Answers to Problem 50, Chemistry 301X - 2006

(a) The primary bromide will react faster than the secondary bromide in an S_N2 displacement because the secondary position is more sterically hindered than the primary position. The entering nucleophile has more difficulty in approaching the rear of the secondary carbon-bromine bond than that of the primary carbon-bromine bond.

(b) Iodide is a better leaving group than bromide and so will be more easily displaced.

(c) The closer the *tert*-butyl group is to the leaving group, the more it will shield the rear of the departing bond. Accordingly, $(CH_3)_3CCH_2CH_2—I$ will be more reactive than $(CH_3)_3CCH_2—I$.

(d) Primary allylic bromides will be more reactive than simple primary bromides, as the transition state for displacement will be stabilized. So, the compound with the double bond will be more reactive in the S_N2 displacement than will the simple primary bromide.

(e) The strained three-membered ring will be opened much more easily than the relatively unstrained five-membered ring (which actually will be very unreactive in the S_N2 reaction) But see the detailed answer to the next Problem.