<u>Alcohols #2: The Grignard Reaction</u>

As we continue working with alcohols, you saw in the last video we encountered the Grignard Reaction. Like I said before, the Grignard Reaction is not only helpful in producing alcohol functional groups, but it allows us to make **carbon-carbon** bonds. With this reaction, we can attach separate organic molecules, and that's a big deal. I'm going to be painstakingly thorough about this reaction, so please humor me if you think I'm going too slow. I just want to make sure you all nail the Grignard Reaction down.

1.) Below are a bunch of Complete the Reaction problems aimed at forming Grignard nucleophiles. I **ONLY** want you to give me the expected Grignard nuc formed. We aren't attacking any carbonyls yet.
Give both the form showing formal charges and the form showing the nucleophilic carbon bonded to the MgBr ion

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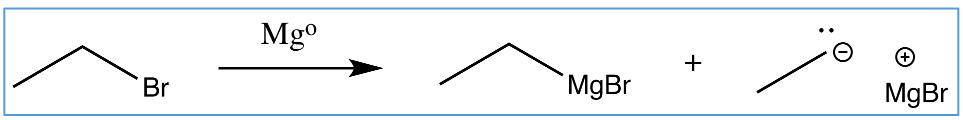

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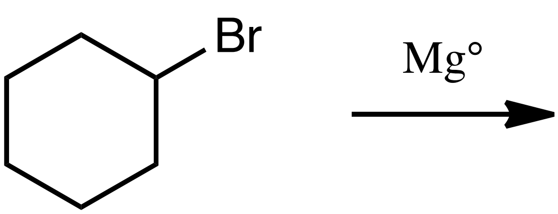
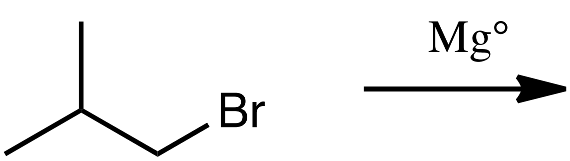
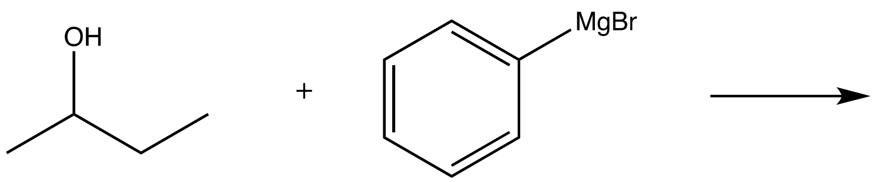
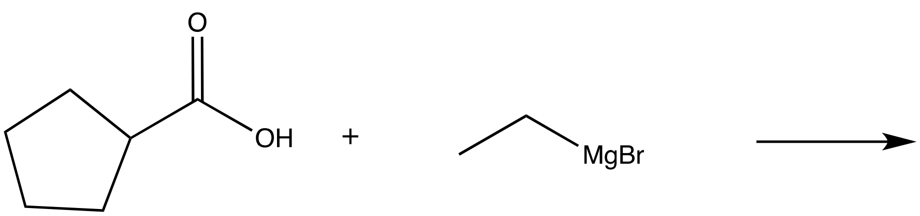


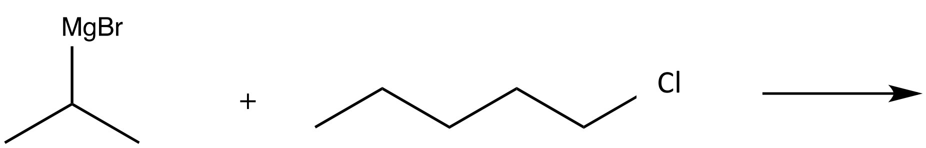


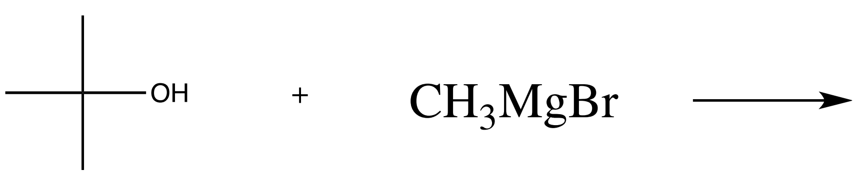
Okay, good job. Make sure you are comfortable with forming a Grignard Reagent before moving on. We're only about to add more moving pieces, so having that one down pat will make taking the next step.

2.) Before we go on, we're going to take a quick detour down Acid-Base Memory Lane. We definitely established in the last video that Grignards are strong, reactive nucleophiles (cause carbons don't bear negative charges well, right?). Well, we also said they are **strong bases** too, remember? Complete the following Acid-Base reactions, THEN we'll attack some carbonyls. But watch out—I snuck in one regular Sn2 reaction.





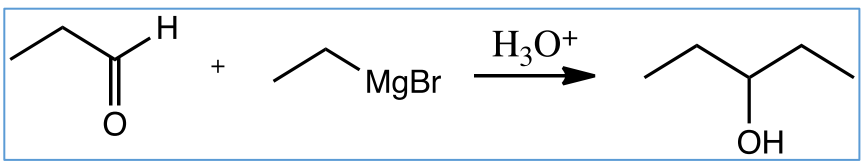


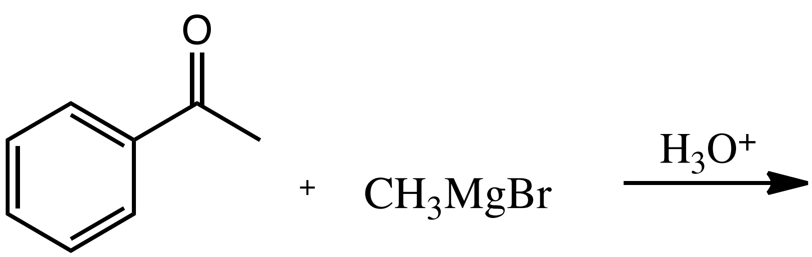


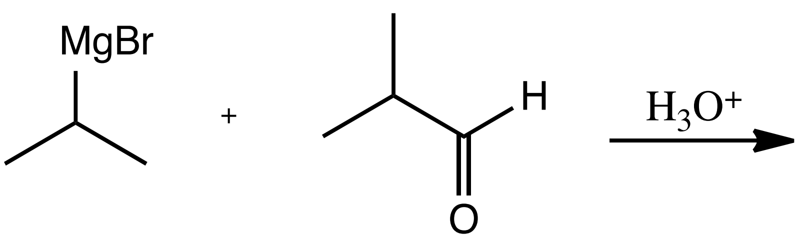
You might have caught onto this, did you notice how water/anything with a proton able to be donated caused an acid-base reaction? **Protic environments spoil/ruin Grignards, consuming them before they can do anything else, such as attacking a carbonyl.** Just keep that in mind—Grignard Reactions require non-polar, aprotic solvents to thrive successfully.

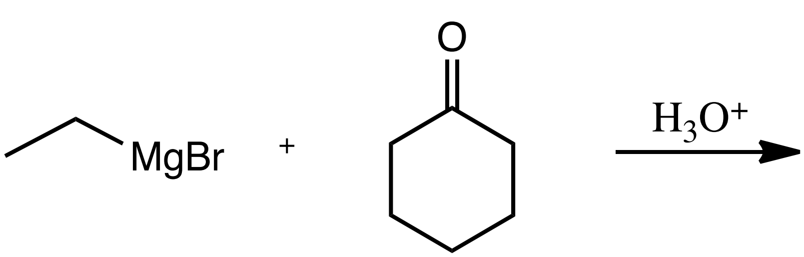
3.) Okay, now for the good stuff: Let's do some Complete the Reaction with the Grignard Reaction. Remember to be conscious of which 2 carbons you are connecting the Grignard and the substrate with, count your carbons so as to not lose any, and stay organized. You all got this. It all boils down to S_N2, but with some formal charge finesse and protonation.

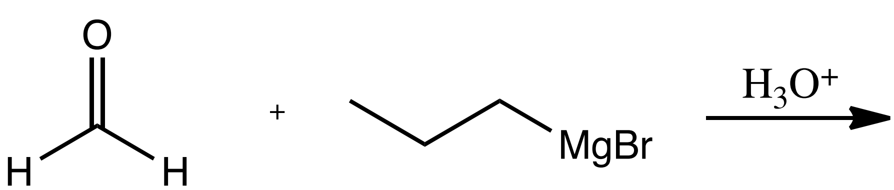
Here's a small example to look at if you get in a bit of an organic tizzy

**  **

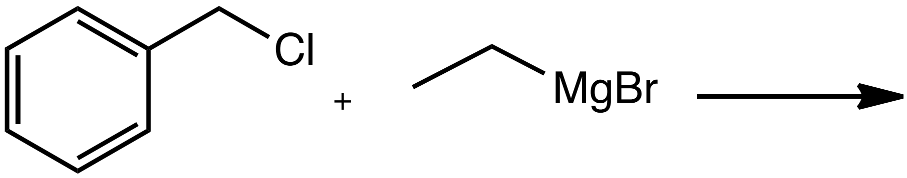


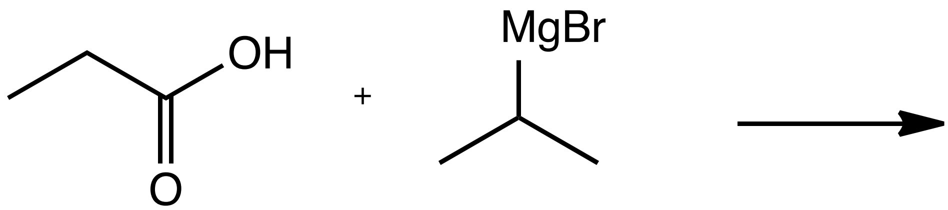


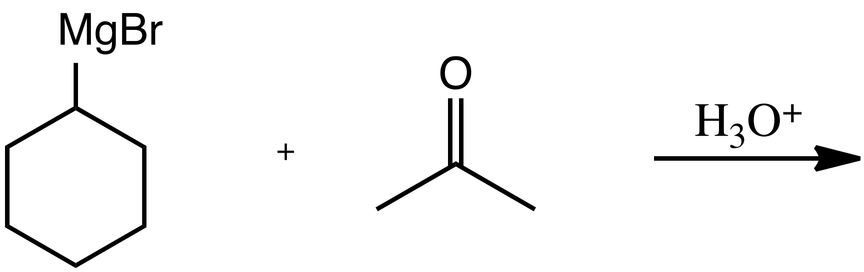


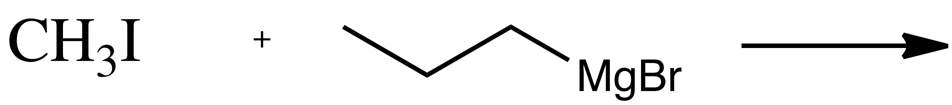


Now, while the Grignard Reaction works well when carbonyls are attacked, remember it is an S_N2 pathway: All you need is a good leaving group to kick off, right? Also, don't sleep on a potential acid-base question disguised as a bad Grignard Reaction

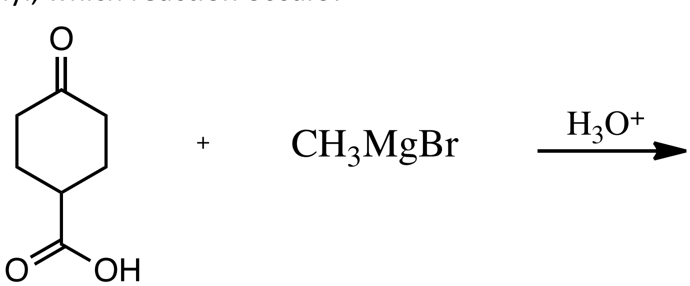








Bonus question here: Between the competing Acid-Base Rxn and the S_N2 attack of the carbonyl, which reaction occurs?



You're doing great: ONE last problem and this worksheet is overrrrrr. So stick with me, take a deep breath, and let's get this final question.

4.) Draw the curved arrow **mechanism** of the Grignard Reaction depicted below. YOU GOT THIS ☺ (feel free to ignore spectator ions, and don't lose any carbons!!).