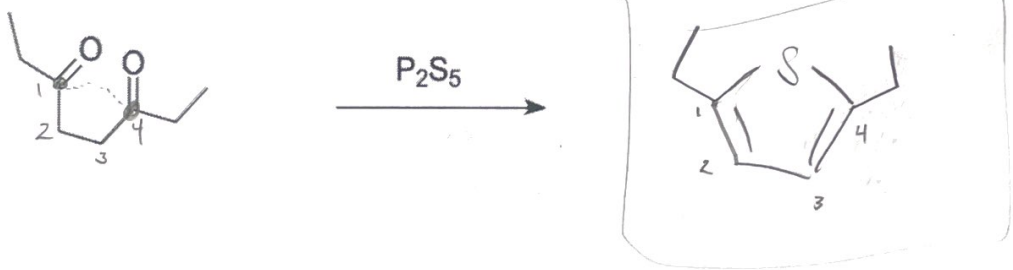
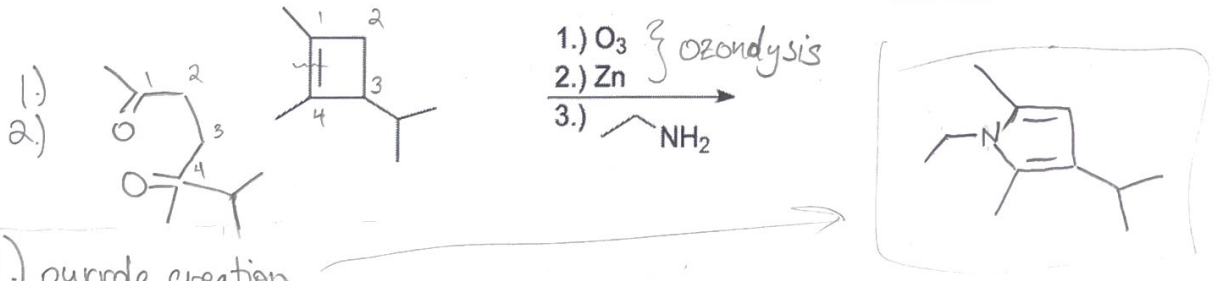
Heterocycles: Reactions, Concepts, and Synthesis Practice

Hey, gang! Wow, can you believe it: You're **deep** into Organic Chemistry II, all the way at heterocycles. It feels like ages ago we were talking about cyclohexane chairs, but now, we're talking about cyclic structures with other atoms besides carbon mixed in.

Just note that we're at a point in Organic Chemistry where, in my experience, instructors tend to pick and choose, or completely skip, certain material. So if there are questions here that you haven't covered in your particular course, don't sweat it & just ignore those problems. And, as a result, I'm going to keep this worksheet a bit on the shorter side, including topics that, in my experience, I've seen instructors commonly cover.

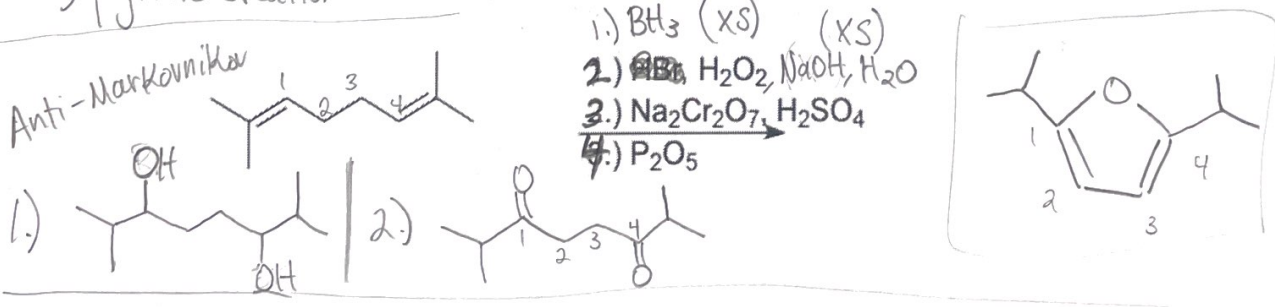
1.) To get this party started, let's practice our new heterocycle chemistry skills with some complete the reaction questions:

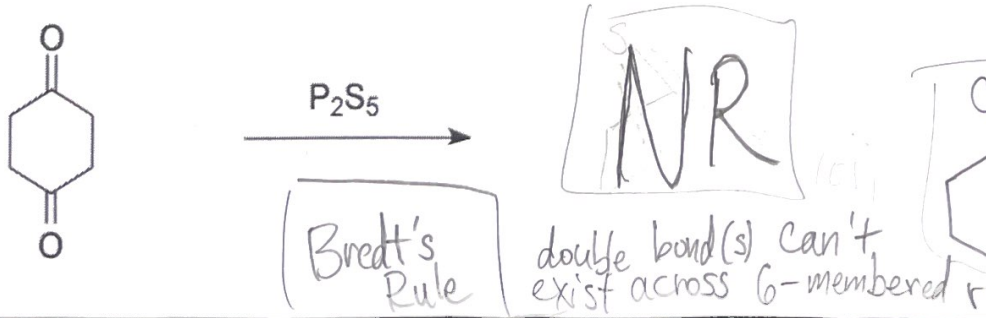




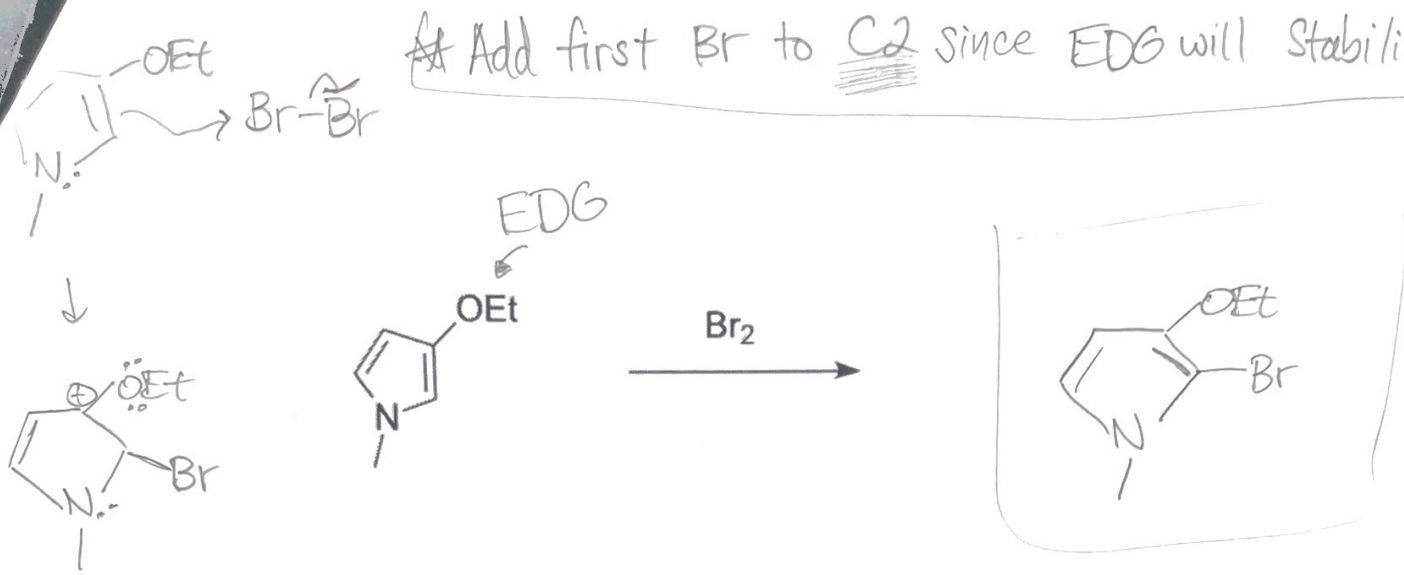
3.) pyrrole creation

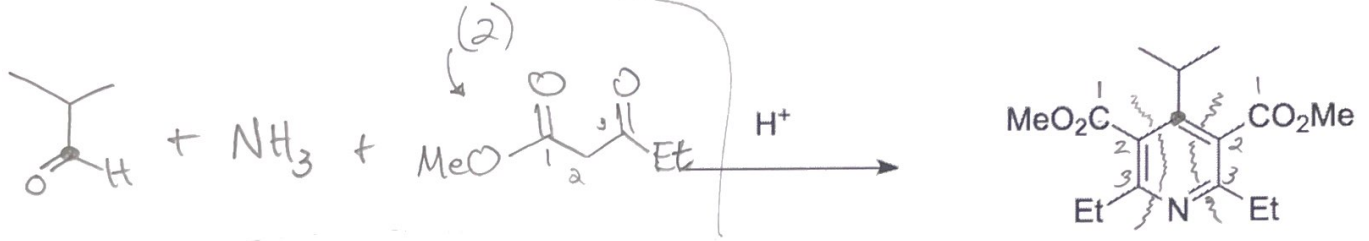
Anti-Markovnikov





~~Add~~ Add first Br to C2 since EDG will Stabilize ~~sp~~



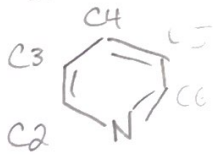


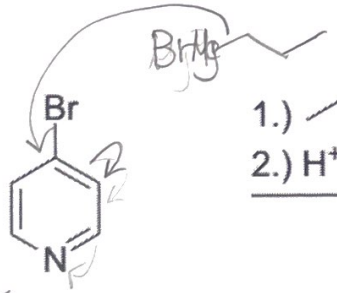
provide reactant(s)

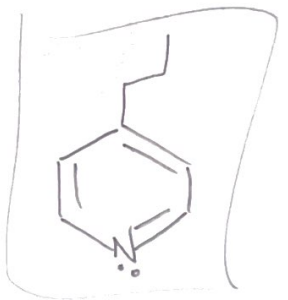
Hantzch Pyridine Syn.

NAS w/ pyridine

Remember:

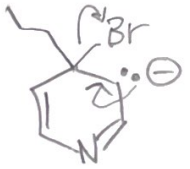




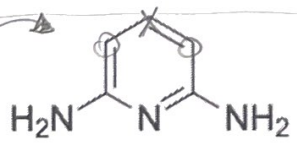


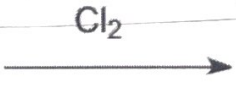
Attack @ C4

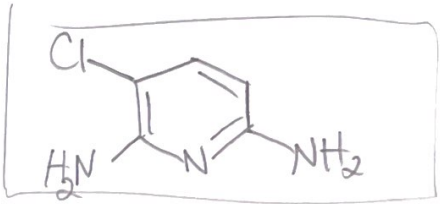
lots of good *resonance Stabilization



positions are equivalent







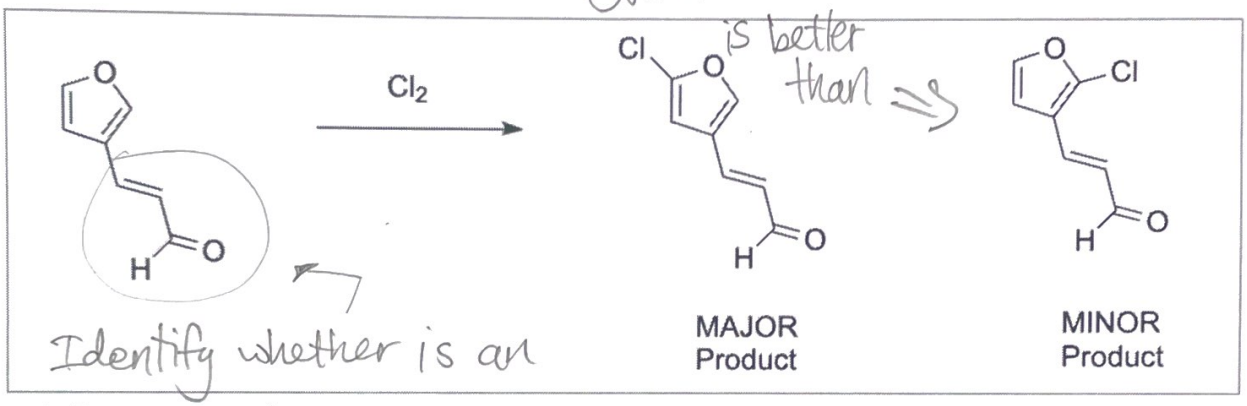
Resonance for intermediates adding @ C3 & C5 are superior to adding to C4

EAS w/ Pyridine

2.) Okay, let's take a break from completing reactions, and let's shift gears to explaining why a given reaction occurs.

Below you will see an EAS reaction of a furan derivative. The reaction yields two products, where there is both a major and minor product. **Using structures and (BRIEF) supporting written explanations, account for the major & minor products shown.**

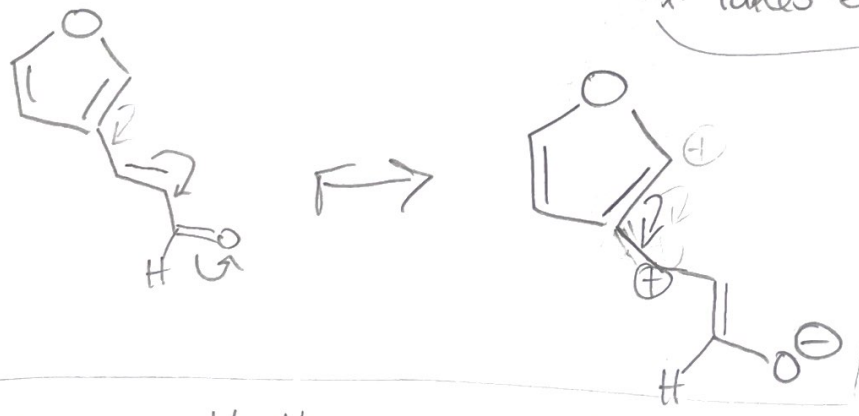
Overall resonance is better than



Identify whether is an EDG or EWG

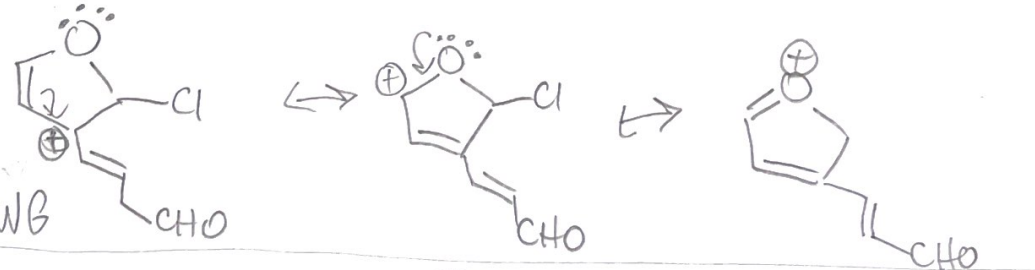
* Takes electrons out of the ring *

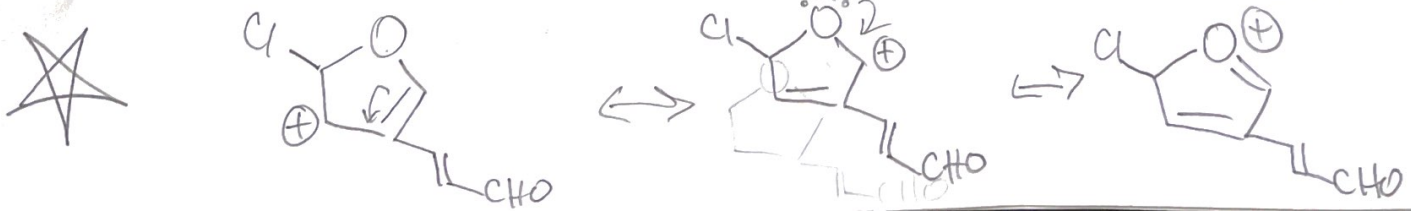
EWG



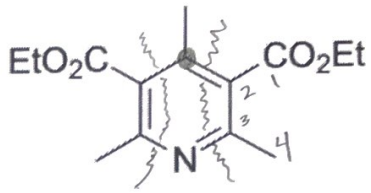
As a result, the resonance after performing EAS is as follows:

poor placement of ⊕ charge next to EWG





3.) Using alcohols that consist of **3 carbons or less**, synthesize the target molecule shown below. You may use any inorganic reagents necessary.



alcohols with <= 3 carbons