

Answers: TH = 332.8 mg/L as CaCO_3
 CH = 284.0 mg/L as CaCO_3
 NCH = 48.8 mg/L as CaCO_3

- 6-2. Calculate the total, carbonate, and noncarbonate hardness in Problem 6-1 using all of the polyvalent cations. What is the percent error in using only the predominant cations?
- 6-3. The following mineral analysis was reported for a water sample taken from Well No. 1 at Magnolia, Illinois (Woller and Sanderson, 1976b). Determine the total, carbonate and noncarbonate hardness in mg/L as CaCO_3 using the predominant polyvalent cation definition of hardness.

Well No. 1, Lab No. B109535, April 23, 1973

Iron	0.42	Zinc	0.01
Manganese	0.04	Silica (SiO_2)	20.0
Ammonium	11.0	Fluoride	0.3
Sodium	78.0	Boron	0.3
Potassium	2.6	Nitrate	0.0
Calcium	78.0	Chloride	9.0
Magnesium	32.0	Sulfate	0.0
Barium	0.5	Alkalinity	494.0 as CaCO_3
Copper	0.01	pH	7.7 units

Note: All reported as "mg/L as the ion" unless stated otherwise.

- 6-4. The following mineral analysis was reported for Michigan State University well water (MDEQ, 1979). Determine the total, carbonate, and noncarbonate hardness in mg/L as CaCO_3 using the predominant polyvalent cation definition of hardness. Note: All units are mg/L as the ion.

Michigan State University Well Water

Fluoride	1.1	Silica (SiO_2)	3.4
Chloride	4.0	Bicarbonate	318.0
Nitrate	0.0	Sulfate	52.0
Sodium	14.0	Iron	0.5
Potassium	1.6	Manganese	0.07
Calcium	96.8	Zinc	0.27
Magnesium	30.4	Barium	0.2