



COMBINATION and MONO ISE

Part Number COMB	Part Number MONO	Ionic Species	Concentration Range (Mol/L)	Limits (ppm)*	Temperature Range (°C)	Main Interferences (Selectivity Coefficients) **	pH Range	ISAB (Ionic Strength Adjustment Buffer)	Reference if mono being used
321-75	X	Ammonia (NH ₃)	10 ⁻⁶ – 1	0.02 – 17,000	5 – 50	Hydrazine	11 – 13	1M NaOH (Sodium Hydroxide)	Combination only
362-75	334-75	Ammonium (NH ₄ ⁺)	5 x 10 ⁻⁵ – 0.5	0.9 – 9,000	5 – 50	K ⁺ (0.1), Na ⁺ (0.002), Mg ²⁺ (0.0002), Ca ²⁺ (0.00006), Li ⁺ (0.00003)	0 – 8.5	1M CH ₃ COOLi (Lithium Acetate)	R2
368-75	312-75	Barium (Ba ²⁺)	10 ⁻⁵ – 10 ⁻¹	1.4 – 13,700	5 – 50	Sr ²⁺ (0.09), Na ⁺ (0.02), K ⁺ (0.02), Mg ²⁺ (0.006), NH ₄ ⁺ (0.003), Ca ²⁺ (0.002), Li ⁺ (0.002)	3 – 10	1M CH ₃ COOLi (Lithium Acetate)	R2
375-75	302-75	Bromide (Br ⁻)	5 x 10 ⁻⁶ – 1	0.4 – 81,000	5 – 50	Ag ⁺ , CN ⁻ , I ⁻ , S ²⁻ must be absent, Cl ⁻ (0.002), OH ⁻ (0.00003)	1 – 12	1M KNO ₃ (Potassium Nitrate)	R2
373-75	309-75	Cadmium (Cd ²⁺)	10 ⁻⁶ – 10 ⁻¹	0.1 – 11,200	5 – 50	Ag ⁺ , S ²⁻ , Cu ²⁺ , Hg ²⁺ must be absent; Iron and Lead ions (10) - these should be less than a hundredth of the Cadmium concentration	3 – 7	1M KNO ₃ (Potassium Nitrate)	R2
361-75	310-75	Calcium (Ca ²⁺)	5 x 10 ⁻⁷ – 10 ⁻¹	0.02 – 4,010	5 – 50	Al ³⁺ (5) – only tolerated in low concentrations, Fe ²⁺ (0.02), Sr ²⁺ (0.008), Ba ²⁺ (0.005), Cu ²⁺ (0.002), Na ⁺ (0.0005), Mg ²⁺ (0.0006), K ⁺ (0.00005), NH ₄ ⁺ (0.00003), Li ⁺ (0.00001)	3.5 – 11	1M KCl (Potassium Chloride)	R1
364-75	301-75	Chloride (Cl ⁻)	3 x 10 ⁻⁵ – 1	1 – 35,500	5 – 50	I ⁻ , Br ⁻ , CN ⁻ , S ²⁻ and Ag ⁺ must be absent, or only present in insignificant amounts compared to the Cl ⁻ ion	1 – 12	1M KNO ₃ (Potassium Nitrate)	R2
379-75	306-75	Cupric (Cu ²⁺)	10 ⁻⁷ – 1	0.006 – 64,000	5 – 50	Ag ⁺ , Hg ²⁺ and S ²⁻ must be absent, Br ⁻ and Cl ⁻ (> 1)	2 – 7	1M KNO ₃ (Potassium Nitrate)	R2
377-75	304-75	Cyanide (CN ⁻)	10 ⁻⁶ – 10 ⁻²	0.03 – 260	5 – 50	Ag ⁺ , I ⁻ and S ²⁻ must be absent, Br ⁻ can interfere	11 – 13	1M NaOH (Sodium Hydroxide)	R2
365-75	333-75	Fluoride (F ⁻)	10 ⁻⁶ – 10 ⁻¹	0.02 – 1,900	5 – 50	OH ⁻ (0.1)	4 – 8	TISAB	R1
376-75	303-75	Iodide (I ⁻)	5 x 10 ⁻⁷ – 1	0.06 – 127,000	5 – 50	Br ⁻ (0.0004), Cl ⁻ (0.000001), Ag ⁺ , S ²⁻ must be absent, CN ⁻ (1)	2 – 12	1M KNO ₃ (Potassium Nitrate)	R2
372-75	307-75	Lead (Pb ²⁺)	10 ⁻⁶ – 10 ⁻¹	0.2 – 20,800	5 – 50	Cd ²⁺ (>1), Ag ⁺ , S ²⁻ , Cu ²⁺ , Fe ²⁺ , Fe ³⁺ and Hg ²⁺ must be absent	3 – 7	1M KNO ₃ (Potassium Nitrate)	R2

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360-75	311-75	Nitrate (NO ₃ ⁻)	7 x 10 ⁻⁶ – 1	0.4 – 62,000	5 – 50	Cl ⁻ (0.006), HCO ₃ ⁻ (0.005), NO ₂ ⁻ (0.001), CH ₃ COO ⁻ (0.0005), F ⁻ (0.0001), SO ₄ ²⁻ (0.00001)	2 – 11	1M (NH ₄) ₂ SO ₄ (Ammonium Sulphate)	R2
367-75	X	Perchlorate (ClO ₄ ⁻)	2 x 10 ⁻⁶ – 1	0.2 – 99,500	5 – 50	SCN ⁻ (0.03), I ⁻ (0.02), NO ₃ ⁻ (0.02), Cl ⁻ (0.0003), PO ₄ ³⁻ (0.0002), CH ₃ COO ⁻ (0.0001)	0 – 11	1M CH ₃ COOLi (Lithium Acetate)	R1
366-75	314-75	Potassium (K ⁺)	10 ⁻⁶ – 1	0.04 – 39,000	5 – 50	Rb ⁺ (2), Cs ⁺ (0.4), NH ₄ ⁺ (0.01), Na ⁺ (0.0004), Ca ²⁺ (0.0003), Mg ²⁺ (0.0003), Li ⁺ (0.0001)	1 – 9	0.1M TEAC (Tetraethylammonium Chloride)	R2
371-75	308-75	Silver (Ag ⁺)	10 ⁻⁷ – 1	0.01 – 107,900	5 – 50	S ²⁻ and Hg ²⁺ must be absent or in very low concentrations relative to the silver concentration	1 – 9	5M KNO ₃ (Potassium Nitrate)	R2
315-77	315-75	Sodium (Na ⁺) (glass)	10 ⁻⁷ – 3	0.002 – 69,000	5 – 80	Li ⁺ , K ⁺ , Pb ⁺ , NH ₄ ⁺ , Ag ⁺ , Ti ⁺	9 – 12	Ammonium Chloride + Ammonium Hydroxide	R2
315-78	305-75	Sodium (Na ⁺) (PVC)	4 x 10 ⁻⁵ – 1.5	1- 35,000	5 – 50	K ⁺ (0.6), NH ₄ ⁺ (0.2), Ca ²⁺ (0.02) Mg ²⁺ (0.03), S ²⁻ , Br ⁻ , CN ⁻ , I ⁻	1 - 12	2M Lithium Acetate	R2
378-75	X	Sulphide (S ²⁻)	10 ⁻⁷ – 1	0.003 – 32,000	5 – 50	Ag ⁺ and Hg ²⁺ must be absent	13 – 14	5M KNO ₃ (Potassium Nitrate)	R2
380-75	X	Thiocyanate (SCN ⁻)	2 x 10 ⁻⁵ – 10 ⁻¹	1 – 5,800	5 – 50	Ag ⁺ , S ²⁻ , Cl ⁻ , I ⁻ must be absent, Br ⁻ and S ₂ O ₃ ²⁻ small interferences	2 – 12	1M KNO ₃ (Potassium Nitrate)	R2
370-75	X	Water Hardness	5 x 10 ⁻⁷ – 10 ⁻¹	0.02 – 4,010	5 – 50	Al ³⁺ (5) – only tolerated in low concentrations, Fe ²⁺ (0.02), Sr ²⁺ (0.008), Ba ²⁺ (0.005), Cu ²⁺ (0.002), Na ⁺ (0.0005), Mg ²⁺ (0.0006), K ⁺ (0.00005), NH ₄ ⁺ (0.00003), Li ⁺ (0.00001)	4.5 – 10	1M KCl (Potassium Chloride)	R1

* These limits are based on detection. i.e. in a bath at 25 degrees small volumes (5 micro litres) of a standard are added until a deflection in the mV data, that is above general noise, is observed. The solution is slightly buffered deionised water. As a guide, if the lower limit is multiplied by 10, that will give quite a good linear detection limit or at least one that one can calibrate to.

** The Selectivity Coefficient (SC) quantifies the apparent increase in the measured concentration caused by 1 unit of the interferent. Multiply the SC by 100 to give the % error when the analyte and the interferent are at the same concentration.