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## SOLUBILITY DATA FOR AQUEOUS SOLUTIONS

Table 1. Solubility of substances (solid, liquid, or gas) in pure water at 20 °C and 100 kPa (i.e. mass concentration in the liquid phase, in equilibrium with the solute pure phase).

Substance	Formula(estate)	Solubility [kg/m <sup>3</sup> solution]
<u>Solid solutes</u>		
Ammonium chloride	NH <sub>4</sub> Cl(s)	(297 g/kg solvent)
Ammonium nitrate	NH <sub>4</sub> NO <sub>3</sub> (s)	(1180 g/kg solvent)
Aspirin /Acetyl salicylic acid)	HC <sub>9</sub> H <sub>7</sub> O <sub>4</sub> (s)	3.3
Baking soda	NaHCO <sub>3</sub> (s)	100
Caustic soda	NaOH(s)	420
Washing soda (sodium carbonate hydrate)	Na <sub>2</sub> CO <sub>3</sub> ·10H <sub>2</sub> O(s)	280
Sodium nitrate	NaNO <sub>3</sub> (s)	(890 g/kg solvent)
Potassium nitrate	KNO <sub>3</sub> (s)	(300 g/kg solvent)
Calcite	CaCO <sub>3</sub> (s)	0.014
Calcium chloride	CaCl <sub>2</sub> (s)	(750 g/kg solvent)
Potassium chlorate	KClO <sub>3</sub> (s)	80
Potassium chloride	KCl(s)	(330 g/kg solvent)
Salt (sodium chloride)	NaCl(s)	(360 g/kg solvent)
Sugar (sucrose)	C <sub>12</sub> H <sub>22</sub> O <sub>11</sub> (s)	790 (=1600 g/kg solvent)
Glucose	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> (s)	570 (=890 g/kg solvent)
<u>Liquid solutes</u>		
Acetone	C <sub>3</sub> H <sub>6</sub> O(l)	miscible
Benzene	C <sub>6</sub> H <sub>6</sub> (l)	1.75
Cyclohexane	C <sub>6</sub> H <sub>12</sub> (l)	0.060
n-Butane	C <sub>4</sub> H <sub>10</sub> (l)	0.061
n-Pentane	C <sub>5</sub> H <sub>12</sub> (l)	0.040
n-Hexane	C <sub>6</sub> H <sub>14</sub> (l)	0.012
n-Heptane	C <sub>7</sub> H <sub>16</sub> (l)	0.006
<u>Gaseous solutes*</u>		
Acetylene	C <sub>2</sub> H <sub>2</sub> (g)	1.1
Ammonia	NH <sub>3</sub> (g)	520 (560 g/kg solvent)
Argon	Ar(g)	0.060
Carbon dioxide	CO <sub>2</sub> (g)	1.5
Carbon monoxide	CO(g)	0.028
Methane	CH <sub>4</sub> (g)	0.020
Helium	He(g)	0.002
Hydrogen	H <sub>2</sub> (g)	0.002
Hydrogen chloride	HCl(g)	82
Nitrogen	N <sub>2</sub> (g)	0.019
di-Nitrogen oxide	N <sub>2</sub> O(g)	2.2
Nitrogen monoxide	NO(g)	0.006
Oxygen	O <sub>2</sub> (g)	0.043
Sulfur dioxide	SO <sub>2</sub> (g)	100

\*At 100 kPa (gas solubility is proportional to pressure in the ideal-solution limit; see table below).

Table 2. Gas solubility data in liquids and solids. The quotient  $c_{i,liq}/c_{i,gas}$  or  $c_{i,sol}/c_{i,gas}$  is presented, i.e. the so-called Ostwald solubility coefficient,  $K_{cc}$  (in mol/m<sup>3</sup> of solute in solution, per mol/m<sup>3</sup> of solute in its pure phase); other forms of Henry law constant are also in common use; e.g.  $K_{pp}=K_{cc}M_i/(R_uT)$  (in kg/m<sup>3</sup> of solute in solution, per unit partial-pressure of solute in its pure phase; e.g. for CO<sub>2</sub> at 273,  $K_{cc}=1.8$  implies  $K_{pp}=K_{cc}M_i/(R_uT)=1.8\cdot0.044/(8.3\cdot273)=35\cdot10^{-6}$  (kg/m<sup>3</sup>)/Pa=3.5 (kg/m<sup>3</sup>)/bar).

Mixture	at 273 K	at 288 K	at 298 K	at 323 K
O <sub>2</sub> (g) in H <sub>2</sub> O(l)	0.044	0.036	0.032 (=23 ppm_mol/bar=1.3 (mol/m <sup>3</sup> )/bar)	0.025
N <sub>2</sub> (g) in H <sub>2</sub> O(l)	0.027	0.018	0.015 (=11 ppm_mol/bar=0.60 (mol/m <sup>3</sup> )/bar)	0.011
H <sub>2</sub> (g) in H <sub>2</sub> O(l)	0.024	0.021	0.019 (=14 ppm_mol/bar=0.77 (mol/m <sup>3</sup> )/bar)	0.017
CO <sub>2</sub> (g) in H <sub>2</sub> O(l)	1.8	1.1	0.80 (=580 ppm_mol/bar=32 (mol/m <sup>3</sup> )/bar)	0.50
CO(g) in H <sub>2</sub> O(l)	0.03	0.026	0.23 (=170 ppm_mol/bar=9.2 (mol/m <sup>3</sup> )/bar)	0.020
CH <sub>4</sub> (g) in H <sub>2</sub> O(l)	0.060	0.039	0.027 (=20 ppm_mol/bar=1.1 (mol/m <sup>3</sup> )/bar)	0.024
C <sub>2</sub> H <sub>2</sub> (g) in H <sub>2</sub> O(l)	1.9	1.1	0.99 (=730 ppm_mol/bar=40 (mol/m <sup>3</sup> )/bar)	
NH <sub>3</sub> (g) in H <sub>2</sub> O(l)	1190	844	684 (=33%_mol/bar=28000 (mol/m <sup>3</sup> )/bar)	370
N <sub>2</sub> O(g) in H <sub>2</sub> O(l)	1.3		0.567 (=410 ppm_mol/bar=23 (mol/m <sup>3</sup> )/bar)	
H <sub>2</sub> S(g) in H <sub>2</sub> O(l)		3.0	2.5 (=1800 ppm_mol/bar=100 (mol/m <sup>3</sup> )/bar)	1.8
O <sub>2</sub> (g) in rubber			0.08	
N <sub>2</sub> (g) in rubber			0.04	
H <sub>2</sub> (g) in rubber			0.05	
CO <sub>2</sub> (g) in rubber			1.0	
H <sub>2</sub> (g) in polyethylene			0.04	
H <sub>2</sub> (g) in nickel			0.22	

More detailed solubility data, and many other properties, can be found in [Solution properties](#) for some special solutions: salt-water, sugar-water, alcohol-water, hydrogen peroxide-water, ammonia-water and carbon dioxide-water.

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