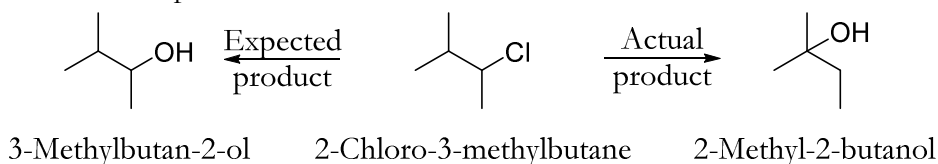


# Experiment 32

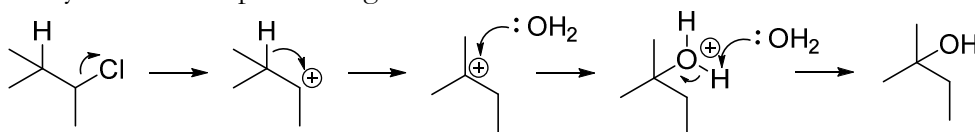
## Substitution Kinetics: Measuring the Hydrolysis of *tert*-Butyl Chloride

### Study Questions

- 1) A student planned to synthesize 3-methylbutan-2-ol from 2-chloro-3-methylbutane using hydrolysis (as in the experiment above). Instead of obtaining the expected product, 2-methyl-2-butanol was isolated. Explain these results.

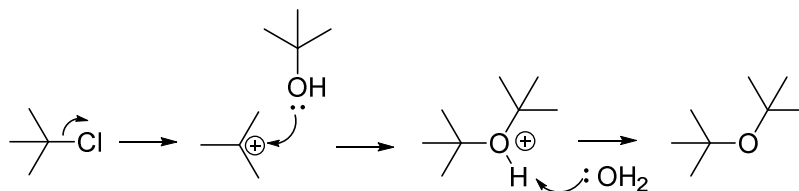


**Answer:** The carbocation that forms is immediately rearranged to a different carbocation, which forms 2-methyl-2-butanol upon adding to water.



- 2) During this reaction, some *tert*-butyl ether may form. Show the mechanism for its formation.

**Answer:**



- 3) How would the formation of *tert*-butyl ether affect your calculation of the rate constant?

**Answer:** Since the formation of *t*-butyl ether still generates one molecule of HCl per molecule of *t*-butyl chloride, the measured rate would not change.

- 4) A pair of students performed this lab, but left their volumetric flask unstoppered during the reaction. How would this affect their calculation of the rate constant? **Answer:** Since the boiling point of acetone is lower than that of water, the relative amount of acetone in the solvent would decrease. This would make the solvent more polar overall, which would artificially increase the rate.