

Properties of Some Common Food Acidulants

Property	Citric Acid	Malic Acid	Fumaric Acid	Tartaric Acid
Appearance	White Crystals	White Crystal Powder	White Crystal Powder	White Crystals
Crystal System	Monoclinic Holohedra	Triclinic Crystal	Monoclinic Prisms	Monoclinic Sphenoidal Prisms
Taste	Tart	Smooth Tart	Tart	Bitter Tart
Odour	None	None	None	None
Empirical Formula	C ₆ H ₈ O ₇	C ₄ H ₆ O ₅	C ₄ H ₄ O ₄	C ₄ H ₆ O ₆
Molecular Weight	192.12	134.09	116.07	150.09
Equivalent Weight	64.04	67.05	58.04	75.05
Melting Point C	153	128.5 - 129	286 - 287	168 - 170
Specific Gravity	1.542 (18 /4)	1.601 (20 /4)	1.635 (20 /4)	1.7598 (20 /4)
Bulk Density, kg/m ³	900.2	890.6	961.1	804.1
Solubility in Ethanol (g./100ml @ 25 C)	58.9	39.16	4.3	19.6
Solubility in Ether (g./100ml @ 25 C)	1.84	1.41	0.56	0.59
Solubility in Chloroform (g./100ml @ 25 C)	<0.01	0.04	0.02	0.04
Heat of Combustion (kcal./mole, 20 C)	-474.5	-320.1	-320.0	-257.1
Heat of Solution (kcal./mole solute)	3.9	4.9	-	3.3
Viscosity 50% Aq. Solutions, cps., 25 C	6.5	6.5	#	6.5
Standard Free energy of Anion formation, F , kcal., 25 C, aq. solutions (4,5)	-278.8	-201.98	-144.41	-
Sp.Gr.Sat. Aq.Solutions (5) (25) (75)	1.24 1.28 1.31	1.210 1.250 1.310	1.000 1.000 0.989	1.26 1.27 1.31
Buffering Index*	2.46	3.26	3.46	3.53

Solubility too limited

* The slope of the pH-titration curve between pH 3.5-5 for 100ml of 0.01N acid titrated with 0.1N sodium hydroxide. The larger the value, the better the buffering action of the acid and its salt.