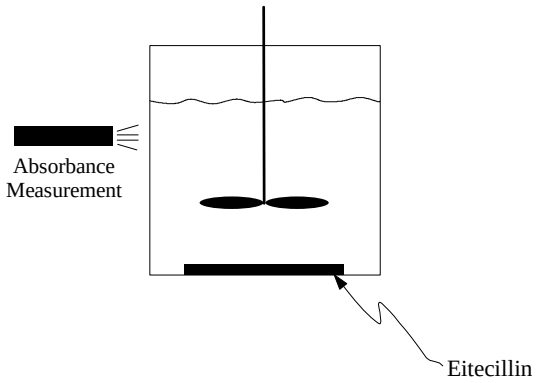
You use a container with 100 mL of water to measure the mass transfer coefficient, k_L, of a highly potent drug Eitecillin dissolving in water. The system involves a 5.0 cm diameter disk of compressed pure Eitecillin that has one face exposed to the water (see diagram). The temperature and agitation of the water are carefully controlled. You measure absorbance of the solution in order to obtain data on the concentration of Eitecillin dissolved in water with time (see Table). Calculate the mass transfer coefficient for these conditions. The solubility of Eitecillin in water at this temperature is 32.2 mg/L.



Data

Time (s)	Eitecillin (mg/L)
20	9.6
70	19.7
120	24.5

A biologist places three concentrations of substrate (S) with 0.53 mg/L of purified enzyme having a molecular weight of 46,400 in a beaker of product-free water. Relatively quickly, after sample is taken to measure the rate of product formation (dP/dt). This experiment is repeated using deionized water and water containing 2.5 mM potassium atlantate, an inhibitor of the enzyme.

S (mM)	deionized water dP/dt (mM/min)	water + atlantate dP/dt (mM/min)
10	7.5	6.0
25	12.7	9.0
40	15.3	10.2

a) Assuming Michaelis-Menten kinetics applies, find the value of V_{MAX} and K_M for each sample. (Include units)
b) What type of enzyme inhibitor is potassium atlantate?
c) What is the value of K_I (mM)?