Updated: 23 March 2018

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CEE 680: Water Chemistry

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 H_2CO_3
  - 10^{-3} M solution of $NaHCO_3$
  - 10^{-3} M solution of Na_2CO_3
- For an open system, what is the pH of:
  - 10^{-3} M solution of H_2CO_3
  - 10^{-3} M solution of $NaHCO_3$
  - 10^{-3} M solution of Na_2CO_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

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

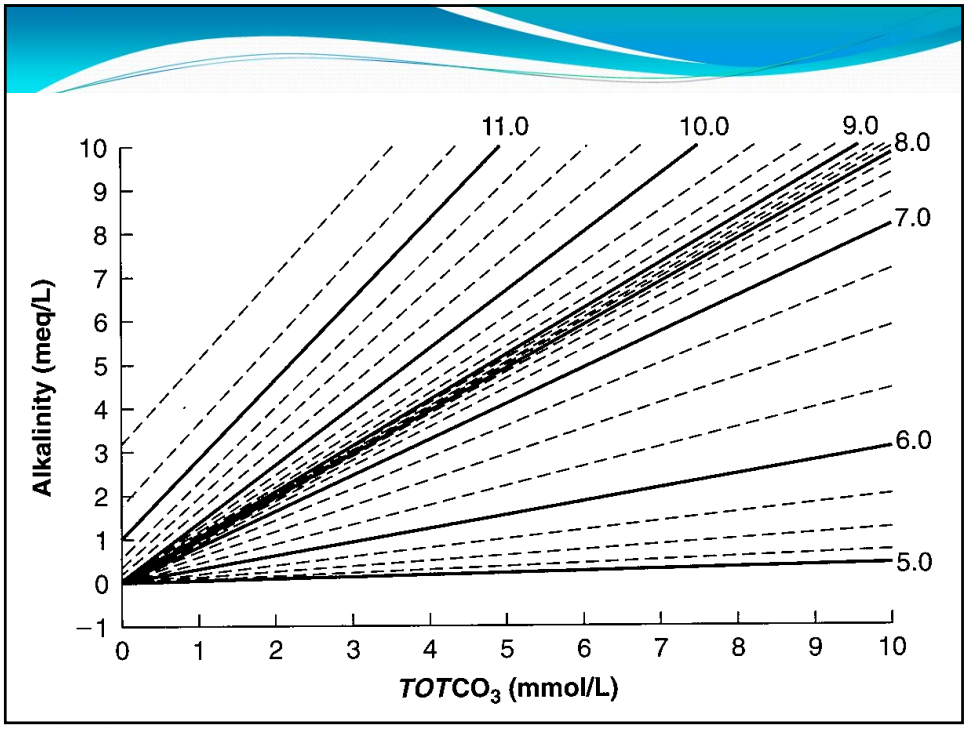
$$Alk = (\alpha_1 + 2\alpha_2)C_T + [OH^-] - [H^+]$$

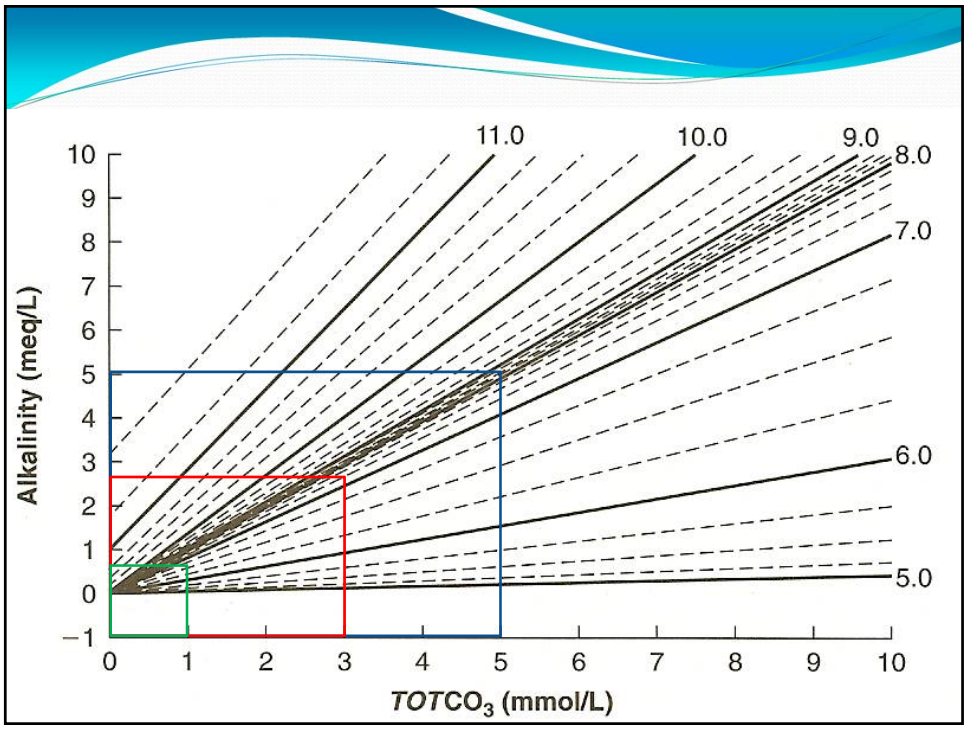
More practice

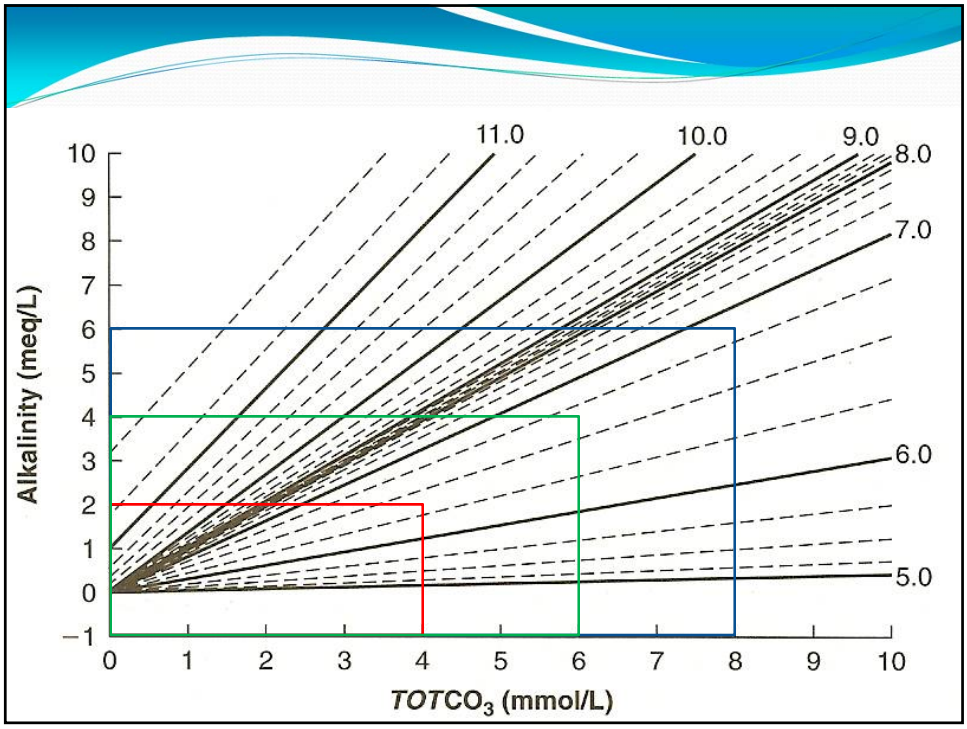
- What is the pH of a blend of the following:
  - 1 MGD of pH 6.5 water with a Alkalinity of 50 mg/L
  - 1 MGD of pH 8.5 water with an Alkalinity of 500 mg/L

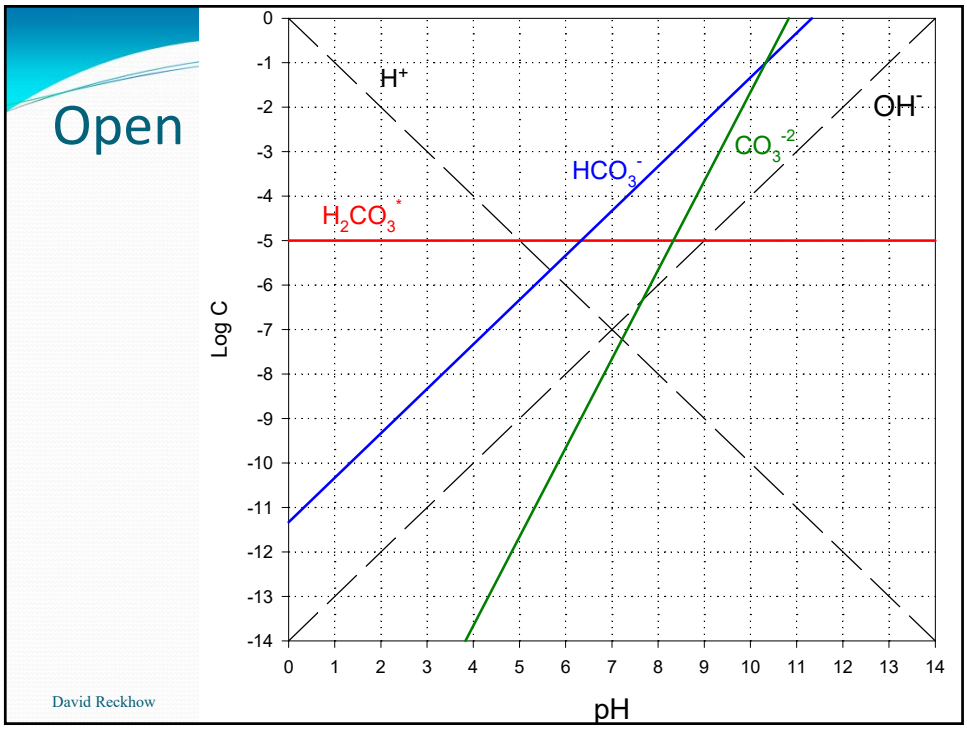
$$Alk = (\alpha_1 + 2\alpha_2)\frac{K_H p_{CO_2}}{\alpha_0} + [OH^-] - [H^+]$$

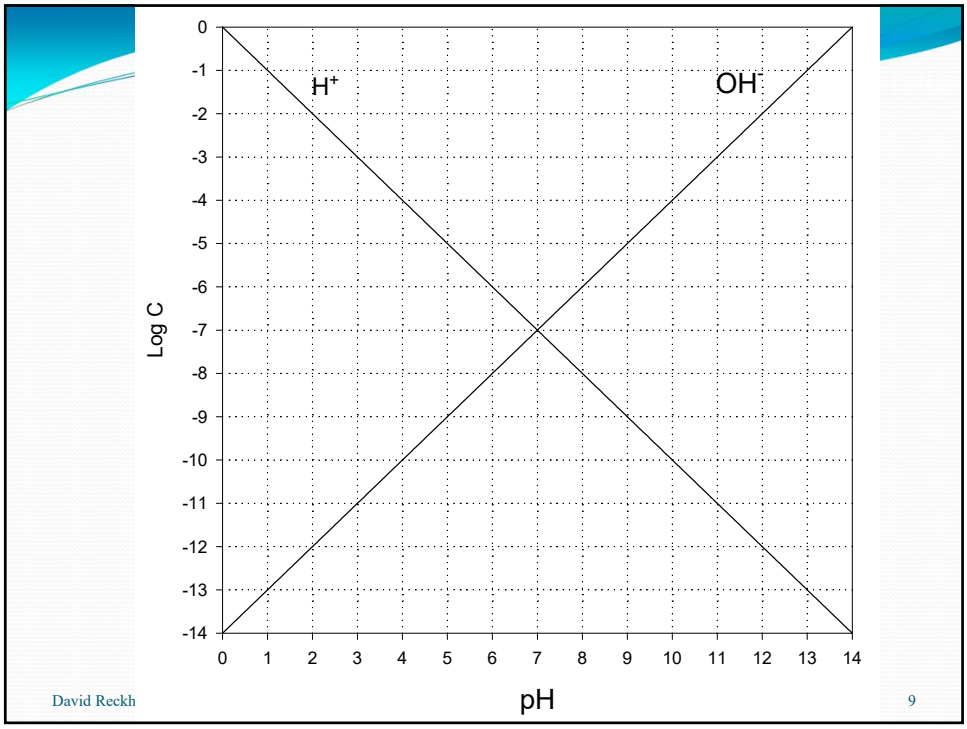
$$Alk = (\alpha_1 + 2\alpha_2)C_T + [OH^-] - [H^+]$$


11.0
10.0
9.0
8.0
7.0
6.0
5.0
Alkalinity (meq/L)
$TOTCO_3$ (mmol/L)


11.0
10.0
9.0
8.0
7.0
6.0
5.0
Alkalinity (meq/L)
$TOTCO_3$ (mmol/L)


11.0
10.0
9.0
8.0
7.0
6.0
5.0
Alkalinity (meq/L)
TOTCO3 (mmol/L)


Open
H+
OH-
HCO3-
CO3-2
H2CO3*
Log C
pH
David Reckhow


H+
OH-
Log C
pH
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
-14
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
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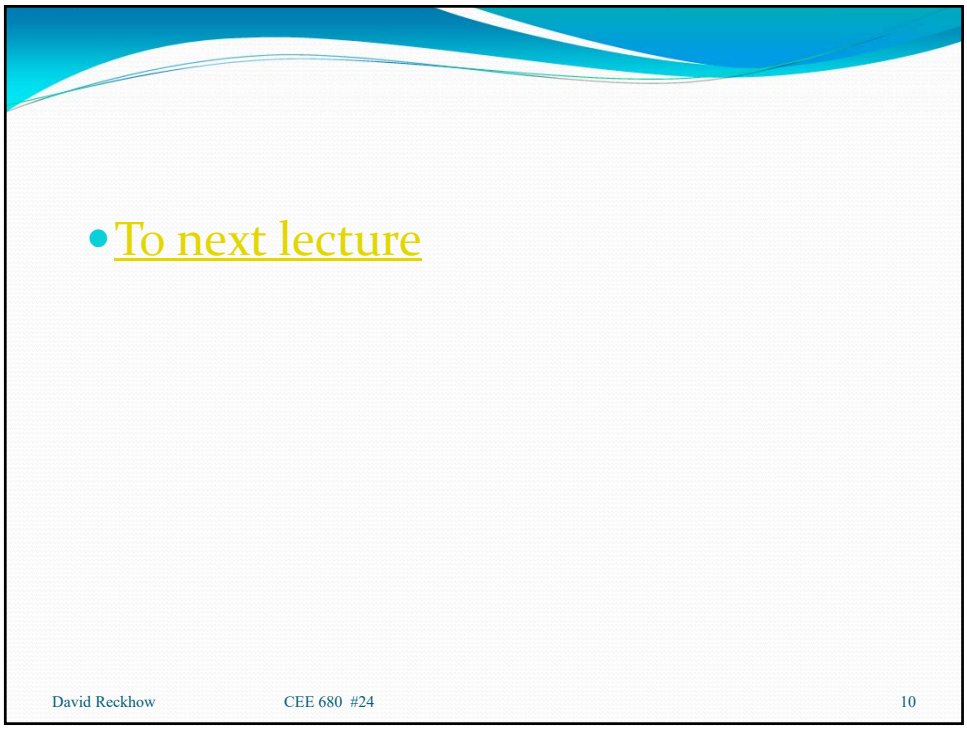
To next lecture
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