Lecture #24

Dissolved Carbon Dioxide: Open & Closed Systems V

(Stumm & Morgan, Chapt.4 )

Benjamin; Chapter 7
In-Class Practice

• For a closed system, what is the pH of:
  • $10^{-3}$ M solution of $\text{H}_2\text{CO}_3$
  • $10^{-3}$ M solution of $\text{NaHCO}_3$
  • $10^{-3}$ M solution of $\text{Na}_2\text{CO}_3$

• For an open system, what is the pH of:
  • $10^{-3}$ M solution of $\text{H}_2\text{CO}_3$
  • $10^{-3}$ M solution of $\text{NaHCO}_3$
  • $10^{-3}$ M solution of $\text{Na}_2\text{CO}_3$
More practice

What is the pH of a blend of the following:

- 1 MGD of pH 6.5 water with a Alkalinity of 50 mg/L
- 0.5 MGD of pH 8.5 water with an Alkalinity of 500 mg/L

\[
Alk = \left(\alpha_1 + 2\alpha_2\right) \frac{K_H p_{CO_2}}{\alpha_0} + [OH^-] - [H^+]
\]

\[
Alk = \left(\alpha_1 + 2\alpha_2\right)C_T + [OH^-] - [H^+]
\]
More practice

What is the pH of a blend of the following:
- 1 MGD of pH 6.5 water with a Alkalinity of 50 mg/L
- 1 MGD of pH 8.5 water with an Alkalinity of 500 mg/L

\[
Alk = \left( \alpha_1 + 2\alpha_2 \right) \frac{K_H p_{CO_2}}{\alpha_0} + [OH^-] - [H^+] \\
Alk = \left( \alpha_1 + 2\alpha_2 \right) C_T + [OH^-] - [H^+]
\]
The diagram shows the relationship between pH and the logarithm of the concentration (Log C) for various species in a solution. The pH scale ranges from 0 to 14, and the Log C scale ranges from -14 to 0. The diagram includes the following species:

- **H^+**
- **OH^-**
- **H2CO3^***
- **HCO3^-**
- **CO3^-2**

The x-axis represents the pH values, while the y-axis represents the logarithm of the concentration. The lines indicate the stability regions of these species at different pH levels.
• To next lecture