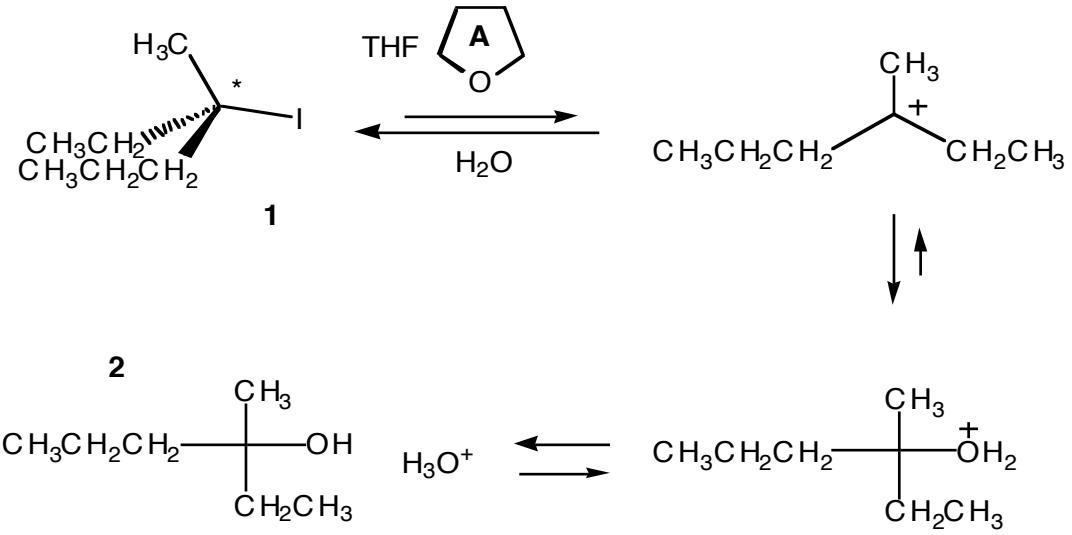
Answers to Problem 56, Chemistry 301X - 2006

1. the product is the corresponding alcohol, formed in a standard S_N1 reaction.



2. No, there is no connection whatsoever.

3. S_N1. There are no S_N2 reactions at tertiary carbons.

4. If the mechanism were exactly as written in 1, the product would have to be racemic. But, such an analysis ignores the leaving group. The LG begins its independent life on the "retention side" blocking access to the nucleophile. Hence inversion is favored.

5. In the more polar solvent water, the carbocation intermediate is more stable and, therefore, longer lived. The leaving group can diffuse away, and thus racemization is favored as the intermediate becomes symmetrically solvated.