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Chris Haslego
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**Content Based
Chemical Engineering**

AVERAGE PROPERTIES OF A LIQUID MIXTURE

REFERENCES: MARKS' MECHANICAL ENGINEERS HANDBOOK; PERRY'S CHEMICAL ENGINEERS HANDBOOK; FLUID FLOW by Sabersky & Acosta

NOTE: Always begin a new case by retrieving the original file. Direct entry of data in cells that originally contain table lookups could cause functions to be lost, or incorrect calculations. I format cells requiring entry colored **RED**; calculated values are black.

- 1.) Enter identification at [C5]
- 2.) Enter fluid by using [=], then going to fluid name in the gas or liquid tables, and double-clicking the cell or high-lighting and hitting the [return key]. Fluid specifics will be returned via lookup tables. For NOT in my tables enter values in the appropriate cells.
- 3.) Enter each fluid's flow rate at [D8] thru [D16].
- 4.) Temperature defaults to 70F - 0C. Directly enter temperature if different.

Print out using direct Excel commands. This application is provided by Chemi Engineers Resource Website, visit cheresources.com for additional selections.

Print out using direct EXCEL commands.

AVERAGE PROPERTIES OF A LIQUID MIXTURE
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EQUIP: HAZARD SUMMARY #3 HOLD TANK

	fluid	lb/hr	sp.gr.	μ .cps	$^{\circ}$ F	gpm	Wt%
1.)	WATER	1000	0.9826019	0.463068	140	2.0354123	83.333333
2.)	CAUSTIC 20%	200	1.223	1.5741117	70	0.3270646	16.666667
3.)			0	0	0	0	0
4.)			0	0	0	0	0
5.)			0	0	0	0	0
6.)			0	0	0	0	0
7.)			0	0	0	0	0
8.)			0	0	0	0	0
9.)			0	0	0	0	0

	<u>fluid</u>	<u>lb/hr</u>	<u>sp.gr.</u>	<u>μ.cps</u>	<u>$^{\circ}$F</u>	<u>gpm</u>	<u>Wt%</u>
	LIQUID MIXTURE	1200	1.015883	0.648242	111.67009	2.3624769	100

Average Density = 63.391097 lb/cu ft

Max Temperature = 140 $^{\circ}$ F

AVERAGE PROPERTIES OF A LIQUID MIXTURE
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EQUIP: HAZARD SUMMARY #3 HOLD TANK

	fluid	kg/s	sp.gr.	Pa.s	°C	m ³ /s	Wt%
1.)	Water	1000	1	0.001	60	1	50
2.)	CAUSTIC 20%	1000	1.223	0.004208	12	0.8176615	50
3.)			0	0	0	0	0
4.)			0	0	0	0	0
5.)			0	0	0	0	0
6.)			0	0	0	0	0
7.)			0	0	0	0	0
8.)			0	0	0	0	0
9.)			0	0	0	0	0

<u>fluid</u>	<u>kg/s</u>	<u>sp.gr.</u>	<u>Pa.s</u>	<u>°C</u>	<u>m³/s</u>	<u>Wt%</u>
LIQUID MIXTURE	2000	1.1003149	0.002604	21.21659	1.8176615	100

Average Density = 1100.3149 kg/m³

Max Temperature = 60 °C 140 °F

Physical Properties			
liquid		visc (cp)	spec. grav.
ACETIC ACID 100%		0.731	1.050
ACETIC ACID 70%		1.195	1.010
ACETONE		0.216	0.789
AMMONIA 26%		0.570	0.905
AMMONIA 100%		0.064	0.682
BENZENE		0.391	0.844
BLACK LIQUOR 50%		32.355	1.250
BLACK LIQUOR 63%		324.529	1.330
BLACK LIQUOR 68%		1493.574	1.360
BRINE, CALCIUM CHLORIDE 25%		0.695	1.230
BRINE, SODIUM CHLORIDE 25%		0.682	1.190
CARBON DIOXIDE		0.050	1.102
CAUSTIC 20%		1.574	1.223
CAUSTIC 50%		13.554	1.530
CHLORINE LIQUID		0.288	1.467
CONDENSATE		0.462	0.992
DOWTHERM A		2.038	0.995
ETHANOL 100%		0.506	0.789
ETHANOL 40%		0.756	0.935
ETHANOL 95%		0.603	0.804
ETHYL CHLORIDE		0.195	0.923
ETHYLENE GLYCOL		5.736	1.110
FREON, R11		0.325	1.410
FREON, R12		0.222	1.170
FREON, R22		0.190	1.440
FUEL OIL #2		1.577	0.876
FUEL OIL #6		78.036	0.993
GASOLINE		0.410	0.751
GLYCEROL, 100%		95.818	1.260
HYDROCHLORIC 31.5%		1.223	1.159
ISOPROPYL ALCOHOL		0.760	0.785
KEROSENE		1.040	0.811
LUBE OIL MOBIL 634		162.816	0.884
METHANOL 100%		0.343	0.796
METHANOL 40%		1.223	0.937
METHANOL 90%		0.443	0.824
METHYL CHLORIDE		0.210	0.998
MULTITHERM PG-1		12.833	0.875
NITRIC ACID 60%		1.197	1.370
NITRIC ACID 95%		0.671	1.500
OIL, VEGETABLE HARDENED		24.683	0.920
OIL, VEGETABLE UNHARDENED		19.769	0.880
SULPHUR DIOXIDE		0.248	1.434
SULPHURIC 110%, FUMING		15.134	1.840
SULPHURIC ACID 98%		7.582	1.830
SULPHURIC ACID 60%		2.976	1.500
TOLUENE		0.396	0.862
TURPENTINE		0.761	0.864
WATER		0.463	0.983