

Method Abstract #115

Calcium and Magnesium Hardness

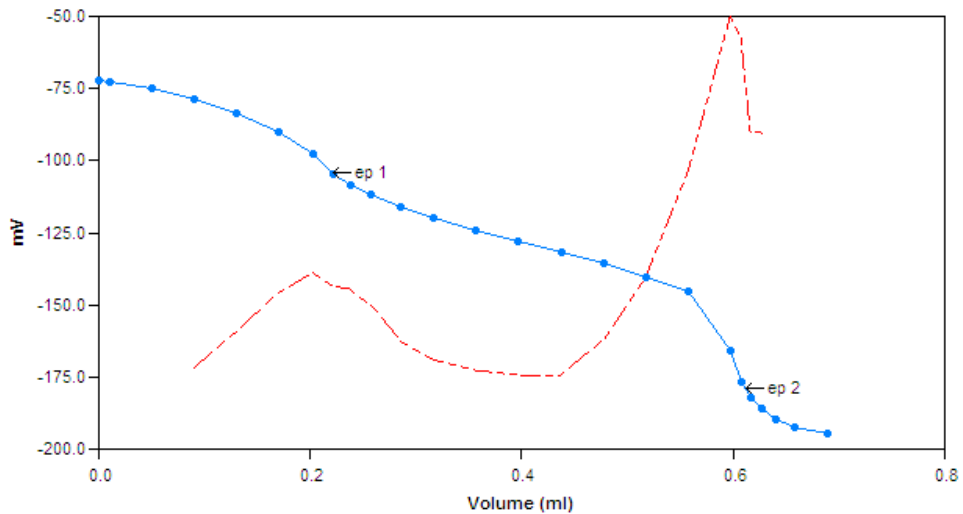
Scope and Application

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 involves the addition of ammonium hydroxide buffer to a water sample until the pH reaches at least 10. Next, the sample is titrated with EDTA to two endpoints. From these, the calcium, magnesium, and total hardness concentrations are calculated.

Sample Titration Curve



Method Performance

Parameter	Specification		
	CaCO ₃ (Total Hardness)	Ca	Mg
Measuring Range*	1.09 – 1500ppm	0.59 – 750ppm	0.50-750ppm
MDL**	1.09ppm	0.59ppm	0.50ppm
RSD @ MDL	9.13% or +/- 0.385ppm	6.19% or +/- 0.051ppm	16.03% or +/- 0.084ppm
RSD @ Mid Range (~150ppm Ca, 40ppm Mg, 550ppm CaCO ₃)	0.74% or +/- 4.21ppm	2.45% or +/- 4.12ppm	4.77% or +/- 1.71ppm
RSD @ High Range (~700ppm Ca, 300ppm Mg, 3000ppm CaCO ₃)	0.50% or +/- 15.12ppm	1.70% or +/- 12.74ppm	2.35% or +/- 6.67ppm

*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) was determined based on data obtaining a coefficient of variance better than 30%. Results may differ depending on laboratory practices and sample matrix.