TEST #2

EXAMPLE 1 SOLUTION

$$\frac{d(Vc)}{dt} = k_L A (c^* - c) \qquad c^* = 32.2 \text{ mg/L}$$

$$V \int \frac{dc}{c^* - c} = k_L A \int dt$$

$$-V \ln(c^* - c) = k_L A t + C_0$$

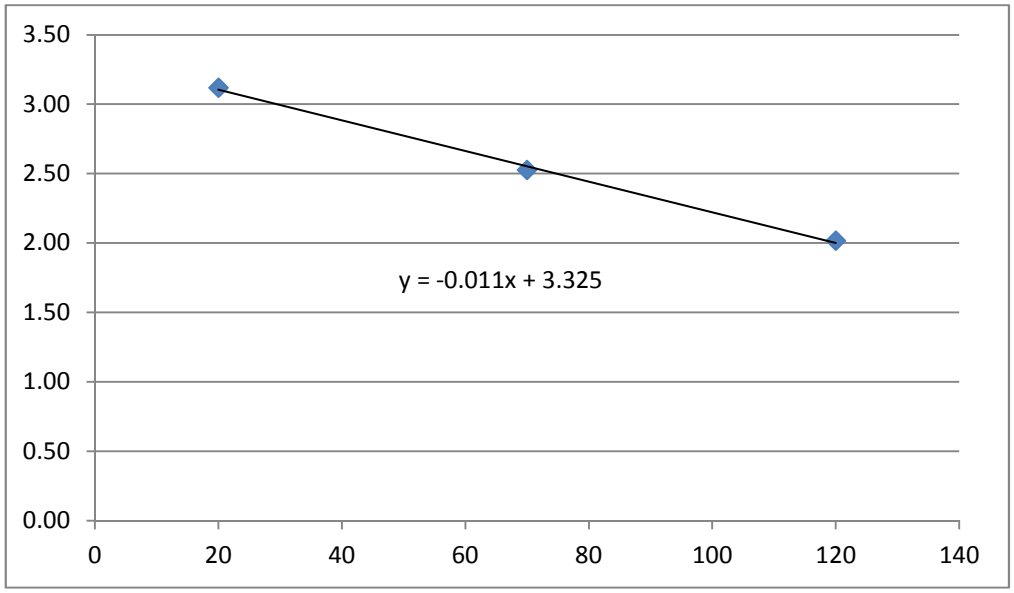
$$\ln(c^* - c) = -\frac{k_L A}{V} t + C_0'$$

EQUATION INDICATES THAT PLOTTING $\ln(c^* - c)$ VERSUS t SHOULD YIELD STRAIGHT LINE WITH SLOPE $= -\frac{k_L V}{V}$

Test #2

Example Problem 1

t	c	c* - c	ln(c* - c)
20	9.6	22.6	3.12
70	19.7	12.5	2.53
120	24.7	7.5	2.01



FROM PLOT ... SLOPE = $-0.0110\ s^{-1}$

UNIT WILL BE RECIPROCAL OF TIME UNIT.

$$-\frac{k_L A}{V} = -0.0110\ s^{-1}$$

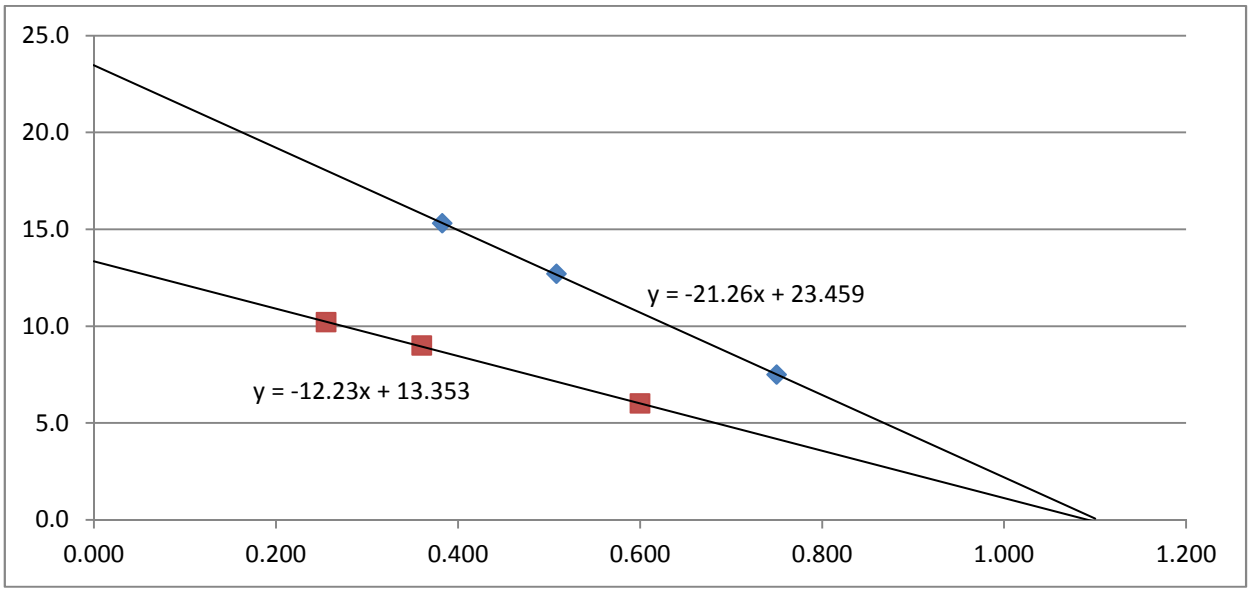
$$k_L = \frac{(0.0110\ s^{-1})(100\ cm^3)}{(2.5)^2\ \pi}$$

$$k_L = 0.056\ cm/s$$

Test #2
Example Problem 2

Make Eadie-Hofstee plot for both "deionized" water and "water+atlantate"

S (mM)	$V_{DEIONIZED}$ (mmol/Lmin)	$V_{DEIONIZED}/S$ (1/min)	$V_{WITH-ATL}$ (mmol/Lmin)	$V_{WITH-ATL}/S$ (1/min)
10	7.5	0.750	6	0.600
25	12.7	0.508	9	0.360
40	15.3	0.383	10.2	0.255



DEIONIZED WATER
V_{MAX} = 23.5 mmol/Lmin
K_M = 21.3 mM

WATER WITH ATLANTATE
V_{MAX} = 13.4 mmol/Lmin
K_M = 12.2 mM

Uncompetitive Inhibition (BOTH K_M and V_{MAX} have decreased...by 43%!)

$K_M(app) = K_M/(1 + I/K_I)$

$12.2 = 21.3/(1 + 2.5/K_I)$

K_I = 3.4 mM

Note that a wide range of numeric results would be acceptable answers

Test #2
Example Problem 2