

## ELECTRICAL CONDUCTIVITY OF AQUEOUS SOLUTIONS

The following table gives the electrical conductivity of aqueous solutions of some acids, bases, and salts as a function of concentration. All values refer to 20 °C. The conductivity  $\kappa$  (often called specific conductance in older literature) is the reciprocal of the resistivity. The molar conductivity  $\Lambda$  is related to this by  $\Lambda = \kappa/c$ , where  $c$  is the amount-of-substance concentration of the electrolyte. Thus if  $\kappa$  has units of millisiemens per centimeter (mS/cm), as in this table, and  $c$  is expressed in mol/L, then  $\Lambda$  has units of  $S\text{ cm}^2\text{ mol}^{-1}$ . For these electrolytes the concentration  $c$  correspond-

ing to the mass percent values given here can be found in the table "Concentrative Properties of Aqueous Solutions" in Section 8.

### References

1. *CRC Handbook of Chemistry, and Physics, 70th Edition*, Weast, R. C., Ed., CRC Press, Boca Raton, FL, 1989, p. D-221.
2. Wolf, A. V., *Aqueous Solutions and Body Fluids*, Harper and Row, New York, 1966.

**Electrical Conductivity  $\kappa$  in mS/cm for the Indicated Concentration in Mass Percent**

Name	Formula	0.5%	1%	2%	5%	10%	15%	20%	25%	30%	40%	50%
Acetic acid	CH <sub>3</sub> COOH	0.3	0.6	0.8	1.2	1.5	1.7	1.7	1.6	1.4	1.1	0.8
Ammonia	NH <sub>3</sub>	0.5	0.7	1.0	1.1	1.0	0.7	0.5	0.4			
Ammonium chloride	NH <sub>4</sub> Cl	10.5	20.4	40.3	95.3	180						
Ammonium sulfate	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	7.4	14.2	25.7	57.4	105	147	185	215			
Barium chloride	BaCl <sub>2</sub>	4.7	9.1	17.4	40.4	76.7	109.0	137.0				
Calcium chloride	CaCl <sub>2</sub>	8.1	15.7	29.4	67.0	117	157	177	183	172	106	
Cesium chloride	CsCl	3.8	7.4	13.8	32.9	65.8	102	142				
Citric acid	H <sub>3</sub> C(OH)(COO) <sub>3</sub>	1.2	2.1	3.0	4.7	6.2	7.0	7.2	7.1			
Copper(II) sulfate	CuSO <sub>4</sub>	2.9	5.4	9.3	19.0	32.2	42.3					
Formic acid	HCOOH	1.4	2.4	3.5	5.6	7.8	9.0	9.9	10.4	10.5	9.9	8.6
Hydrogen chloride	HCl	45.1	92.9	183								
Lithium chloride	LiCl	10.1	19.0	34.9	76.4	127	155	170	165	146		
Magnesium chloride	MgCl <sub>2</sub>	8.6	16.6	31.2	66.9	108	129	134	122	98		
Magnesium sulfate	MgSO <sub>4</sub>	4.1	7.6	13.3	27.4	42.7	54.2	51.1	44.1			
Manganese(II) sulfate	MnSO <sub>4</sub>		6.2	10.6	21.6	34.5	43.7	47.6				
Nitric acid	HNO <sub>3</sub>	28.4	56.1	108								
Oxalic acid	H <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	14.0	21.8	35.3	65.6							
Phosphoric acid	H <sub>3</sub> PO <sub>4</sub>	5.5	10.1	16.2	31.5	59.4	88.4	118	146	173	209	
Potassium bromide	KBr	5.2	10.2	19.5	47.7	95.6	144	194				
Potassium carbonate	K <sub>2</sub> CO <sub>3</sub>	7.0	13.6	25.4	58.0	109	152	188	223			
Potassium chloride	KCl	8.2	15.7	29.5	71.9	143	208					
Potassium dihydrogen phosphate	KH <sub>2</sub> PO <sub>4</sub>	3.0	5.9	11.0	25.0	44.6						
Potassium hydrogen carbonate	KHCO <sub>3</sub>	4.6	8.9	17.0	38.8	72.4	101	128				
Potassium hydrogen phosphate	K <sub>2</sub> HPO <sub>4</sub>	5.2	9.9	18.3	40.3							
Potassium hydroxide	KOH	20.0	38.5	75.0	178							
Potassium iodide	KI	3.8	7.5	14.2	35.2	71.8	110	188	224			
Potassium nitrate	KNO <sub>3</sub>	5.5	10.7	20.1	47.0	87.3	124	157	182			
Potassium permanganate	KMnO <sub>4</sub>	3.5	6.9	13.0	30.5							
Potassium sulfate	K <sub>2</sub> SO <sub>4</sub>	5.8	11.2	21.0	48.0	88.6						
Silver(I) nitrate	AgNO <sub>3</sub>	3.1	6.1	12.0	26.7	49.8	72.0	92.8	112	129	162	
Sodium acetate	NaCH <sub>3</sub> COO	3.9	7.6	14.4	30.9	53.4	64.1	69.3	69.2	64.3		
Sodium bromide	NaBr	5.0	9.7	18.4	44.0	84.6	122	157	191	216		
Sodium carbonate	Na <sub>2</sub> CO <sub>3</sub>	7.0	13.1	23.3	47.0	74.4	88.6					
Sodium chloride	NaCl	8.2	16.0	30.2	70.1	126	171	204	222			
Sodium citrate	Na <sub>3</sub> C <sub>6</sub> H <sub>5</sub> O <sub>7</sub>		7.4	12.8	26.2	42.1	52.0	57.1	57.3	53.5		
Sodium dihydrogen phosphate	NaH <sub>2</sub> PO <sub>4</sub>	2.2	4.4	9.1	21.0	33.2	43.3	49.6	53.1	54.0	46.1	
Sodium hydrogen carbonate	NaHCO <sub>3</sub>	4.2	8.2	15.0	31.4							
Sodium hydrogen phosphate	Na <sub>2</sub> HPO <sub>4</sub>	4.6	8.7	15.6	31.4							
Sodium hydroxide	NaOH	24.8	48.6	93.1	206							
Sodium nitrate	NaNO <sub>3</sub>	5.4	10.6	20.4	46.2	82.6	111	134	152	165	178	
Sodium phosphate	Na <sub>3</sub> PO <sub>4</sub>	7.3	14.1	22.7	43.5							
Sodium sulfate	Na <sub>2</sub> SO <sub>4</sub>	5.9	11.2	19.8	42.7	71.3	91.1	109				
Sodium thiosulfate	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	5.7	10.7	19.5	43.3	76.7	104	123	134	136	118	
Strontium chloride	SrCl <sub>2</sub>	5.9	11.4	22.0	49.1	91.5	127	153	168	178		
Sulfuric acid	H <sub>2</sub> SO <sub>4</sub>	24.3	47.8	92	211							
Trichloroacetic acid	CCl <sub>3</sub> COOH	10.3	19.6	37.2	84.7	148	193	221				
Zinc sulfate	ZnSO <sub>4</sub>	2.8	5.4	10.0	20.5	33.7	43.3					