

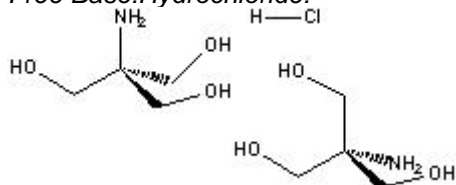
TECHNICAL INFORMATION

Catalog Number: 103130, 103132, 103133, 152176, 194557, 194558, 194855, 194856, 195605, 816100, 819620, 819623, 819638

Tris and Tris hydrochloride

Structures:

Free Base: Hydrochloride:



Molecular Formula:

Free Base: $C_4H_{11}NO_3$ Molecular Weight: 121.1

Hydrochloride: $C_4H_{11}NO_3 \cdot HCl$ Molecular Weight: 157.6

CAS

Free Base: 77-86-1

Hydrochloride: 1185-53-1

Synonyms: Tris-[hydroxymethyl]aminomethane; THAM; 2-Amino-2-(hydroxymethyl)- 1,3-propanediol; Tromethamine; Trometamol

pH of a 0.05 M aqueous Solution:

Free Base: 10.4

Hydrochloride: 4.7

pKa (Tris Base): 8.1 at 25°C

Description: Tris and Tris Hydrochloride have been useful as buffers in a wide variety of biological systems. Uses include pH control *in vitro*^{1,2} and *in vivo*^{3,4} for body fluids and in buffering systems for electrophoresis applications.^{2,11} Tris has been used as a starting material for polymers, oxazolones (with carboxylic acids) and oxazolidines (with aldehydes).⁶ Tris does not precipitate calcium salts and is of value in maintaining solubility of manganese salts.⁷ It can be used for the direct standardization of a strong acid solution; the equivalence point can be determined either potentiometrically or by use of a suitable indicator such as 3-(4-Dimethylamino-1-naphthylazo)-4-methoxybenzenesulfonic acid (MP # 157794).

Tris is relatively non-hygroscopic; however, if needed, Tris Base can be dried at 100°C for up to 4 hours to remove any water.

Neither Tris Base or Tris Hydrochloride by themselves provide adequate buffering capacity. Generally the two need to be mixed together to provide a buffer with pH between 7 and 9 to provide adequate buffering. Typical mixtures would be:

at Temperature		M Solution	
pH		g/L for 0.05	
5°C	25°C	Tris HCl	Tris Base

37°C

7.76	7.20		7.02	0.67
7.89	7.30	6.91	6.85	0.80
7.97	7.40	7.02	6.61	0.97
8.07	7.50	7.12	6.35	1.18
8.18	7.60	7.22	6.06	1.39
8.26	7.70	7.30	5.72	1.66
8.37	7.80	7.40	5.32	1.97
4.48	7.90	7.52	4.88	2.30
8.58	8.00	7.62	4.44	2.65
8.68	8.10	7.71	4.02	2.97
8.78	8.20	7.80	3.54	3.34
8.88	8.30	7.91	3.07	3.70
8.98	8.40	8.01	2.64	4.03
9.09	8.50	8.10	2.21	4.36
9.18	8.60	8.22	1.83	4.65
9.28	8.70	8.31	1.50	4.90
9.36	8.80	8.42	1.23	5.13
9.47	8.90	8.51	0.96	5.32
9.56	9.00	8.62	0.76	5.47
		8.70		

Alternatively, Tris buffers can be made by using Tris Base and titrating with a hydrochloric acid solution to the desired pH value.

Effects of Temperature on pH: As Tris solutions decrease in temperature from 25°C to 5°C, the pH value increases an average of 0.03 units per °C. As the solution increases in temperature from 25°C to 37°C, the pH decreases an average of 0.025 units per °C.

Effects of Concentration on pH: Increasing the total Tris concentration from 0.05 M to 0.5 M will increase the pH by about 0.05. Decreasing the concentration from 0.05 M to 0.005 M will decrease the pH by about 0.05.

Sterilization of Solutions: Tris solutions can be autoclaved (121°C, 15 psi, 15 minutes) or sterile filtered.

Solubility (Tris Base): Soluble in water (550 mg/ml), ethylene glycol (79.1 mg/ml), methanol (26 mg/ml), anhydrous ethanol (14.6 mg/ml), 95% ethanol (22.0 mg/ml), DMF (14 mg/ml), acetone (2 mg/ml), ethyl acetate (0.5 mg/ml), olive oil (0.4 mg/ml), and chloroform (0.05 mg/ml)

Availability:

Catalog Number	Description	Size
819620	Tris, Ultra Pure	500 g
819623	Purity: Not less than 99.9%	1 kg
819638		5 kg
103133	Tris	100 g
	Purity: Not less than 99.95%	250 g
		500 g
		1 kg
		5 kg
		10 kg
194557	Tris, Cell Culture Reagent	100 g
		500 g
		1 kg
		5 kg
194855	Tris, Molecular Biology Reagent	100 g
		250 g
		500 g
		1 kg
		5 kg
195605	Tris, U.S.P. Grade	50 g
	Purity: Not less than 99.95%	100 g
		500 g
		1 kg
152176	Tris	100 g
	Purity: Approximately 99.0% to 99.5%	250 g
		500 g
		1 kg
		5 kg
		10 kg
103132	Tris, Technical Grade	500 g
	Purity: Not less than 96%	1 kg
		5 kg
		25 kg
103130	Tris Hydrochloride	100 g
	Purity: Not less than 99%	250 g
		500 g
		1 kg
		5 kg
816100	Tris Hydrochloride	1 kg
	Purity: Not less than 99%	
194558	Tris Hydrochloride, Cell Culture Reagent	100 g
		500 g
		1 kg
		5 kg
194856	Tris Hydrochloride, Molecular Biology Reagent	100 g
		250 g
		500 g

References:

- Bates, R.G., Vega, C.A. and White, D.R., *Anal. Chem.*, v. **50**, 1295 (1978).
- Nahas, G.G., *Ann. N.Y. Acad. Sci.*, v. **92**, 333-812 (1961).
- Nahas, G.G., *Pharm. Rev.*, v. **14**, 447 (1962).
- Nahas, G.G., "Use of an organic carbon dioxide buffer in vivo." *Science*, v. **129**, 782 (1959).
- Manfredi, F., Seiker, H.O, Spoto, A.P. and Saltzman, H.A., "Severe carbon dioxide intoxication." *JAMA*, v. **173**, 999 (1960).
- Frump, J.A., *Chem. Rev.*, v. **71**, 483-505 (1971).
- McFarland, W.N. and Norris, K.S., "The control of pH by buffers in fish transport." *California Fish and Game*, v. **44** (4291) (1958).
- Fossum, J.H., Markunas, P.C. and Riddick, J.A., "Tris(hydroxymethyl) aminomethane as an acidimetric standard." *Anal. Chem.*, v. **23**, 491 (1951).
- Bates, R.G. and Pinching, G.D., *J. Research Natl. Bur. Standards*, v. **43**, 519 (1949).

- Ryan, M.F, *Science*, v. **165**, 851 (1969).
- *Anal. Chem.*, v. **37 (10)**, 1291 (1965).
- *Merck Index*, **12th Ed.**, No. 9902.