	51.55	0.7711	6.420	0.1558
53	52.54	0.7669	6.385	0.1566
54	53.53	0.7628	6.350	0.1575
55	54.52	0.7587	6.316	0.1583
56	55.51	0.7547	6.283	0.1592
57	56.50	0.7507	6.249	0.1600
58	57.49	0.7467	6.216	0.1609
59	58.48	0.7428	6.184	0.1617
60	59.47	0.7389	6.151	0.1626
61	60.46	0.7351	6.119	0.1634
62	61.45	0.7313	6.087	0.1643
63	62.44	0.7275	6.056	0.1651
64	63.43	0.7238	6.025	0.1660
65	64.42	0.7201	5.994	0.1668
66	65.41	0.7165	5.964	0.1677
67	66.40	0.7128	5.934	0.1685
68	67.39	0.7093	5.904	0.1694
69	68.37	0.7057	5.874	0.1702
70	69.36	0.7022	5.845	0.1711
71	70.35	0.6988	5.817	0.1719
72	71.34	0.6953	5.788	0.1728
73	72.33	0.6919	5.759	0.1736
74	73.32	0.6886	5.731	0.1745
75	74.31	0.6852	5.703	0.1753
76	75.30	0.6819	5.676	0.1762
77	76.29	0.6787	5.649	0.1770
78	77.28	0.6754	5.622	0.1779
79	78.27	0.6722	5.595	0.1787
80	79.26	0.6690	5.568	0.1796
81	80.25	0.6659	5.542	0.1804
82	81.24	0.6628	5.516	0.1813
83	82.23	0.6597	5.491	0.1821
84	83.22	0.6566	5.465	0.1830
85	84.20	0.6536	5.440	0.1838
86	85.19	0.6506	5.415	0.1847
87	86.18	0.6476	5.390	0.1855
88	87.17	0.6446	5.365	0.1864
89	88.16	0.6417	5.341	0.1872
90	89.15	0.6388	5.316	0.1881
91	90.14	0.6360	5.293	0.1889
92	91.13	0.6331	5.269	0.1898
93	92.12	0.6303	5.246	0.1906
94	93.11	0.6275	5.222	0.1915
95	94.10	0.6247	5.199	0.1924
96	95.09	0.6220	5.176	0.1932
97	96.08	0.6193	5.154	0.1940
98	97.07	0.6166	5.131	0.1949
99	98.06	0.6139	5.109	0.1957
100	99.05	0.6112	5.086	0.1966

NOTES—

The relation of Degrees Baumé or API to Specific Gravity is expressed by the following formulas:

For liquids lighter than water:

$$\text{Degrees Baumé} = \frac{140}{G} - 130, \qquad G = \frac{140}{130 + \text{Degrees Baumé}}$$

$$\text{Degrees API} = \frac{141.5}{G} - 131.5 \qquad G = \frac{141.5}{131.5 + \text{Degrees API}}$$

For liquids heavier than water:

$$\text{Degrees Baumé} = 145 - \frac{145}{G} \qquad G = \frac{145}{145 - \text{Degrees Baumé}}$$

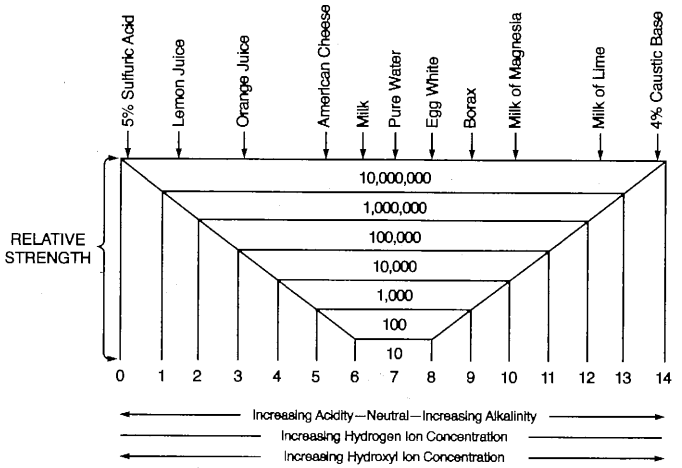
G = Specific Gravity = ratio of the weight of a given volume of oil at 60° Fahrenheit to the weight of the same volume of water at 60° Fahrenheit.

The above tables are based on the weight of 1 gallon (U.S.) of oil with a volume of 231 cubic inches at 60° Fahrenheit in air at 760 mm pressure and 50% humidity. Assumed weight of 1 gallon of water at 60° Fahrenheit in air is 8.32828 pounds.

$$D = \frac{md_1 + nd_2}{m + n}$$

D = Density or Specific Gravity of mixture
m = Proportion of oil of d_1 density
n = Proportion of oil of d_2 density
d_1 = Specific gravity of m oil
d_2 = Specific Gravity of n oil

To determine the resulting gravity by mixing oils of different gravities:



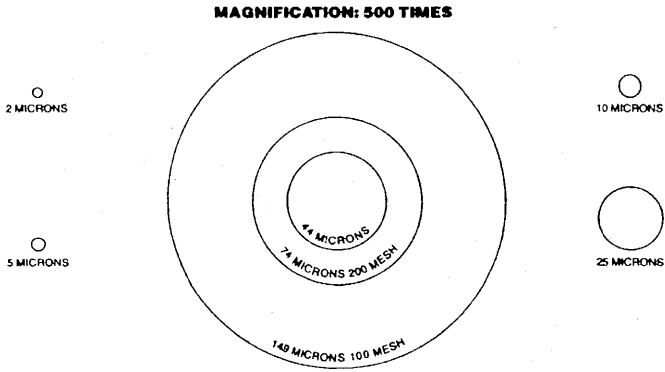
The pH Scale

In its simplest definition, pH can be delined as a measure of the acidity or alkalinity of a substance, For instance, lemon juice is acid and lye is alkaline, The pH scale is used to express the degree.

There are many hundreds of acids and alkalies of varying strength. Despite their widely diverse properties, acids owe their acidity to the single property of actively producing dissociated, or tree, hydrogen ions (H +) in solution; while alkalies owe their alkalinity to the property of actively producing dissociated hydroxyt ions (OH—) in solution. However, all acid substances have some hydroxyl ions, just as all alkaline substances have some hydrogen ions, and the product of the two ions in solution is always a constant. Therefore, it is possible to express the concentration of one ion relative to the other, rather than have a separate scale for each.

Hydrogen ion concentration is used to express both acidity and alkalinity, since an electrode that will sense hydrogen ion concentration is much more stable than one which will sense hydroxyl ion concentration. Because numerical values for the hydrogen ion concentration often are extremely small fractions (for example, 1/10,000,000), the pH scale is used instead. This scale is defined as the negative logarithm (or the log of the reciprocal) of the hydrogen ion concentration. The arbitrary term, pH, is simply a logarithmic index employing small numbers to express hydrogen ion concentration.

The pH scale ranges from 0 to 14, with 7 (the pH of pure water) the neutral point at which hydrogen ions and hydroxyl ions exist at about the same concentration. Numbers greater than 7 indicate the degree of alkalinity, and numbers less than 7 indicate the degree of acidity. The relationship between the two ions and acidity and alkalinity is shown above. Note that the relative strength of acids and alkalies changes tenfold for each unit change in pH. Thus, compared with a solution of pH5, a solution of pH4 is ten times as acid, a solution of pH3 is a hundred limes as acid, and a solution of pH2 is one thousand times as acid.



LINEAR EQUIVALENTS

1 inch ..... 25.4 Millimeters ..... 25,400 Microns
1 millimeter ..... .0394 Inches ..... 1,000 Microns
1 Micron ..... $\frac{1}{25,400}$ of an inch .. .001 Millimeters
1 Micron ..... 3.94×10^{-5} ..... .000039 Inches

RELATIVE SIZES

Lower Limit of Visibility (Naked Eye) ..... 40 Microns
White Blood Cells ..... 25 Microns
Red Blood Cells ..... 8 Microns
Bacteria (Cocci) ..... 2 Microns

STANDARD SCREEN SIZES

Meshes per Linear Inch	ASTM-E-11-61 U. S. Sieve No.	Opening in Inches	Opening in Micron
20.16	20	0.0331	841
27.62	30	0.0234	595
38.02	40	0.0165	420
52.36	50	0.0117	297
72.45	70	0.0083	210
85.47	80	0.0070	177
101.1	100	0.0059	149
142.86	140	0.0041	105
200.00	200	0.0029	74
270.26	270	0.0021	53
323.00	325	0.0017	44