Liquid Flow Conversions

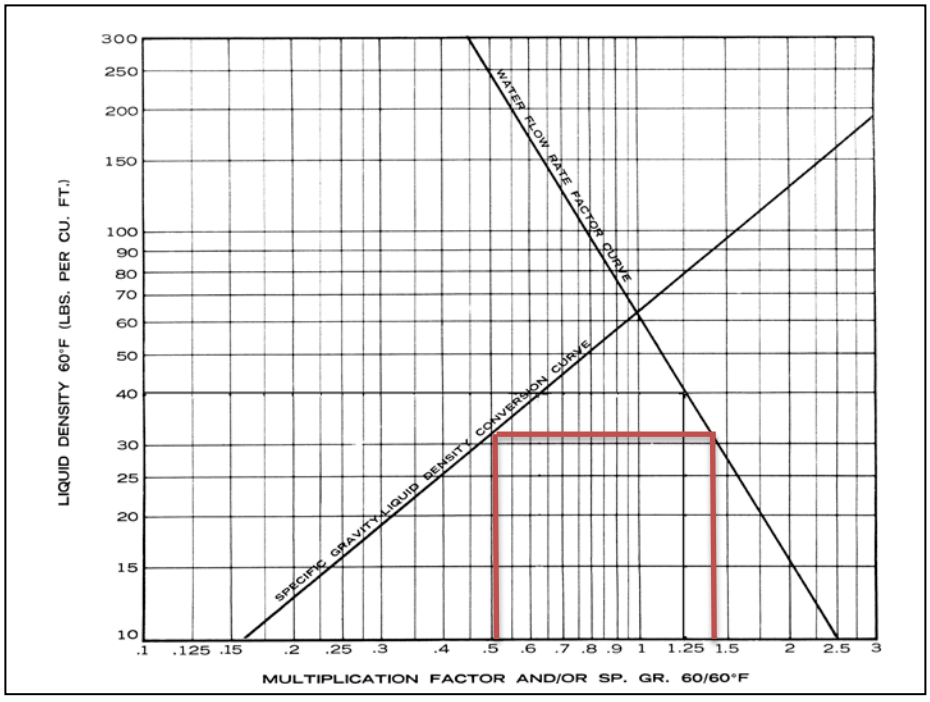
This bulletin provides valuable information for converting liquid flows from water to other liquids. This is extremely useful because many valves are tested and catalogued in water flows. These flows must be converted to a useful number that corresponds to the product and liquid in question.

Conversion factors can be found using: 1) the Conversion Curves Graph (if the liquid's specific gravity or density is known) or 2) the extensive Conversion Table below. The conversion factor can be used for a valve, fitting, or system. The conversion factor indicates a flow rate for a specific liquid compared to the flow rate for water. To obtain the flow for a given liquid, the water flow rate is multiplied times the conversion factor. To obtain the flow rate for water, the given liquid's flow rate is divided by the conversion factor. This allows comparison between different products using water flow as a basis for comparison.

The multiplication factors shown on this page are determined by calculations from liquid density or specific gravity values. The factors do not include: 1) variations in types of make-up connection – full coupling, half coupling, bushing, dip tube, etc., or 2) liquid flow characteristics due to viscosity, vaporization, rate of flow, pressure drop, etc.

Conversion Curve Graph

1. Locate the specific gravity of the liquid in question on the horizontal axis of the Conversion Curves Graph.
2. Draw a vertical line up from this specific gravity until it reaches the Specific Gravity Liquid Density Conversion Curve.
3. Draw a horizontal line over from this point to the Water Flow Rate Factor Curve.
4. Draw a vertical line from this point down to the horizontal axis. This is the conversion factor for the liquid.



Example: Determine the flow of liquid "x" with a specific gravity of .51. Determine the flow of liquid "x" with a specific gravity of .51.

Find .51 on the horizontal axis. See graph above. Draw a vertical line to the Specific Gravity Liquid Density Conversion Curve, a horizontal line from this point over to the Water Flow Rate Factor Curve, and then a vertical line back to the horizontal axis. The line intersects the horizontal axis at 1.40. This indicates that a valve, fitting, or system will flow liquid "x" at the conversion factor times the flow rate given for water.

If a piping system has 100 gpm water flow with a 10 psi drop, then the system would flow liquid "x" at 140 gpm with the same pressure drop.

Conversion Table

If the liquid in question appears in the Liquid Flow Conversion Factors Table, the work has already been done. Simply multiply the water flow in gpm times the conversion factor number to determine the liquid flow for the product in question.

NOTE: Many of the chemicals listed below are shown in both the chemical abstracts name and the common name. Wherever possible, all synonyms are shown in their appropriate alphabetical position. Concentrations are 100% unless otherwise stated.

Example: Determine the equivalent flow of liquid propane for a valve rated at 150-gpm water. The table provides the conversion factor for propane as 1.4 that of water. Multiply the 1.4 conversion factor times the given 150 gpm, to get 210-gpm propane. Conversely, 210-gpm propane can be divided by the conversion factor to get back to 150-gpm water.

FLUID	CONCENTRATION	CONVERSION FACTOR
Acetone		**1.12**
Allylene		**1.22**
Aminoethane		**1.20**
Ammonia, anhydrous		**1.27**
Ammonium Hydroxide Solutions	**1%**	**1.10**
	10%	**1.02**
	20%	**1.04**
	30%	**1.06**
Amyl Alcohol		**1.11**
Aniline		**.99**
Barium Chloride	**2%**	**.99**
	10%	**.96**
	20%	**.91**
Beet Sugar Liquors	**1%**	**1.00**
	10%	**.98**
	20%	**.96**
	40%	**.92**
	60%	**.88**
	80%	**.84**

FLUID	CONCENTRATION	CONVERSION FACTOR
Benzene		1.07
Boron Chloride		.84
Boron Trichloride		.84
Bromine Pentafluoride		.63
Bromine Trifluoride		.59
Bromoethane		.76
Bromoethylene		.82
Butane		1.31
Butadiene		1.27
Butene 1 and 2		1.29
Butyne		1.22
Calcium Chloride	2%	.99
	10%	.96
	20%	.92
Calcium Hydroxide	.05%	1.00
	.10%	1.00
	.15%	1.00
Cane Sugar Liquors	1%	1.00
	10%	.98
	20%	.96
	40%	.92
Carbon Dioxide		.95
Carbon Disulfide		.89
Carbon Oxychloride		.84
Carbon Tetrachloride		.79
Carbonyl Chloride		.84
Carbonyl Oxysulfide		.88
Carbonyl Sulfide		.88
Castor Oil		1.02
China Wood Oil		1.03
Chlorine		.84
Chlorine Trifluoride		.74

FLUID	CONCENTRATION	CONVERSION Factor
Chlorodifluoromethane		.92
`Chloroethane		1.05
Chloroethene		1.05
Chloroethylene		1.05
Chloromethane		1.00
Chloropentafluoroethane		.89
Chlorotrifluoroethylene		.88
Chlorotrifluoromethane		.88
Coconut Oil		1.04
Corn Oil		1.04
Cotton Seed Oil		1.04
Cyanogen		1.02
Cyclohexane		1.13
Cyclopropane		1.18
Dibromodifluoromethane		.66
Dibromotetrafluoroethane		.68
Dichlorodifluoromethane		.88
Dichloroethylether		.90
Dichlorofluoromethane		.86
Dichlorotetrafluoroethane		.83
Dicyan		1.02
Difluoro-1-Chloroethane		.94
Difluoroethane		.99
Difluoroethylene		1.28
Dimethyl Ether		1.17
Dimethylamine		1.21
Dimethylpropane		1.30
Dinitrogen Monoxide		.90
Dinitrogen Tetroxide		.83
Dinitrogen Trioxide		.83
Epoxyethane		1.06
Ethanol		1.13
Ethyl Acetate		1.05
Ethyl Acetylene		1.22

FLUID	CONCENTRATION	CONVERSION Factor
Ethyl Alcohol		1.12
Ethyl Chloride		1.05
Ethyl Mercaptan		1.09
Ethylamine		1.20
Ethylene Glycol		.95
Ethylene Oxide		1.06
Fluroethylene		1.25
Freon	See Refrigerants	
Furfural Aldehyde		.93
Gasoline		1.17
Genetron	See Refrigerants	
Germane		.81
Germanium Tetrahydride		.81
Germanomethane		.81
Hydriodic Acid, anhydrous		.59
Hydrobromic Acid, anhydrous		.68
Hydrofluoric Acid, anhydrous		1.00
Hydrogen Bromide		.68
Hydrogen Fluoride		1.00
Hydrogen Iodide		.59
Hydrogen Selenide		.70
Hydrogen Sulfide		1.00
Iodine Pentafluoride		.56
Isobutane		1.34
Isobutene		1.30
Isobutylene		1.30
Isopropyl Alcohol		1.13
Isotron	See Refrigerants	
Kerosene		1.12
Latex		1.02
Linseed Oil		1.04
Lubricating Oils (Refined)		1.05
Magnesium Sulfate	2%	.99
	10%	.95
	20%	.91
Mercury		.27
Methanol		1.12

FLUID	CONCENTRATION	CONVERSION Factor
Methanethiol		1.06
Methoxyethylene		1.14
Methyl Acetylene		1.22
Methyl Alcohol		1.12
Methyl Bromide		.76
Methyl Chloride		1.00
Methyl Ether		1.17
Methyl Mercaptan		1.06
Methyl Oxide		1.17
Methyl Vinyl Ether		1.14
Methylamine		1.20
Methylene Chloride		.87
Methylpropane		1.34
Methylpropene		1.30
Monoethylamine		1.20
Monogermane		.81
Monomethylamine		1.20
Neopentane		1.30
Nickel Carbonyl		.86
Nickel Tetracarbonyl		.86
Nitric Oxide		.89
Nitrobenzene		.91
Nitrogen Dioxide		.83
Nitrogen (III) Oxide		.83
Nitrogen Peroxide		.83
Nitrogen Sesquioxide		.83
Nitrogen Tetroxide		.83
Nitrogen Trioxide		.83
Nitrous Oxide		.90
Octafluoro-2-butene		.82
Octafluorocyclobutane		.81
Octafluoropropane		.88
Oxalomitrile		1.02
Oxirane		1.06

`FLUID	CONCENTRATION	CONVERSION Factor
Parafin		1.07
Perfluoro-2-Butene		.82
Perfluorocyclobutane		.81
Perfluoropropane		.88
Petroleum Oils (crude)		1.07
Phenol		.97
Phosgene		.84
Potassium Chloride	1%	1.00
	10%	.97
	20%	.94
Potassium Cyanide	1%	1.00
	4%	.99
	10%	.98
Potassium Dichromate	1%	1.00
	10%	.97
Potassium Hydroxide	1%	1.00
	10%	.96
	20%	.92
	40%	.85
Potassium Nitrate	1%	1.00
	10%	.97
	20%	.94
Potassium Sulfate	1%	1.00
	10%	.96
Propane		1.40
Propene		1.28
Propyl Alcohol		1.12
Propylene		1.28
Propylene Glycol		.98
Propyne		1.22
Refrigerant #11		.83
Refrigerant #12		.88
Refrigerant #13		.88
Refrigerant #21		.86
Refrigerant #22		.92

FLUID	CONCENTRATION	CONVERSION Factor
Refrigerant #113		.80
Refrigerant #114		.83
Refrigerant #114B2		.68
Refrigerant #115		.89
Refrigerant #142B		.94
Refrigerant #152A		.99
Refrigerant #C318		.81
Refrigerant #1132A		1.28
Silane		1.20
Silicone Tetrahydride		1.20
Sodium Carbonate	1%	1.00
	10%	.95
Sodium Chloride	1%	1.00
	10%	.97
	20%	.93
	40%	.85
Sodium Dichromate	1%	1.00
	10%	.96
	20%	.93
	40%	.85
Sodium Hydroxide	1%	1.00
	10%	.95
	20%	.91
	40%	.81
Sodium Nitrate	1%	1.00
	10%	.97
	20%	.94
	40%	.87
Sodium Phosphate	1%	1.00
	4%	.98
	10%	.95
Sodium Sulfate	1%	1.00
	10%	.97
	20%	.95

`FLUID	CONCENTRATION	CONVERSION Factor
	30%	.90
Sodium Sulfide	1%	1.00
	10%	.95
	18%	.91
Sulfur Dioxide		.84
Sulfur Hexafluoride		.80
Sulfur Tetrafluoride		.72
Sulfur Trioxide		.71
Sulfur Fluoride		.86
Tetramethylmethane		1.30
Toluene		1.07
Transformer Oil		1.05
Trichlorofluoromethane		.83
Trimethylamine		1.23
Trimethylene		1.18
Trimethylmethane		1.34
Turpentine		1.08
Ucon	See Refrigerants	
Vegetable Oil		1.04
Vinyl Bromide		.82
Vinyl Chloride		1.05
Vinyl Fluoride		1.25
Vinyl Methyl Ether		1.14
Vinyldene Fluoride		1.28