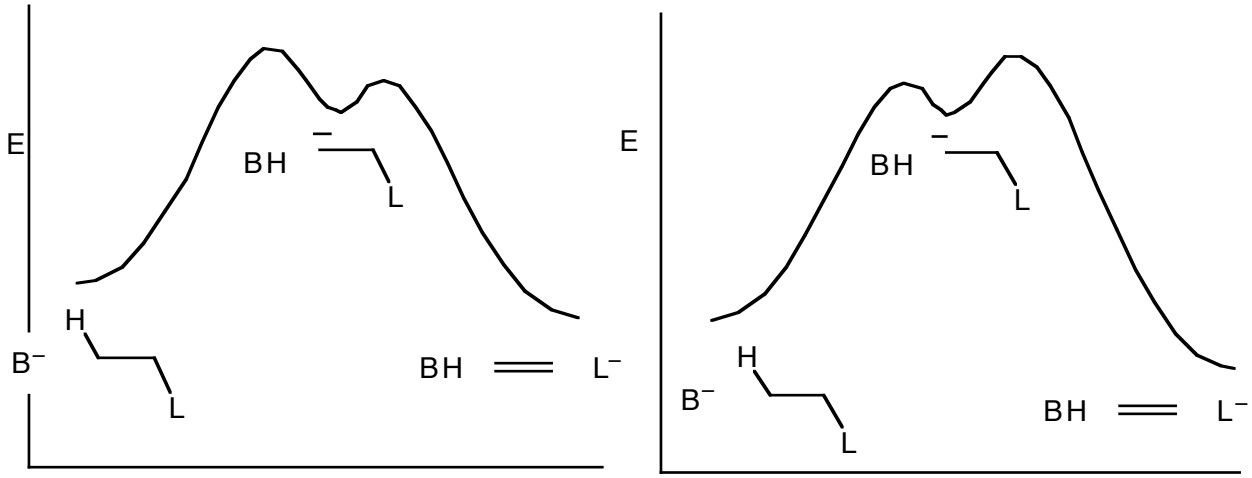
Answers to Problem 70, Chemistry 301X - 2006

(a) You need a poor leaving group, a strong base, and an R group that will stabilize an adjacent negative charge, either through induction or resonance. So, use OR as a leaving group, methoxide as base, and F (induction) or CN (resonance) as R. There are, of course, other possibilities.



First step rate determining

Second step rate determining

(c) No dice. If the second step is rate determining, as on the right above, this experiment will work. If, however, the first step is rate determining, as on the left above, deuterium will not be rapidly incorporated into either the starting material or product. Moreover, exchange could be an irrelevant side reaction. The mechanism could be E2, for example, with a faster, but not relevant, exchange.