

Method Abstract #126

Calcium, Magnesium and Total Hardness Determination by Potentiometric Titration Using TRIS Buffer

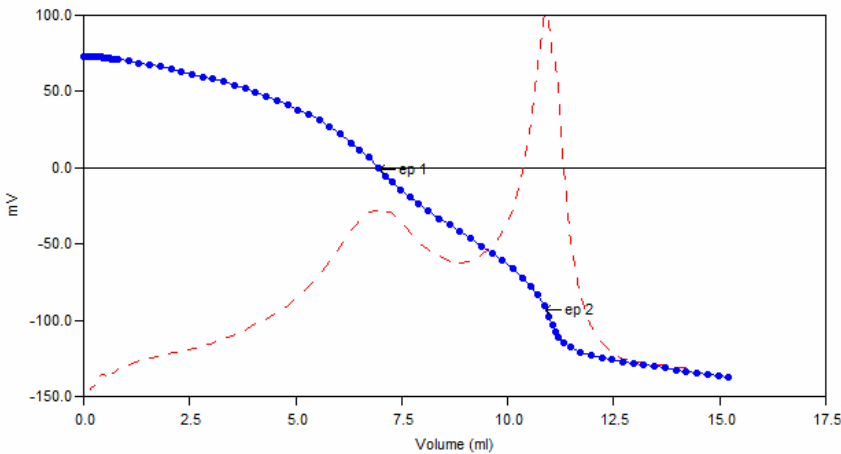
Scope and Application

This method is useful for monitoring the calcium, magnesium and total hardness in water samples. It is a variation of Standard Method 2340-C and ASTM D 1126.

Method Summary

Hardness analysis typically involves the addition of an ammonium hydroxide buffer to a water sample prior to titration. The traditional buffer is caustic and causes a shocking effect on the pH electrode. It also has an undesirable odor. This method utilizes a TRIS-based buffer which eliminates the shocking effect. Like the traditional method, after addition of the buffer samples are titrated with EDTA to two endpoints. From these, the calcium, magnesium, and total hardness concentrations are calculated.

Sample Titration Curve



*Data for this measuring range was obtained using laboratory prepared standards formulated from calcium carbonate. The measuring range may be increased by using larger capacity analysis vessels and/or auto-dilution.

**The Method Detection Limit (MDL) calculation procedure was obtained from US EPA 40 CFR Appendix B to Part 136 - Definition and Procedure for the Determination of the Method Detection Limit. Results may differ depending on laboratory practices and sample matrix.

Method Performance

Parameter	Specification		
	CaCO ₃ (Total Hardness)	Ca ²⁺	Mg ²⁺
Measuring Range*	1 – 600ppm	2.05 – 210ppm	0.3 – 130ppm
MDL**	0.99ppm	0.28ppm	0.11ppm
RSD @ MDL	24.03% or +/- 0.35ppm	4.81% or +/- 0.10ppm	21.05% or +/- 0.04ppm
RSD for City of Guelph tap water	2.29% or +/- 9.04ppm (AVG 394.45ppm)	5.06% or +/- 5.47ppm (AVG 108.02ppm)	6.21% or +/- 1.88ppm (AVG 30.29ppm)