1. Calculate as mg/L as CaCO_3

\[ \text{Ca}^{2+}: 120 \text{ mg/L} \left( \frac{100/2}{40/2} \right) = 300 \text{ mg/L as CaCO}_3 \]

\[ \text{Mg}^{2+}: 39 \text{ mg/L} \left( \frac{100/2}{24/2} \right) = 162.5 \text{ mg/L as CaCO}_3 \]

\[ \text{Na}^+: 12.8 \text{ mg/L} \left( \frac{100/2}{23/1} \right) = 27.8 \text{ mg/L as CaCO}_3 \]

\[ \text{K}^+: 3.4 \text{ mg/L} \left( \frac{100/2}{39/1} \right) = 4.36 \text{ mg/L as CaCO}_3 \]

\[ \text{Fe}^{2+}: 6.2 \text{ mg/L} \left( \frac{100/2}{56/2} \right) = 11 \text{ mg/L as CaCO}_3 \]

\[ \text{Mn}^{2+}: 0.9 \text{ mg/L} \left( \frac{100/2}{55/2} \right) = 0.55 \text{ mg/L as CaCO}_3 \]

\[ \text{HCO}_3^-: 422 \text{ mg/L} \quad \text{HCO}_3^- \left( \frac{100/2}{61/1} \right) = 346 \text{ mg/L as CaCO}_3 \]

\[ \text{SO}_4^{2-}: 101 \text{ mg/L} \left( \frac{100/2}{96/2} \right) = 105 \text{ mg/L as CaCO}_3 \]

\[ \text{Cl}^-: 32 \text{ mg/L} \left( \frac{100/2}{35.5/1} \right) = 45.09 \text{ mg/L as CaCO}_3 \]

\[ \text{CO}_3^{2-}: 1.2 \text{ mg/L} \left( \frac{100/2}{60/2} \right) = 2 \text{ mg/L as CaCO}_3 \]

2. Calculate the hydrogen ion concentration:

\[ \text{HCO}_3^- = 422 \text{ mg} \quad \text{HCO}_3^- \left( \frac{1}{2} \right) \times \frac{1 \text{ mole}}{61 \text{ g}} \times \frac{1 \text{ g}}{1000 \text{ mg}} = 6.92 \times 10^{-3} \text{ mol/L} \]

\[ \text{CO}_3^{2-} = 1.2 \text{ mg/L} \quad \text{CO}_3^{2-} \left( \frac{1}{2} \right) \times \frac{1 \text{ mole}}{60 \text{ g}} \times \frac{1 \text{ g}}{1000 \text{ mg}} = 2 \times 10^{-5} \text{ mol/L} \]

\[ K_a = \frac{[\text{H}^+][\text{CO}_3^{2-}]}{[\text{HCO}_3^-]} \]

\[ 10^{-10.33} = \frac{[\text{H}^+][2 \times 10^{-5}]}{6.92 \times 10^{-3}} \implies [\text{H}^+] = 1.62 \times 10^{-8} \text{ mol/L} \]

\[ 1.62 \times 10^{-5} \text{ mol/L} \times \frac{1 \text{ g}}{\text{ mole}} \times \frac{1000 \text{ mg}}{2} = 1.62 \times 10^{-5} \text{ mg/L} \]