

TEST #2

EXAMPLE 1 SOLUTION

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

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

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

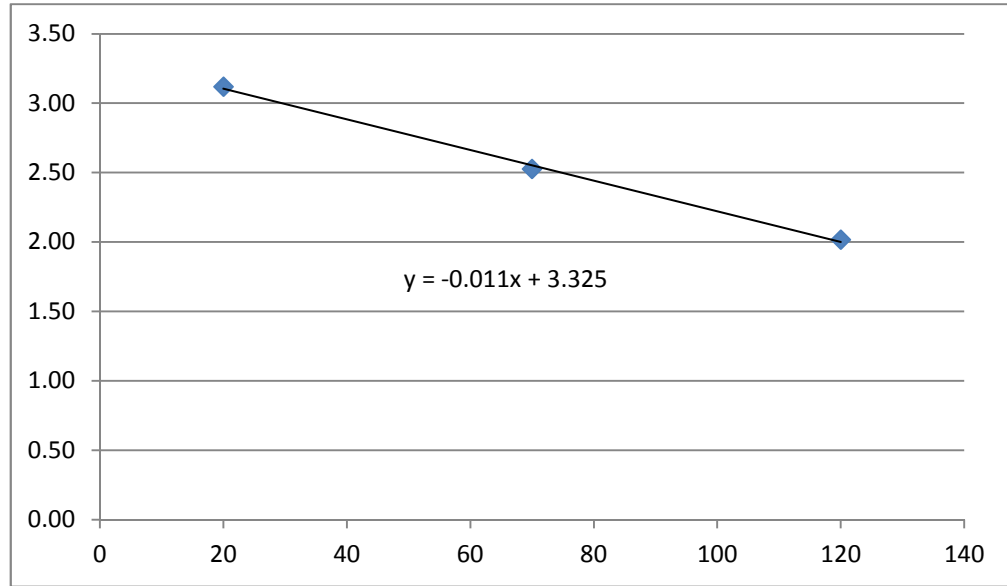
$$\ln(c^* - c) = -\frac{k_L A}{V} t + C_0'$$

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.

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

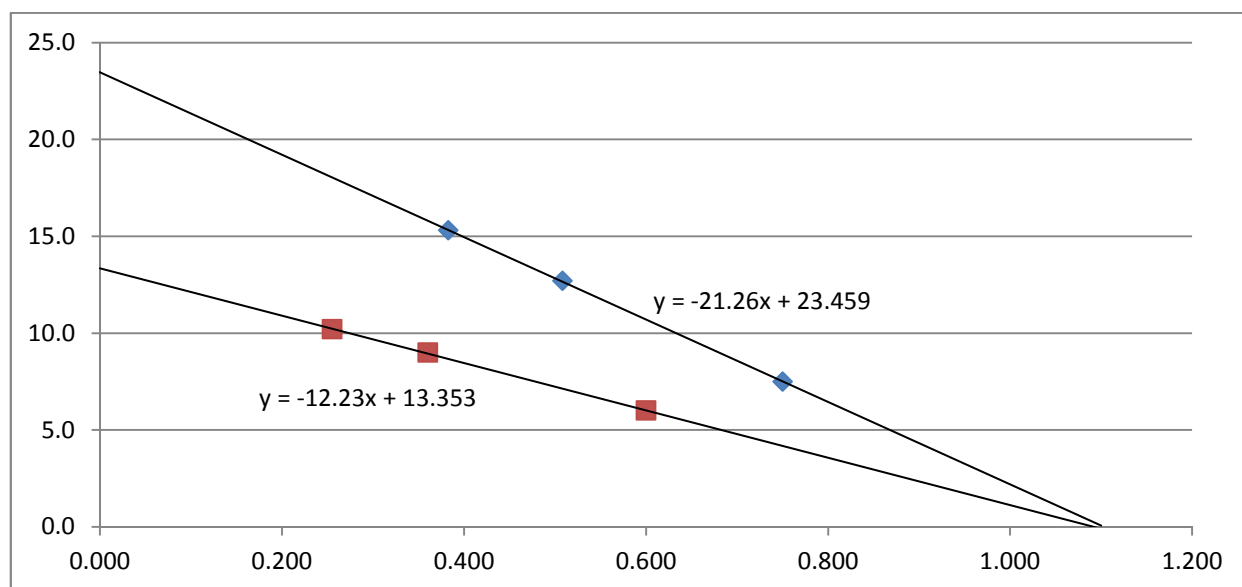
$$k_L = \frac{(0.0110 \text{ s}^{-1})(100 \text{ cm}^3)}{(2.5)^2 \pi}$$

$$\underline{k_L = 0.056 \text{ cm/s}}$$

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%!)

$$K_M(\text{app}) = K_M / (1 + I/K_I)$$

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

$K_I = 3.4$ mM

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