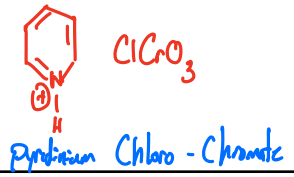
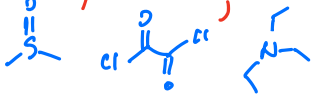
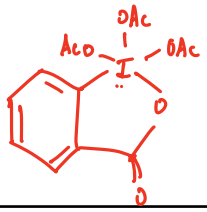
CHEM 223 (2024) SI Session #21

Learning Objectives: By the end of this session, students should be able to:

- Synthesize alcohol products
- Synthesize alcohol derivatives

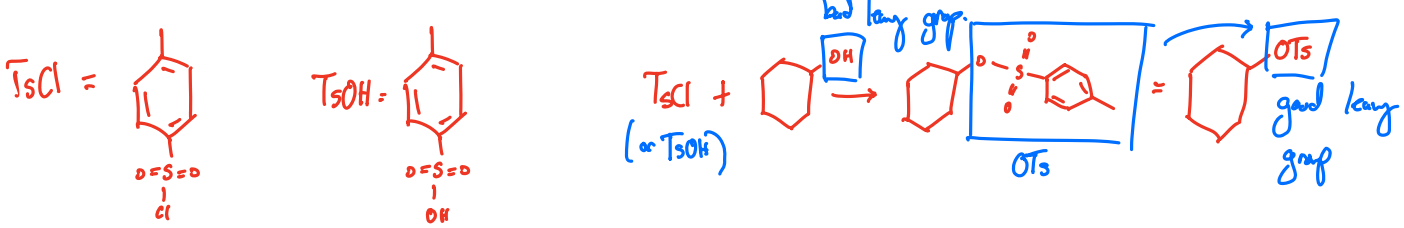
Section 1: ALL Alcohol Oxidation Reactions

1. Fill out the following table of oxidation reactions

Reaction Name	Reaction Reagents	Reaction Description
Chromic Acid	$Na_2Cr_2O_7$ + H_2SO_4 OR H_2CrO_4 (Same thing)	Uses a heavy metal to oxidize alcohols. Uncontrollable. ↓ 1° alcohol → carboxylic acid.
PCC	 $ClCrO_3$ Pyridinium Chloro-Chromate	Oxidizes alcohols to Carbonyls. Oxidizes 1° alcohols to aldehyde
Bleach (+ TEMPO)	NaOCl, water OR TEMPO	Oxidizes alcohols to Carbonyls. Oxidizes 1° alcohols to aldehyde
Swern oxidation	DMSO, $(COCl)_2$, Et_3N:, CH_2Cl_2  @ -60°C	Uses an aprotic solvent as a main reagent
Dess-Martin Periodinane (DMP)		Takes place under mild conditions

Section 2: Displacing alcohols

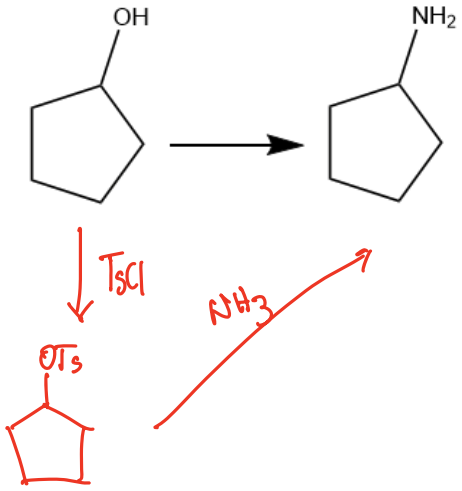
2. Draw TsCl, and draw its reaction with cyclohexanol (NO MECHANISM)

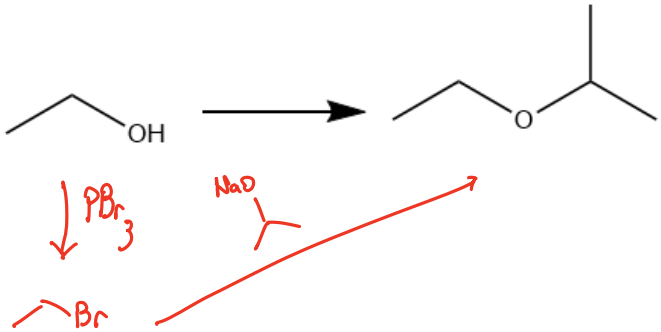


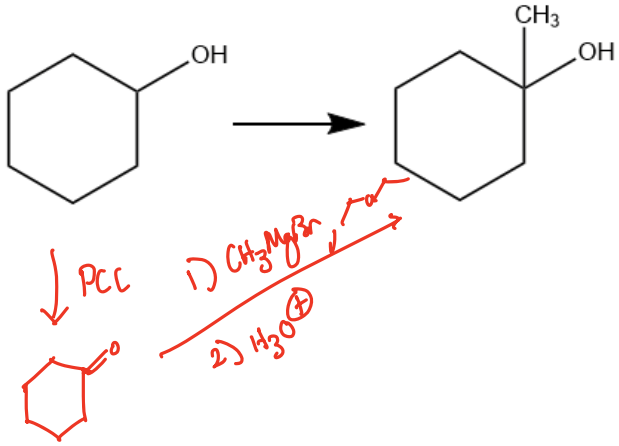
3. Provide the best reagent for replacing OH with Br

4. Provide the best reagent for replacing OH with Cl

5. Provide syntheses for the following compounds

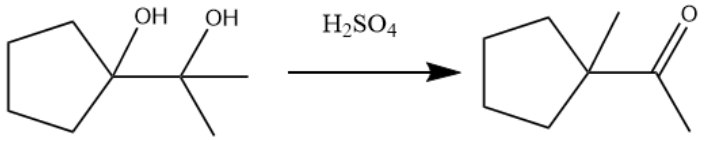




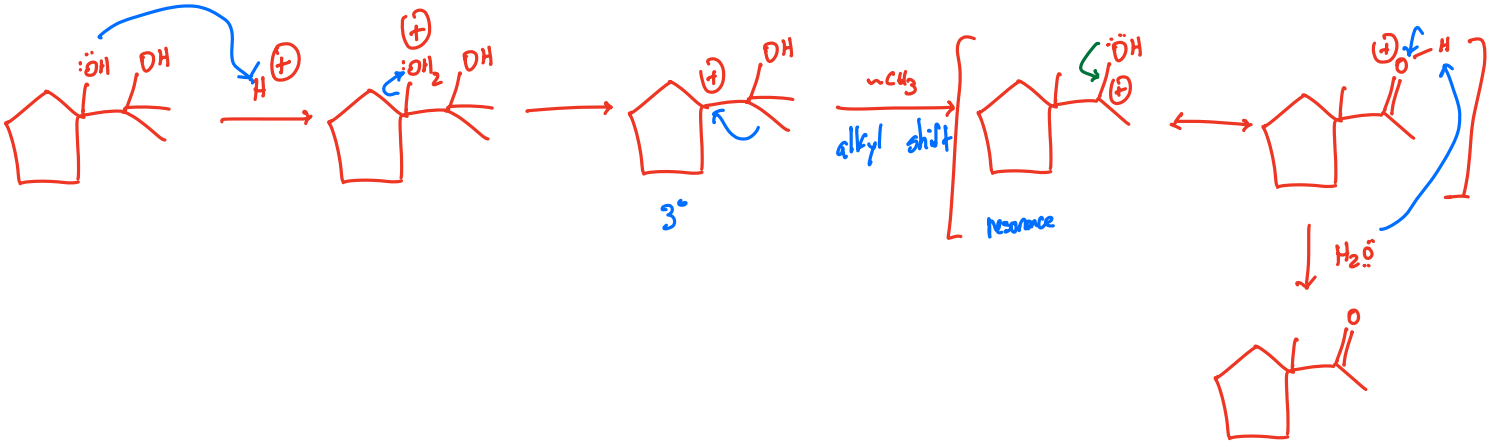


Section 3: Misc reactions that might matter

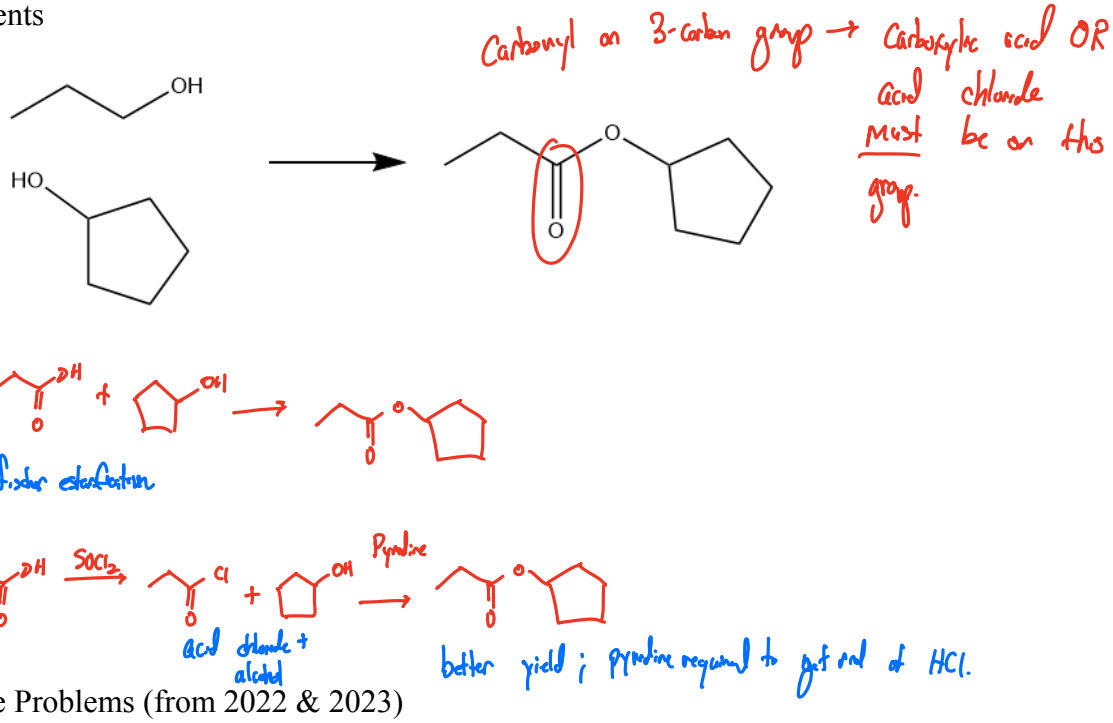
6. Provide a mechanism for the following reaction.



Pinacolone Rearrangement

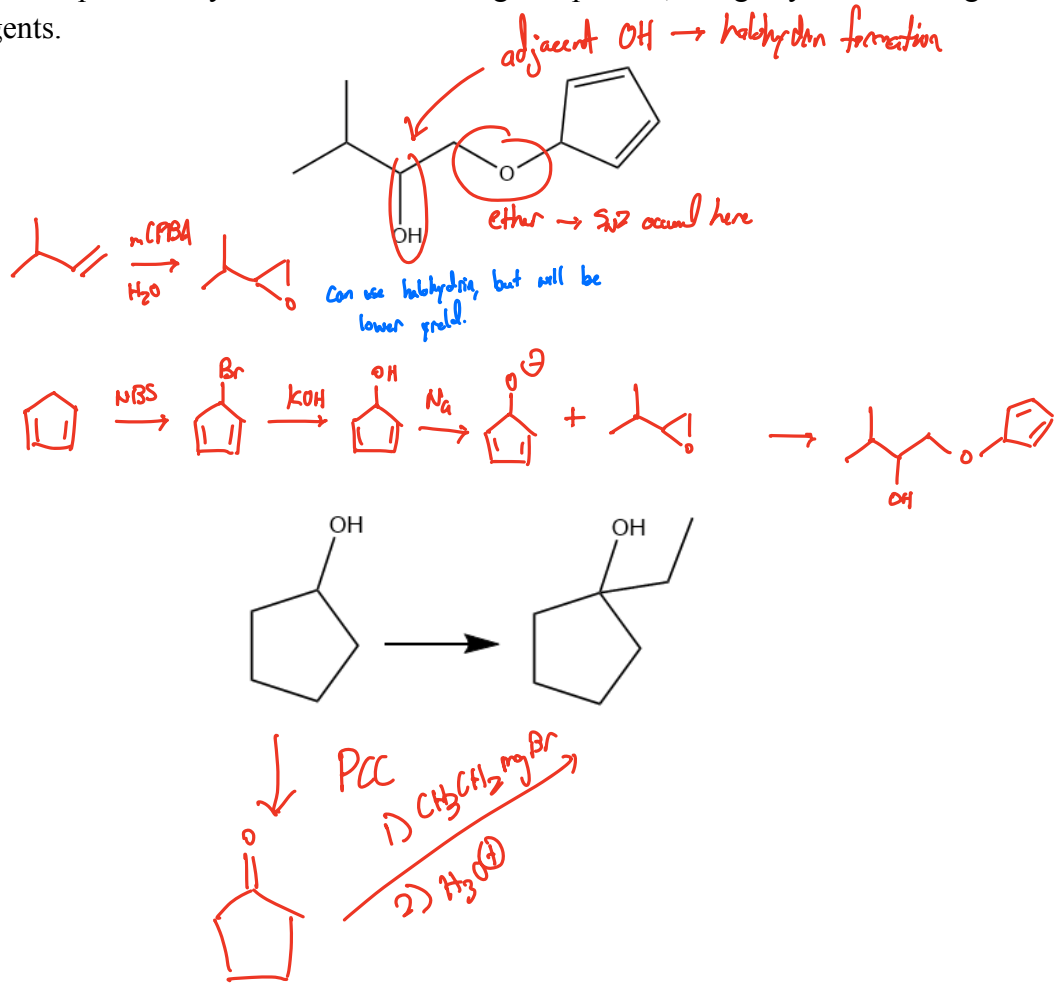


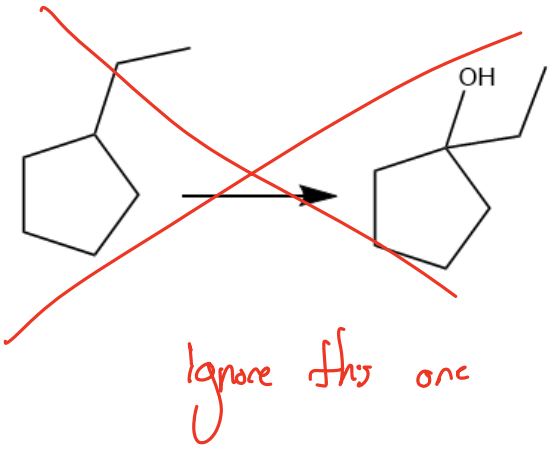
7. Provide 2 different methods to synthesize the following compound, starting with the given reagents



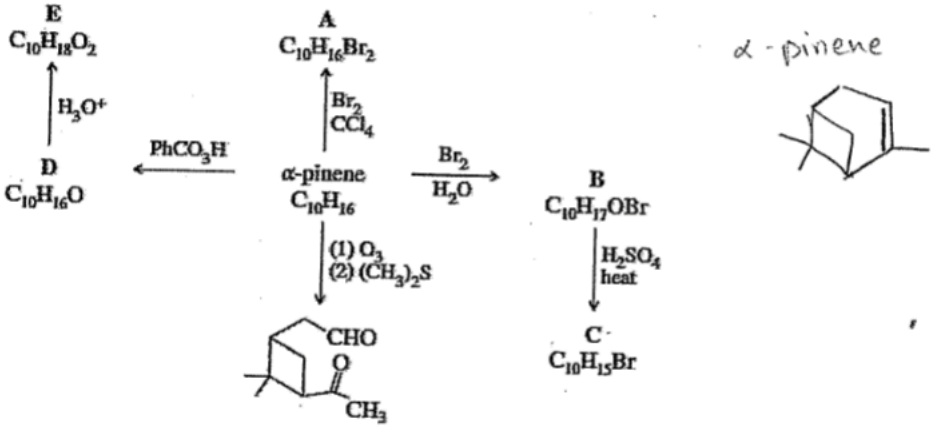
Section 4: Practice Problems (from 2022 & 2023)

8. Synthesis practice: synthesize the following compounds, using any valid starting reagents.

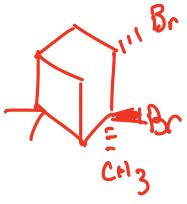




9. Using the given reactants and reagent paths, provide structures for A-E.

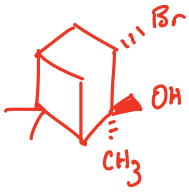


A:

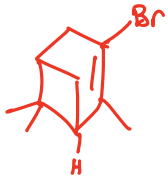


+ enantiomer

B:

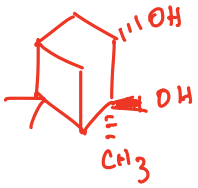


C:



D:

E:



+ enantiomer

10. Mechanism practice: Provide a mechanism for the following reaction