Example 7.2

a) A solution containing Eitemectin was fed at a superficial velocity of 20 cm/h for 9.5 h to a fixed-bed column containing an adsorbent until breakthrough, which was taken to be when the effluent concentration was 10% of the feed concentration. The feed concentration of Eitemectin was low enough so that the equilibrium isotherm was linear with a equilibrium coefficient of 40. The column was 10 cm in length, and the packing void fraction was 0.34. Estimate the mass transfer coefficient, assuming a linear driving force for the mass transfer rate.

b) A new column of the same packing material and 20 cm length is used for the adsorption of Eitemectin. At what time will breakthrough occur, if we feed the solute at 30 cm/h and take the breakthrough to be when the effluent concentration is 15% of the feed concentration? Use the same mass transfer coefficient estimated in part a).