

CE 326 Principles of Environmental Engineering
Water Chemistry Calculations - Part 2
due March 3, 2008

A water sample was analyzed and was found to have the following constituents (same analysis as for part 1 of the homework):

Ca ⁺² , mg/L	135	HCO ₃ ⁻ , mg/L	340
Mg ⁺² , mg/L	36	SO ₄ ⁻² , mg/L	122
Na ⁺ , mg/L	11.6	Cl ⁻ , mg/L	56
K ⁺ , mg/L	4.2	CO ₃ ⁻² , mg/L	1.8
Fe ⁺² , mg/L	9.6		
Mn ⁺² , mg/L	0.8	Temperature	25°C

1. Calculate the alkalinity (exactly).
2. Calculate the total, carbonate, and non-carbonate hardness of the water (include contributions made by iron and manganese).
3. How many mL of 0.02N H₂SO₄ would be required to neutralize the bicarbonate alkalinity in a 50 mL sample?
4. Draw a bar chart for the water (see pages 238-239 for an example).
5. Based on the solubility product for calcium carbonate, how much calcium (mg/L as CaCO₃) should be soluble in this water? Is the water under-saturated or over-saturated with respect to calcium?
6. Based on the solubility product for magnesium hydroxide, how much magnesium (mg/L as CaCO₃) should be soluble in this water? Is the water under-saturated or over-saturated with respect to magnesium?