Answers to Problem 68, Chemistry 301X-2006

Pentyl chloride reacts in a standard, couldn't-be-more-simple S_N2 reaction to give the products. This part was just put in to get you thinking about nucleophiles in general and sulfur as nucleophile in particular.

What's going to happen with that sulfur-containing labeled compound? No S_N1, that's for sure. And water is a poor nucleophile so a standard S_N2 will surely be slow. But there is a good nucleophile, sulfur, right inside the molecule. displacement by S leads to what's called an episulfonium ion. Note the symmetry. Opening of this reactive compound by water (another S_N2) can happen in two ways leading to the observed results.