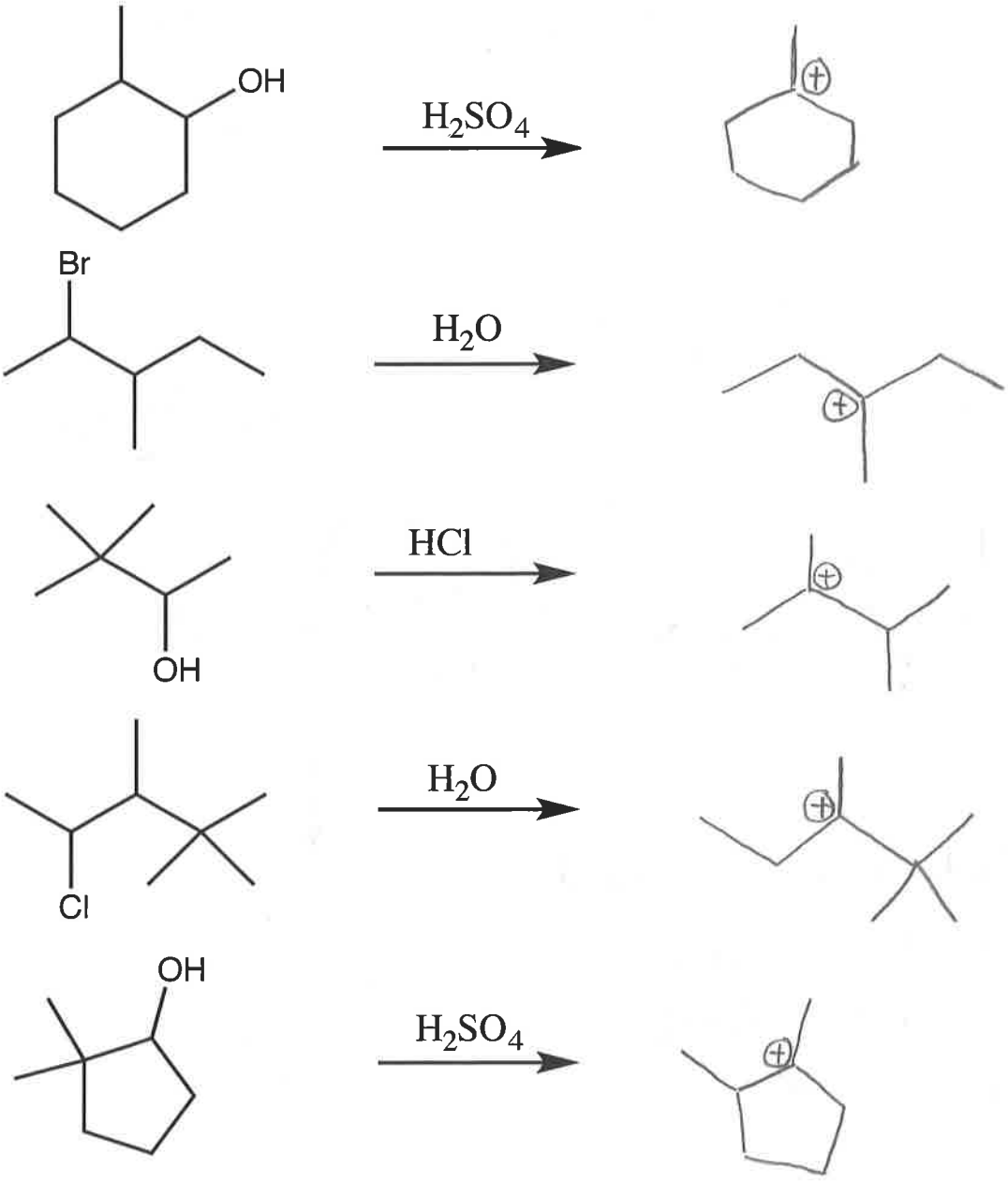
Alcohol Derivatives #1: Carbocation Rearrangements

Heyyoo, what's up boys and gals? Okay, now that we've played around with alcohols (not in the weekend sense ☺) and mastered the Grignard Reaction, we're moving on to functional groups that derive, or stem, from alcohols: ethers and epoxides. HOWEVER, we saw in the last video how what happens when we protonate alcohols, forming water, to be a good leaving group: When water leaves and forms a carbocation, we **have** to check for a carbocation shift—whether it be a hydride shift or a methyl shift.

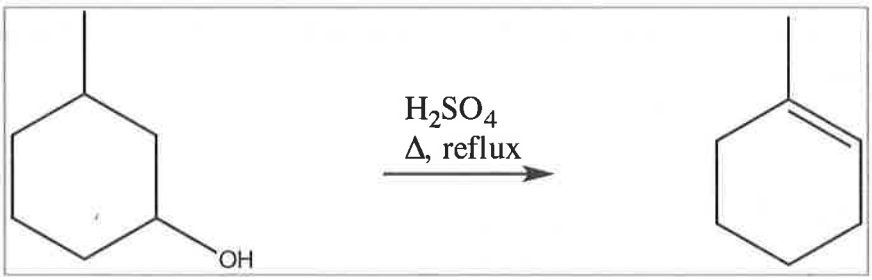
1.) Below are a bunch of Complete the Reaction problems where a carbocation **will be** formed, whether it's an alcohol being protonated to water or a halogen leaving through solvolysis. All I need from you is to draw the correct carbocation intermediate that will be formed. So that means, if a hydride/methyl shift occurs, the product needs to reflect that.

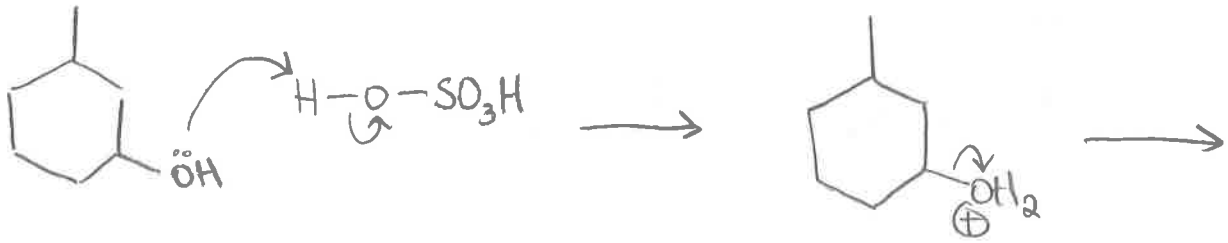


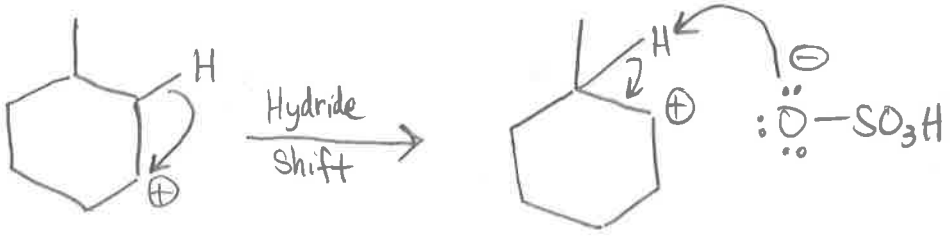
Okay, good job. The reason I had you do that first is that these shifts can happen during a Mechanism Problem, Complete the Reaction, and/or you might need to take advantage of a shift during a Synthesis to hit your target molecule. Now, let's do some problems that include some shifts ☺.

2.) So in the last video, we discussed the Dehydration Reaction with Sulfuric Acid. Since this reaction's mechanism proceeds through E1, carbocations are involved, and that means shifts are in play, right?

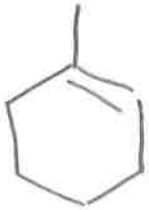
Given the reaction below, draw the curved arrow mechanism ☺. Also, give a brief explanation WHY the shift occurred: Said another way, why did the carbocation shift up to make the double bond where it ended up?





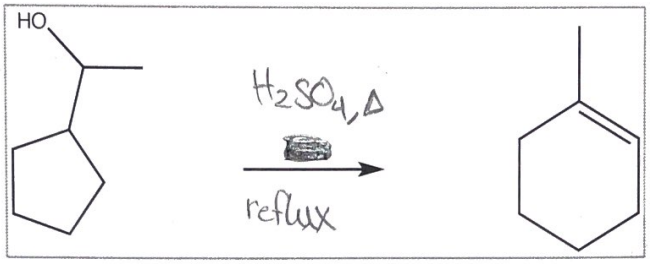


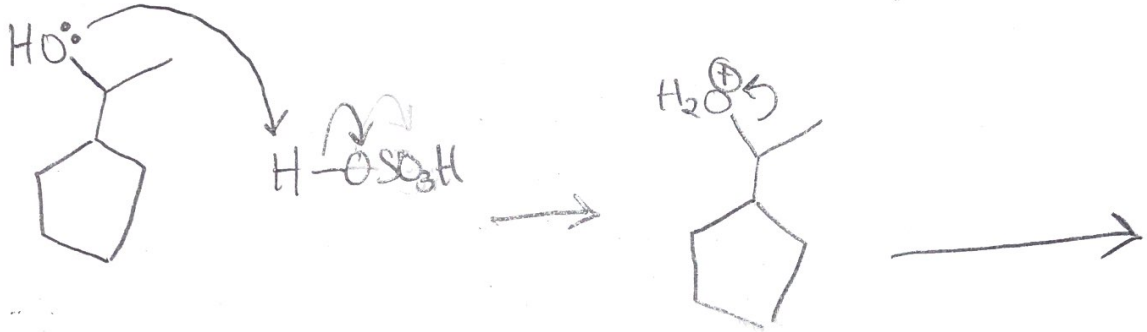
* Hydride shift occurred so that the more substituted double bond could form ⇒

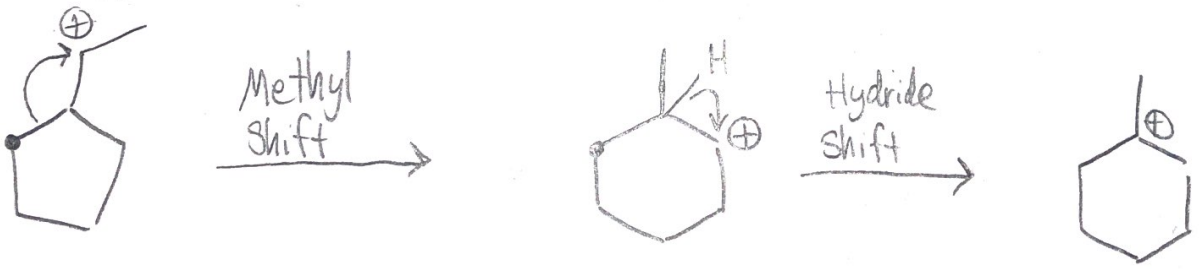


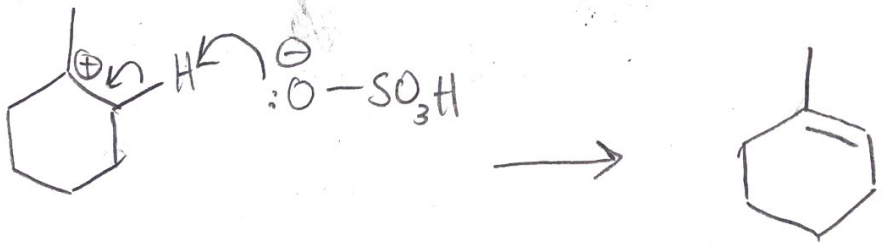
3.) Okay, one more mechanism, then we're going to hit Complete the Reaction Problems and wind things up. This question may look ludicrous at first glance, but stay calm: This won't be the last time you may look at an O Chem question and have NO clue what's going. Start by doing what you do know how to do, one step at a time, and usually you'll have a Light Bulb Moment where it clicks and you see what the problem is about.

If you don't get this on the first try, don't worry: Look at the answer, see where you went wrong, and give it another honest try ☺.









*wouldn't Change product w/o Shift
$:H^{\ominus}$

4.) Alright, alright, alright—let's FINALLY get to Complete the Reaction Problems. You know the drill by now: Predict the major organic product given the reaction below, and don't forget to account for shifts ☺ ☺ ☺.