

Table 13.06 Density ρ (kg/dm³) of pure liquids and its variation with the temperature t (°C)

Chemical Name	- 100	- 75	- 50	- 25	0	20	50	100	150	200	250
A											
Acetic Acid						1.049	1.018	0.960	0.896	0.827	0.736
Acetic Anhydride					1.105	1.082	1.044				
Acetone		0.983	0.868	0.840	0.812	0.791	0.756				
Acetonitrile				0.829	0.803	0.783	0.750				
Acetyl Chloride						1.104					
Allyl Alcohol				0.891	0.870	0.854	0.827	0.774	0.711	0.628	0.502
Allyl Chloride						0.938					
Ammonia		0.731	0.702	0.671	0.639	0.610	0.563	0.457			
Aniline					1.039	1.022	0.996	0.951			
Anisole						0.955					
B											
Benzaldehyde					1.062	1.046					
Benzene						0.879	0.847	0.793	0.731	0.661	0.561
Benzyl Alcohol					1.061	1.045	1.022				
Benzyl Chloride					1.103						
Bromine					3.208	3.140					
Butadiene (1,2-B.)		0.766	0.734	0.701	0.676	0.652	0.614	0.542	0.420		
Butadiene (1,3-B.)	0.754	0.728	0.701	0.673	0.646	0.621	0.582	0.501	0.320		
Butane (n-B.)	0.690	0.670	0.649	0.626	0.601	0.579	0.542	0.468	0.290		
Butane (iso-B.)				0.610	0.584	0.559	0.520				
Butanol (n-B.)	0.910	0.884	0.866	0.846	0.823	0.807	0.780	0.737	0.686	0.627	0.534

Chemical Name	- 100	- 75	- 50	- 25	0	20	50	100	150	200	250
Butanone					0.826	0.803					
Butene (1-B.)	0.712	0.691	0.668	0.645	0.619	0.592	0.558	0.477			
Butene (cis 2-B.)			0.700	0.675	0.643	0.620	0.585	0.506	0.365		
Butyl Acetate (n-B.)						0.882					
Butylene Glycol						1.017					
Butyric Acid (n-B.)					0.977	0.958	0.927			0.774	0.699
C D											
Carbon Disulphide	1.432	1.398	1.362	1.328	1.292	1.262					
Carbon Tetrachloride				1.685	1.633	1.594	1.534	1.434	1.322	1.189	0.980
Chlorine	1.717	1.659	1.598	1.538	1.469	1.409	1.314	1.123	0.809		
Chlorobenzene (Mono-C.)					1.128	1.106	1.074	1.019	0.960	0.896	
Chloroform		1.660	1.618	1.565	1.526	1.490	1.433	1.315	1.208	1.062	0.790
Chlorosulphonic Acid						1.753					
Cresol (m-C.)						1.034	1.009				
Cumene						0.862					
Cyclohexane						0.779	0.750	0.700	0.645	0.578	0.482
Cyclohexanol							0.925				
Cyclohexanone						0.947	0.920				
Dibutyl Ether						0.770					
Diethyl Ether	0.842	0.816	0.790	0.764	0.736	0.714	0.676	0.611	0.518		
Chemical Name	- 100	- 75	- 50	- 25	0	20	50	100	150	200	250
Diethylene Glycol					1.133	1.126	1.098	1.087	1.014		
Dioxane (1.4-D.)						1.034	1.008				

Chemical Name	- 100	- 75	- 50	- 25	0	20	50	100	150	200	250
E											
Epichlorohydrin				1.245	1.225	1.186	1.142	1.078	1.004	0.928	0.823
Ethanol	0.890	0.868	0.845	0.823	0.807	0.790	0.763	0.716	0.649	0.557	
Ethyl Acetate					0.924	0.901	0.864	0.797	0.721	0.621	0.330
Ethyl Chloride			0.995	0.955	0.924	0.892	0.846	0.750	0.670		
Ethyl Formate					0.948	0.923	0.883	0.811	0.726	0.602	
Ethylbenzene		0.951	0.929	0.907	0.885	0.866	0.840	0.797			
Ethylene Chlorhydrin						1.210					
Ethylene Dichloride			1.360	1.325	1.287	1.258	1.210	1.135	1.060		
Ethylene Glycol					1.128	1.115	1.090	1.054	1.016	0.974	0.922
F G H											
Fatty Alcohol (Octadecanol)							0.814				
Formaldehyde						0.815					
Formamide						1.112					
Formic Acid						1.220	1.184				
Furfural					1.181	1.160	1.128				
Glycerol					1.272	1.260	1.242	1.209	1.172	1.132	1.094
Heptane		0.761	0.741	0.721	0.701	0.684	0.658	0.612	0.560	0.495	0.388
Hexane	0.760	0.742	0.721	0.700	0.678	0.659	0.631	0.580	0.520	0.438	
Hexanol				0.856	0.833	0.820	0.805	0.762	0.710	0.656	0.595
Hydrogen Bromide			2.132	2.020	1.896	1.791	1.625				
Hydrogen Chloride	1.235	1.158	1.080	1.008	0.920						
Hydrogen Cyanide					0.715	0.688					

Chemical Name	- 100	- 75	- 50	- 25	0	20	50	100	150	200	250
Hydrogen Fluoride			1.123	1.063	1.002	0.962					
Hydrogen Sulphide			0.980	0.924	0.866						
M N											
Methanol	0.897	0.875	0.854	0.832	0.811	0.792	0.765	0.714	0.650	0.553	
Methyl Acetate					0.959	0.934	0.894	0.822	0.734	0.610	
Methyl Chloride	1.140	1.090	1.050	0.990	0.960	0.921	0.859	0.770			
Methyl Formate					1.003	0.975	0.929	0.845	0.740	0.566	
Methylcyclohexane	0.870	0.850	0.828	0.808	0.787	0.769	0.742	0.697			
Methylene Chloride	1.540	1.480	1.460	1.390	1.362	1.336	1.270	1.190	1.070	0.920	
Methylpentanone						0.813					
Nitrobenzene						1.203	1.174				
O P											
Oleic Acid							0.886				
Paraldehyde						0.994	0.956	0.899			
Pentane	0.737	0.715	0.693	0.670	0.646	0.626	0.596	0.533	0.460		
Petrol (Extraction-P.)			0.775	0.755	0.735	0.720	0.690	0.650			
Phenol							1.050				
Propane	0.646	0.619	0.591	0.561	0.529	0.501	0.450				
Propanol	0.911	0.887	0.865	0.842	0.820	0.804	0.779	0.733	0.674	0.592	0.453
Propene	0.671	0.642	0.615	0.586	0.555	0.523	0.465				
Propionic Acid					1.015	0.993				0.786	0.703
Propylene Glycol					1.054	1.040	1.016	0.974	0.932		
Pyridine				1.028	1.003	0.983	0.953	0.901			

Chemical Name	- 100	- 75	- 50	- 25	0	20	50	100	150	200	250
S T											
Stannic Chloride						2.224	2.165				
Stearic Acid								0.839			
Sulphur monochlorid						1.678					
Tetrachloroethene				1.692	1.656	1.621	1.570	1.485	1.402	1.308	1.190
Tetrahydrofuran						0.889					
Toluene		0.956	0.933	0.910	0.885	0.867	0.839	0.793	0.737	0.672	0.595
Trichloroethene	1.670	1.630	1.585	1.540	1.500	1.463	1.415	1.328	1.240	1.130	0.980
Tricresyl Phosphate						1.180					
Triethylamine					0.746	0.726	0.699	0.652			0.400
V X											
Vinyl Acetate						0.930	0.892				
Vinyl Chloride	1.085	1.050	1.015	0.980	0.945	0.911	0.863	0.745	0.510		
Xylene (m-X.)				0.902	0.881	0.866	0.838	0.795	0.744	0.683	0.615

The values for the density ρ are taken from reference literature. They are sufficiently accurate for necessary calculations e.g. of mass rate flow or rate of flow, pressure and pump power input.

Intermediate values can be calculated by linear interpolation.

$$\rho = \rho_1 + \frac{t - t_1}{t_2 - t_1} \cdot (\rho_2 - \rho_1)$$

Table 13.07 Density ρ (kg/dm³) of aqueous solutions as a function of concentration (w : 1 to 12%) and temperature

Chemical Name	t °C	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	12 %
A												
Acetic Acid	0		1.003								1.018	
	20	1.000	1.001	1.003	1.004	1.006	1.007	1.008	1.010	1.011	1.013	1.015
	60		0.985								0.994	
Acetone	20										0.985	
	60										0.966	
Alum	19	1.008	1.017	1.027	1.037	1.047	1.057					
Aluminium Chloride	18	1.008	1.016		1.034		1.053		1.071		1.090	1.109
Aluminium Nitrate	18	1.007	1.014		1.031		1.047		1.064		1.081	1.099
Aluminium Sulphate	19	1.009	1.019		1.040		1.061		1.083		1.105	1.129
Ammonia	15		0.990			0.978					0.959	
	20	0.994	0.990	0.985	0.981	0.977	0.973	0.969	0.965	0.961	0.958	0.950
	50		0.979			0.966					0.944	
Ammonium Acetate	18	1.001	1.003		1.007		1.012		1.016		1.020	1.024
Ammonium Bromide	18	1.004	1.010		1.022		1.033		1.045		1.057	
	25	1.003	1.008		1.020		1.031		1.043		1.055	1.067
Ammonium Carbonate	15	1.003	1.006		1.013		1.020		1.027		1.034	1.040
Ammonium Chloride	20	1.001	1.005		1.011		1.017		1.023		1.029	1.034
Ammonium Nitrate	20	1.002	1.006		1.015		1.023		1.031		1.040	1.048
Ammonium Oxalate	15	1.004	1.009	1.014	1.019	1.024	1.029	1.035				

Chemical Name	t °C	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	12 %
Ammonium Sulphate	20	1.004	1.010		1.022		1.034		1.046		1.057	1.069
Arsenic Acid	15	1.006	1.012		1.026		1.040		1.054		1.068	1.083
B												
Barium Acetate	18	1.006	1.013		1.028		1.043		1.059		1.075	1.091
Barium Chloride	20		1.016		1.034		1.053		1.072		1.092	1.113
Barium Hydroxide	18	1.013	1.018		1.025		1.037		1.055		1.077	
Barium Nitrate	18	1.007	1.015		1.032		1.049		1.067		1.086	
Borax	15	1.008	1.018	1.027								
Boric Acid	20	1.002	1.006	1.009	1.014							
C												
Cadmium Chloride	20		1.016		1.034		1.052		1.072		1.092	1.112
Calcium Chloride	20	1.007	1.015		1.032		1.049		1.066		1.084	1.102
Calcium Hydroxide	20		1.013		1.025		1.037		1.049		1.061	
Calcium Nitrate	18		1.014		1.029		1.045		1.061		1.077	1.094
Chloric Acid	18	1.004	1.010		1.022		1.034		1.047		1.059	1.072
Chrome Alum, green	15	1.007	1.016		1.034		1.052		1.070		1.089	1.109
violet	15	1.009	1.018		1.038		1.057		1.077			
Chromic Acid	15	1.006	1.014		1.030		1.045		1.060		1.076	1.093
Citric Acid	18		1.007		1.015		1.022		1.030		1.038	1.046
Copper Chloride	20	1.007	1.017		1.036		1.056		1.076		1.096	1.116
Copper Sulphate	20	1.009	1.019		1.040		1.062		1.084		1.107	1.131
E												
Ethanol	15	0.997	0.995	0.994	0.992	0.990	0.989	0.987	0.986	0.984	0.983	0.981

Chemical Name	<i>t</i> °C	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	12 %
	50		0.984			0.979					0.970	
	80		0.968			0.962					0.952	
F G												
Ferric Chloride	20	1.007	1.015		1.032		1.049		1.067		1.085	1.104
Ferric Nitrate	18	1.007	1.014		1.030		1.047		1.064		1.081	1.099
Ferric Sulphate	17.5	1.007	1.016		1.033		1.050		1.067		1.084	1.103
Ferrous Chloride	18	1.008	1.017		1.035		1.054		1.073		1.092	1.113
Ferrous sulphate	18	1.009	1.018		1.038		1.058		1.079		1.100	1.122
Formic Acid	20	1.002	1.004	1.007	1.009	1.012	1.014	1.017	1.020	1.022	1.025	1.030
	40		0.997			1.003					1.015	
Glycerol	0					1.013					1.025	
	20	1.001	1.003	1.005	1.008	1.010	1.013	1.015	1.017	1.020	1.022	1.027
H												
Hydrobromic Acid	20	1.005	1.012		1.027		1.042		1.057		1.072	1.088
Hydrochloric Acid	0		1.012			1.027					1.052	
	20	1.003	1.008	1.013	1.018	1.023	1.028	1.033	1.038	1.043	1.047	1.057
	100		0.968			0.984					1.009	
Hydrocyanic Acid	18	0.998	0.996		0.993		0.990		0.986		0.982	
Hydrofluoric Acid	20		1.005		1.012		1.021		1.028		1.036	1.043
Hydrofluorsilicic Acid	17.5	1.007	1.015		1.031		1.048		1.065		1.082	1.100
Hydrogen Peroxide	18	1.002	1.006		1.013		1.020		1.028		1.035	1.043

Chemical Name	<i>t</i> °C	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	12 %
L												
Lactic Acid	20		1.003									
Lead Acetate	18	1.006	1.014		1.029		1.045		1.061		1.077	1.094
Lithium Bromide	20	1.006	1.013		1.028		1.043		1.059		1.075	1.091
Lithium Chloride	20	1.004	1.010		1.022		1.033		1.044		1.056	1.068
M												
Magnesium Chloride	20		1.015						1.065			
	30		1.012						1.062			
Magnesium Sulphate	20		1.019		1.039		1.060		1.082		1.103	1.126
Manganese Chloride	18	1.007	1.015		1.032		1.050		1.068		1.086	1.105
Manganese Sulphate	15	1.009	1.019		1.039		1.060		1.081		1.103	1.125
Mercuric Chloride	20	1.007	1.015	1.024	1.032	1.041	1.050					
Methanol	15.6	0.997	0.996	0.994	0.992	0.991	0.989	0.987	0.986	0.984	0.983	0.980
N												
Nickel Chloride	20	1.008	1.018		1.037		1.057		1.078		1.099	1.121
Nickel Nitrate	20	1.007	1.015		1.033		1.050		1.069		1.088	1.107
Nickel Sulphate	18	1.009	1.020		1.042		1.063		1.085		1.109	1.133
Nitric Acid	20	1.004	1.010	1.015	1.020	1.026	1.031	1.037	1.043	1.049	1.054	1.066
	100		0.969			0.983					1.008	
O												
Oleum (% stands for % free SO ₃)	35		1.827		1.835		1.843		1.850		1.857	1.863
Oxalic Acid	17.5	1.004	1.008	1.013	1.018	1.023	1.028	1.033	1.038	1.042		

Chemical Name	<i>t</i> °C	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	12 %
P												
Phosphoric Acid	20	1.004	1.009	1.014	1.020	1.025	1.031	1.036	1.042	1.047	1.053	1.065
Potassium Bromide	20	1.005	1.013		1.028		1.043		1.058		1.074	1.090
Potassium Carbonate	20	1.007	1.016		1.035		1.053		1.072		1.090	1.110
Potassium Chlorate	18	1.005	1.011	1.018	1.025	1.031	1.038					
Potassium Chloride	20	1.005	1.011		1.024		1.037		1.050		1.063	1.077
Potassium Cyanide	15	1.004	1.009		1.019		1.030		1.040		1.051	1.061
Potassium Dichromate	20	1.005	1.012	1.019	1.026	1.034	1.041	1.048	1.055	1.063	1.070	1.086
Potassium Ferricyanide	20	1.003	1.009		1.020		1.031		1.043		1.054	1.066
Potassium Ferrocyanide	20	1.005	1.012		1.026		1.040		1.054		1.068	1.082
Potassium Hydroxide	0		1.019			1.048					1.096	
	15	1.008	1.018	1.027	1.036	1.045	1.054	1.064	1.073	1.082	1.092	1.111
	50		1.055			1.032					1.077	
Potassium Iodide	20	1.006	1.013		1.028		1.044		1.060		1.076	1.093
Potassium Nitrate	20	1.005	1.011		1.023		1.036		1.049		1.063	1.076
Potassium Permanganate	15	1.006	1.013	1.020	1.027	1.034	1.041					
Potassium Sulphate	20	1.006	1.015	1.023	1.031	1.039	1.048	1.056	1.065	1.073	1.082	
S												
Silver Nitrate	20	1.007	1.015		1.033		1.051		1.069		1.088	1.108
Sodium Bicarbonate	18	1.006	1.013	1.021	1.028	1.035	1.043	1.051	1.058			
Sodium Bromide	20	1.006	1.014		1.030		1.046		1.063		1.080	1.098
Sodium Carbonate	15	1.010	1.020	1.031	1.041	1.052	1.062	1.073	1.083	1.094	1.105	1.127
	25	1.007	1.018	1.028	1.038	1.048	1.059	1.069	1.080	1.090	1.101	1.122

Chemical Name	t °C	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	12 %
Sodium Chlorate	18	1.005	1.012		1.026		1.040		1.054		1.068	1.083
Sodium Chloride	0						1.046		1.062		1.077	1.094
	20	1.005	1.013		1.027		1.041		1.056		1.071	1.086
Sodium Dichromate	15		1.013		1.027		1.041		1.056		1.070	1.084
Sodium Hydrogensulphate	20	1.006	1.014		1.029		1.045		1.061		1.077	1.094
Sodium Hydrogensulphite	15		1.019	1.032	1.042	1.051	1.062		1.084		1.105	1.125
Sodium Hydroxide	0		1.024			1.060					1.117	
	20	1.010	1.021	1.032	1.043	1.054	1.065	1.076	1.087	1.098	1.109	1.131
	100		0.980			1.012					1.064	
Sodium Hypochlorite	20						1.016					
Sodium Nitrate	20	1.005	1.012		1.025		1.039		1.053		1.067	1.082
Sodium Nitrite	20	1.005	1.011		1.024		1.038		1.052		1.065	1.078
Sodium Phosphates												
monobasic	25	1.005	1.012		1.027		1.042		1.058		1.073	
dibasic	18	1.009	1.020	1.031	1.043	1.055	1.067					
tribasic	15	1.009	1.019	1.030	1.041	1.052	1.062	1.074	1.085	1.096	1.108	
Sodium Silicates												
$\text{Na}_2\text{O} \cdot 2,06 \text{SiO}_2$	20	1.007	1.016		1.035		1.054		1.073		1.093	1.113
$\text{Na}_2\text{O} \cdot 3,36 \text{SiO}_2$	20	1.006	1.014		1.030		1.047		1.065		1.083	1.101
Sodium Sulphate	10	1.009	1.018		1.037		1.056		1.075			
	25	1.006	1.015		1.033		1.052		1.070		1.089	1.108
Sodium Sulphide	18	1.010	1.021		1.044		1.067		1.091		1.115	1.139
Sodium Sulphite	19	1.008	1.017		1.036		1.056		1.075		1.095	1.115

Chemical Name	t °C	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	12 %
Sodium Thiocyanate	18	1.004	1.009		1.020		1.030		1.041		1.052	
Sodium Thiosulphate	20	1.007	1.015		1.032		1.048		1.065		1.083	1.100
Stannic Chloride	15	1.007	1.015		1.031		1.047		1.064		1.081	1.099
Stannous Chloride	15	1.007	1.015		1.031		1.047		1.064		1.081	1.099
Sulphuric Acid	0		1.015			1.036					1.074	
	20	1.005	1.012	1.018	1.025	1.032	1.039	1.045	1.052	1.059	1.066	1.080
	100		0.971			0.989					1.021	
Sulphurous Acid	15.5	1.004	1.009		1.019		1.029		1.039		1.049	
Z												
Zinc Chloride	20		1.017		1.035		1.053		1.072		1.090	1.109
Zinc Sulphate	20		1.019		1.040		1.062		1.084		1.107	1.131

Table 13.08 Density ρ (kg/dm³) of aqueous solutions as a function of concentration (*w*: 15 to 65 %) and temperature

Chemical Name	<i>t</i> °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
A												
Acetaldehyde	19	1.003			0.997			0.986		0.971		0.947
Acetic Acid	0		1.034		1.049		1.062		1.073		1.081	
	20	1.020	1.026	1.033	1.038	1.044	1.049	1.053	1.058	1.061	1.064	1.067
	60		1.004		1.011		1.018		1.023		1.028	
Acetone	20		0.972		0.958		0.941		0.921		0.899	
	60		0.947		0.929		0.907		0.884		0.859	
Aluminium Nitrate	18	1.126	1.175		1.281							
Aluminium Sulphate	19	1.164	1.226	1.292								
Ammonia	15	0.941	0.925	0.910	0.895	0.880	0.865	0.849	0.832	0.815	0.796	0.776
	20	0.940	0.923	0.907	0.892							
	50	0.924	0.906	0.888	0.870	0.853	0.835	0.818				
Ammonium Acetate	18	1.030	1.039	1.048	1.057							
Ammonium Bromide	25	1.086	1.119		1.190		1.270					
Ammonium Carbonate	15	1.051	1.068	1.084	1.100	1.116	1.129					
Ammonium Chloride	20	1.043	1.057	1.070								
Ammonium Iodide	18	1.102	1.141	1.183	1.227	1.275	1.326	1.385	1.442			
Ammonium Nitrate	20	1.061	1.083		1.128	1.151	1.175		1.226	1.252	1.279	

Chemical Name	<i>t</i> °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
	40		1.073		1.116		1.163		1.213		1.266	
	100		1.041		1.082		1.127		1.175		1.227	
Ammonium Sulphate	20	1.087	1.115	1.144	1.172	1.200	1.228		1.283			
Ammonium Thiocyanate	18	1.033	1.045	1.057	1.065		1.087		1.111			
Arsenic Acid	15	1.105	1.145	1.187	1.233	1.283	1.337	1.396	1.460	1.530	1.607	1.690
B												
Barium Acetate	18	1.116	1.160	1.207	1.255	1.307	1.361					
Barium Chloride	20	1.145	1.203	1.266								
Barium Hydroxide	15	1.142	1.213	1.287	1.360							
C												
Cadmium Chloride	20	1.143	1.199	1.260	1.327	1.401	1.483	1.575	1.676			
Calcium Chloride	- 30			1.263	1.309							
	- 10	1.138	1.199	1.253	1.298							
	20		1.178	1.228	1.282	1.337	1.396					
Calcium Bisulphite	20		1.040									
Calcium Hydroxide	20	1.092	1.126	1.161	1.199							
Calcium Nitrate	18	1.119	1.164	1.211	1.259	1.311	1.366	1.423				
Chloric Acid	18	1.092	1.127									
Chrome Alum, green	15	1.140	1.193	1.251	1.315	1.383	1.456	1.533	1.615			

Chemical Name	<i>t</i> °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
Chromic Acid	15	1.119	1.163	1.210	1.260	1.313	1.371	1.435	1.505	1.581	1.663	
Citric Acid	18	1.058	1.079	1.101	1.124	1.148	1.172	1.197	1.222			
Copper Chloride	20	1.149	1.205									
Copper Sulphate	20	1.167										
D												
Diethylene Glycol	– 10		1.043				1.076				1.104	
	20		1.034				1.062				1.088	
	140		0.953				0.975				0.993	
E												
Ethanol	– 20						0.963		0.944		0.923	
	0	0.980	0.976	0.971	0.965	0.958	0.949	0.940	0.930	0.918	0.907	0.896
	15	0.977	0.971	0.964	0.957	0.948	0.939	0.929	0.918	0.907	0.895	0.884
	80	0.942	0.932	0.922	0.910	0.899	0.887	0.875	0.863	0.851	0.839	0.827
Ethylene Glycol	– 40										1.110	
	– 20					1.070	1.079	1.087	1.096			
	0		1.033				1.061				1.090	
	40		1.019				1.042				1.063	
	100		0.980				1.000				1.018	

Chemical Name	<i>t</i> °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
F												
Ferric Chloride	20	1.133	1.182	1.234	1.291	1.353	1.417	1.485	1.551			
Ferric Nitrate	18	1.127	1.175	1.228								
Ferric Sulphate	17.5		1.181	1.241	1.307	1.376	1.449	1.528	1.613	1.703	1.798	
Ferrous Chloride	18	1.144	1.200	1.260								
Ferrous Sulphate	18	1.156	1.214									
Formic Acid	20	1.037	1.049	1.061	1.073	1.085	1.096	1.109	1.121	1.132	1.142	1.154
	40		1.037		1.059		1.080					
G												
Glycerol	0	1.039	1.052	1.065	1.079	1.093	1.108	1.122	1.136	1.150	1.164	1.178
	20	1.035	1.047	1.060	1.073	1.086	1.099	1.113	1.126	1.140	1.154	1.168
	60	1.018	1.030	1.043	1.054	1.067	1.079	1.093	1.115	1.118	1.131	1.144
	100		1.025				1.053				1.140	
H												
Hydrobromic Acid	20	1.113	1.158	1.206	1.258	1.315	1.377	1.445	1.517	1.595	1.679	1.768
Hydrochloric Acid	0	1.080	1.107	1.134	1.161	1.188						
	20	1.073	1.098	1.124	1.149	1.174	1.198					

Chemical Name	<i>t</i> °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
	100	1.033	1.058	1.081	1.103	1.122						
Hydrocyanic Acid	18	0.972	0.958	0.943	0.925	0.908	0.892	0.876	0.860	0.844	0.826	0.809
Hydrofluoric Acid	20	1.054	1.070	1.087	1.102	1.116	1.128	1.142	1.155			
Hydrofluorsilicic Acid	17.5	1.127	1.173	1.222	1.273							
Hydrogen Peroxide	0	1.059	1.080	1.100	1.121	1.143	1.165	1.187	1.209	1.232		
	18	1.054	1.073	1.092	1.112	1.133	1.154	1.175	1.197	1.219	1.242	1.265
L												
Lactic Acid	20	1.020			1.060				1.120			
Lead Acetate	18	1.197	1.166	1.217	1.271	1.330	1.399					
Lead Nitrate	18	1.145	1.203	1.266	1.329							
Lithium Bromide	20	1.117	1.162	1.210	1.263	1.320	1.384	1.454				
Lithium Chloride	20	1.085	1.115	1.146	1.179	1.217	1.254					
M												
Magnesium Chloride	20	1.128	1.176	1.226	1.279							
	30	1.124	1.171	1.221	1.272							
Magnesium Sulphate	20	1.160	1.220	1.283								
Manganese Chloride	18	1.134	1.185	1.240	1.299							
Manganese Nitrate	18	1.124	1.172	1.223	1.278	1.337	1.399	1.466	1.538	1.615		
Manganese Sulphate	15	1.160	1.221	1.286	1.357							

Chemical Name	<i>t</i> °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
Methanol	- 40								0.955		0.937	
	- 20			0.980	0.970		0.956		0.942		0.923	
	0	0.978	0.972	0.967	0.961	0.954	0.946	0.937	0.929	0.919	0.909	0.898
	15.6	0.975	0.968	0.961	0.954	0.946	0.937	0.928	0.919	0.909	0.898	0.887
N												
Nickel Chloride	20	1.155	1.215	1.280	1.353							
Nickel Nitrate	20	1.138	1.169	1.249	1.311	1.377						
Nickel Sulphate	18	1.171										
Nitric Acid	0	1.093	1.126	1.159	1.195	1.231	1.265	1.299	1.332	1.364	1.393	1.420
	20	1.084	1.115	1.147	1.180	1.214	1.246	1.278	1.310	1.339	1.367	1.391
	100	1.034	1.60	1.086	1.112	1.138	1.164	1.188	1.212	1.234	1.255	1.275
O												
Oleum (% stands for %free SO ₃)	15		1.920		1.957		1.979		2.009		2.020	
	35	1.872	1.892	1.913	1.928	1.944	1.958	1.966	1.973	1.977	1.974	1.965
P												
Phosphoric Acid	20	1.082	1.113	1.146	1.181	1.216	1.254	1.293	1.355	1.379	1.426	1.475
Potassium Bisulphate	18	1.110	1.150	1.193								
Potassium Bromide	20	1.116	1.160	1.208	1.259	1.315	1.375					

Chemical Name	<i>t</i> °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
Potassium Carbonate	- 10			1.249	1.302	1.361	1.417					
	20		1.190		1.298	1.355	1.414	1.476	1.540			
Potassium Chloride	20	1.097	1.133									
Potassium Cyanide	15	1.077										
Potassium Ferricyanide	20	1.085	1.115									
Potassium Ferrocyanide	20	1.105										
Potassium Hydroxide	0	1.146	1.195	1.246	1.299	1.352	1.407	1.465	1.526			
	15	1.140	1.188	1.239	1.291	1.344	1.399	1.456	1.514			
	50	1.123	1.171	1.221	1.272	1.325	1.379	1.435	1.494			
Potassium Iodide	20	1.119	1.166	1.217	1.271	1.331	1.396	1.467	1.546			
Potassium Nitrate	20	1.097	1.133									
Propanol	- 20		0.990						0.937			
	0	0.983	0.979	0.972	0.963	0.953	0.943	0.933	0.923	0.913	0.903	0.893
	30	0.973	0.964	0.954	0.944	0.933	0.923	0.912	0.902	0.891	0.881	0.870
Propylene Glycol	- 20						1.053	1.059				
	0			1.030	1.036	1.042	1.044	1.052				
	20			1.024	1.028	1.033	1.038	1.043				
	100			0.979	0.980	0.982	0.984	0.986				

Chemical Name	<i>t</i> °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
S												
Silver Nitrate	20	1.139	1.194	1.255	1.321	1.303	1.474		1.668		1.916	
Sodium Bisulphate	20	1.119	1.161									
Sodium Bisulphite	15	1.156	1.203	1.244	1.284	1.323						
Sodium Bromide	20	1.126	1.175	1.227	1.284	1.346						
Sodium Carbonate	20	1.159	1.215	1.274								
	30	1.153	1.209	1.267	1.327							
Sodium Chlorate	18	1.105	1.145	1.187	1.231	1.278	1.329					
Sodium Chloride	– 10	1.120	1.162	1.205								
	20	1.109	1.148	1.189								
Sodium Dichromate	15	1.105			1.207	1.244	1.279	1.312	1.342			
Sodium Hydroxide	0	1.174	1.229	1.285	1.340	1.393	1.443	1.492	1.540			
	20	1.164	1.219	1.274	1.328	1.380	1.430	1.478	1.525			
	100	1.117	1.170	1.223	1.275	1.326	1.375	1.422	1.469			
Sodium Hypochlorite	20				1.230							
Sodium Nitrate	20	1.104	1.143	1.184	1.226	1.270	1.318					
Sodium Sulphide	18	1.176										
Sodium Sulphite	19	1.145										
Sodium Thiosulphate	20	1.127	1.174	1.223	1.274	1.327	1.383					

Chemical Name	t °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
Sodiumsilicates												
$\text{Na}_2 \cdot 2,06 \text{SiO}_2$	20	1.145	1.200	1.260	1.321	1.385	1.450					
$\text{Na}_2 \cdot 3,36 \text{SiO}_2$	20	1.130	1.179	1.235	1.290							
Stannic Chloride	15	1.126	1.173	1.223	1.278	1.337	1.403	1.475	1.555	1.644	1.742	1.851
Stannous Chloride	15	1.126	1.174	1.227	1.284	1.346	1.415	1.490	1.573	1.666	1.770	1.887
Sulphuric Acid	0	1.112	1.150	1.191	1.232	1.275	1.317	1.363	1.411	1.462	1.515	1.571
	20	1.102	1.139	1.178	1.219	1.260	1.303	1.348	1.395	1.445	1.498	1.553
	30	1.097	1.134	1.172	1.212	1.253	1.295	1.340	1.387	1.437	1.490	1.545
	50	1.086	1.122	1.159	1.198	1.238	1.281	1.325	1.372	1.422	1.474	1.528
	75	1.070	1.106	1.142	1.180	1.220	1.263	1.301	1.353	1.402	1.454	1.507
	100	1.054	1.089	1.125	1.163	1.203	1.245	1.289	1.335	1.384	1.435	1.487
Z												
Zinc Chloride	20	1.137	1.187	1.238	1.293	1.352	1.417	1.489	1.568	1.655	1.749	1.851
Chemical Name	t °C	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %
Zinc Sulphate	20	1.168	1.232	1.304	1.378							

The values for the density ρ are taken from reference literature. They are sufficiently accurate for necessary calculations e.g. for the mass or the volume flow, pressure and pump power input.

Intermediate values can be calculated by linear interpolation.

for intermediate values of concentration w :
$$\rho = \rho_1 + \frac{w - w_1}{w_2 - w_1} \cdot (\rho_2 - \rho_1)$$

for intermediate values of temperature t :
$$\rho = \rho_1 + \frac{t - t_1}{t_2 - t_1} \cdot (\rho_2 - \rho_1)$$

13.09 Density ρ (kg/dm³) of aqueous solutions as a function of concentration (w : 70 to 100%) and temperature

Chemical Name	t °C	70 %	75 %	80 %	85 %	90 %	95 %	96 %	97 %	98 %	99 %	100 %
A												
Acetaldehyde	19	0.923			0.854							0.783
Acetic Acid	0	1.087		1.090		1.086						
	20	1.069	1.070	1.070	1.069	1.066	1.061	1.059	1.057	1.055	1.052	1.050
	60	1.030		1.029		1.023						
Acetone	20	0.876		0.850		0.822						
	40	0.855		0.828		0.799						
Ammonium Nitrate	100	1.283		1.342		1.408						
	160								1.422		1.433	
	200								1.406		1.412	
Arsenic Acid	15	1.781										
D												
Diethylene Glycol	- 20			1.132								
	0			1.120								1.135
	20			1.098								1.122
	140			1.014								1.028
E												
Ethanol	- 50	0.926		0.902		0.872						
	- 20	0.901		0.877		0.851						
	0	0.884	0.872	0.860	0.848	0.835	0.821					0.806
	15	0.872	0.860	0.848	0.835	0.822	0.809	0.906	0.803	0.800	0.797	0.794
	80	0.814	0.801	0.789	0.776	0.762	0.749					0.735

Chemical Name	<i>t</i> °C	70 %	75 %	80 %	85 %	90 %	95 %	96 %	97 %	98 %	99 %	100 %
Ethylene Glycol	- 40			1.136								
	0			1.113								1.128
	40			1.085								1.098
	100			1.039								1.054
F G H												
Formic Acid	20	1.166	1.177	1.186	1.195	1.204	1.214	1.216	1.217	1.218	1.220	1.221
Glycerol	0			1.221								1.273
	20	1.181	1.195	1.209	1.222	1.235	1.248	1.251	1.253	1.256	1.259	1.261
	60	1.158	1.171	1.184								1.238
	100			1.155								1.210
Hydrocyanic Acid	18	0.792	0.775	0.758		0.724						0.691
Hydrogen Peroxide	18	1.290	1.315	1.341	1.367	1.393	1.420					1.447
M N O												
Methanol	- 60	0.932		0.910		0.863						
	- 40	0.917		0.894		0.845						
	0	0.887	0.875	0.863	0.851	0.838	0.824	0.821	0.819	0.816	0.813	0.810
	15.6	0.875	0.863	0.850	0.837	0.824	0.810	0.807	0.804	0.802	0.799	0.796
Nitric Acid	0	1.444	1.465	1.485	1.502	1.517	1.529					1.550
	20	1.413	1.434	1.452	1.469	1.483	1.493	1.495	1.497	1.501	1.506	1.513
	50	1.369	1.387	1.404	1.420	1.432	1.443					1.461
	100	1.294	1.311	1.326	1.339	1.351	1.363					1.382
Oleum (% stands for % of free SO ₃)	15	2.018		2.008		1.990						1.984
	35	1.955	1.941	1.925	1.908	1.889	1.866	1.861	1.855	1.849	1.843	1.837

Chemical Name	t °C	70 %	75 %	80 %	85 %	90 %	95 %	96 %	97 %	98 %	99 %	100 %
P												
Phosphoric Acid	20	1.526	1.579	1.633	1.689	1.746	1.807	1.819	1.832	1.844	1.857	1.870
Propanol	-20	0.903										0.838
	0	0.884	0.874	0.863	0.853	0.843	0.832					0.819
	20	0.868	0.858	0.847	0.837	0.827	0.816					0.804
	30	0.860	0.850	0.839	0.829	0.819	0.808					0.796
Propanol (Iso-P.)	20	0.860	0.848	0.836	0.824	0.812	0.799					0.785
S Z												
Stannic Chloride	15	1.971										
Sulphuric Acid	0	1.629	1.687	1.748	1.801	1.836	1.855					1.851
	20	1.611	1.669	1.727	1.779	1.814	1.834	1.836	1.836	1.836	1.834	1.831
	50	1.584	1.642	1.697	1.747	1.783	1.804					1.801
	100	1.542	1.597	1.649	1.697	1.733	1.757					1.758
Zinc Chloride	20	1.962										

The values for the density ρ are taken from reference literature. They are sufficiently accurate for necessary calculations e.g. for the mass or the volume flow, pressure and pump power input.

Intermediate values can be calculated by linear interpolation.

for intermediate values of concentration w :
$$\rho = \rho_1 + \frac{w - w_1}{w_2 - w_1} \cdot (\rho_2 - \rho_1)$$

for intermediate values of temperature t :
$$\rho = \rho_1 + \frac{t - t_1}{t_2 - t_1} \cdot (\rho_2 - \rho_1)$$