

How many grams of  $\text{NaHCO}_3$  would be required to keep the ANC levels in a lake above  $50 \mu\text{eq/L}$  for 3 hydraulic residence times given an influent pH of 3.0 and a lake volume of 4 L, if the current lake ANC is  $0 \mu\text{eq/L}$ ?

$$ANC_0 = \left[ ANC_{out} - ANC_{in} \left( 1 - e^{-\frac{t}{\theta}} \right) \right] e^{\frac{t}{\theta}}$$

$$ANC_{out} = 0.000050$$

$$ANC_{in} = -0.001$$

$$\theta = 3, t = 3$$

$$ANC_0 = \left[ 0.000050 - (-0.001) \left( 1 - e^{-\frac{3}{3}} \right) \right] e^{\frac{3}{3}} = 1.854 \text{ meq/L}$$

$$[\text{NaHCO}_3]_0 = ANC_0 = \frac{1.854 \text{ mmol NaHCO}_3}{\text{liter}} * \frac{84 \text{ mg NaHCO}_3}{\text{mmol NaHCO}_3} * 4 \text{ L} = 0.623 \text{ g}$$

**Commented [J1]:** Grade 7/10

**Commented [J2]:** This means  $\frac{t}{\theta} = 3$

**Commented [J3]:** Missing unit

**Commented [J4]:** Missing unit

**Commented [J5]:** Missing unit

**Commented [J6R5]:** Also,  $t/\theta = 3$

**Commented [J7]:** Cascade error. Should be 3 instead

**Commented [J8]:** Cascade error. Should be 3 instead

**Commented [J9]:** Cascade error. Should be 20.1 meq/L

**Commented [J10]:** Cascade error.

**Commented [J11]:** General Comment:

- Be consistent with your units
- Got significant cascade error from plugging in wrong residence time, but all the calculation processes were correct.
- No deduction for submitting word document, but please submit everything in python

**Commented [J12R11]:** -1 pt for wrong residence time

-1 pt for inconsistent unit formats

-1 pt for not having final correct answer

**Commented [J13]:** Cascade error. Correct answer is 6.75 g.