

HARDNESS, TOTAL (mg/L as CaCO₃)
 EPA Method 130.2 (Titrimetric, EDTA)

Table 1. Summary of Contract Required Detection Limits, Holding Times, and Preservation for Hardness

Analytical Parameter	Contract Required Detection Limit (CRDL)	Technical and Contract Holding Times	Preservation
Hardness, Total (mg/L as CaCO ₃)	5.0 mg/L	Technical: 6 months from collection; Contract: 6 months from receipt at laboratory	HNO ₃ to pH <2; Cool to 4EC ±2EC

Follow the procedure outlined in EPA method 130.2 for the analysis of samples for hardness.

Use sample aliquots containing not more than 25 mg CaCO₃ to avoid large titration volumes. This is determined by performing practice runs. pretreat waste waters and highly polluted waters by digesting the sample as described in the procedure in Section 7.1.2 of EPA Method 130.2.

Data Calculations and Reporting Units:

Calculate the sample results according to Section 8 of EPA Method 130.2. Sample results are to be reported in the concentration unit of milligram per liter (mg/L) of CaCO₃. The concentration result shall be reported to two significant figures if the result is less than 10 mg/L; and to three significant figures if the result is greater than or equal to 10 mg/L.

For rounding results, adhere to the following rules:

- a) If the number following those to be retained is less than 5, round down;
- b) If the number following those to be retained is greater than 5, round up; or
- c) If the number following the last digit to be retained is equal to 5, round down if the digit is even, or round up if the digit is odd.

All records of analysis and calculations must be legible and sufficient to recalculate all sample concentrations and QC results. Include an example calculation in the data package.

Table 2. Summary of Internal Quality Control Procedures for Hardness by EPA 130.2

QC Element	Frequency	Acceptance Criteria	Corrective Action
Titration Blank (MB)	One per Batch or SDG ^a (1 per 20 samples minimum)	< CRDL	<ol style="list-style-type: none"> 1. If lowest sample concentration is more than 10X the blank conc., no action 2. If samples are non-detected, no action 3. If detected sample concentrations are less than 10X blank conc., all associated samples must be prepared again with another method blank and reanalyzed
Duplicate Sample (DUP)	One per batch or SDG (1 per 20 samples minimum)	RPD <20% for samples >5X CRDL; ± CRDL for samples <5X CRDL	<ol style="list-style-type: none"> 1. Flag associated data with an "*"
One set of QC reference samples (two concentration levels)	One per batch or SDG (1 per 20 samples minimum)	± 15% of expected result	<ol style="list-style-type: none"> 1. Terminate analysis 2. Identify and document the problem 3. Reanalyze all associated samples

^a SDG - Sample Delivery Group - each case of field samples received; or each 20 field samples within a case; or each 14 calendar day period during which field samples in a case are received.

Check the normality of titrant each day.

Add inhibitors if the end point is not sharp. Excessive amounts of heavy metals interfere by causing fading or indistinct end points. To correct for interferences, refer to Section 7.4 of EPA Method 130.2.