

## Chapter 19: More about Oxidation-Reduction Reactions

### Learning Objectives:

1. Be able to predict products from reductions.
2. Be able to predict products from oxidation of alcohol, aldehydes, ketones, and alkenes.
3. Be able to predict products from hydroxylation of alkenes along with the associated stereochemistry.
4. Be able to predict products from oxidative cleavage of 1,2-diols, alkenes, and alkynes.
5. Be able to write the general electron-pushing (arrow-pushing) mechanisms of ozonolysis and Baeyer-Villiger reaction.
6. Be able to employ the reactions taught in Chem2310 and Chem2320 for multiple step synthesis and functional group interconversion.

### Sections:

- 19.1 Reduction Reactions\*
- 19.2 Oxidation of Alcohols\*
- 19.3 Oxidation of Aldehydes and Ketones\*
- 19.4 Designing a Synthesis VIII: Controlling Stereochemistry<sup>#</sup>
- 19.5 Hydroxylation of Alkenes
- 19.6 Oxidative Cleavage of 1,2-Diols
- 19.7 Oxidative Cleavage of Alkenes
- 19.8 Oxidative Cleavage of Alkynes<sup>#</sup>
- 19.9 Designing a Synthesis IX: Functional Group Interconversion

\* Sections that will be focused

<sup>#</sup> Sections that will be skipped

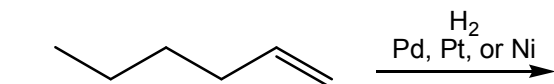
### Recommended additional problems

19.30 – 19.37, 19.39 – 19.49, 19.56 – 19.61

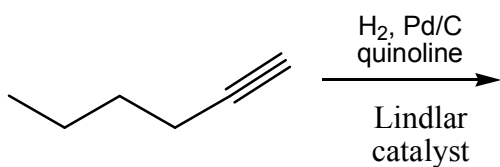
## Class Note

### 19.1 Reduction Reactions\*

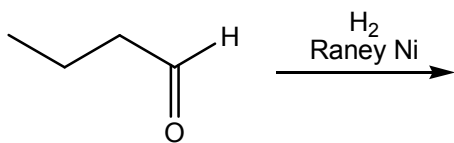
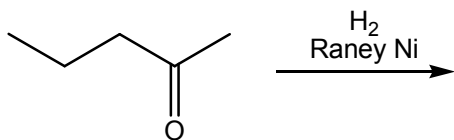
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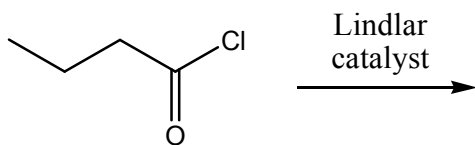
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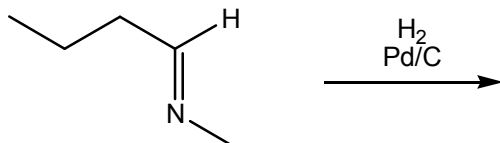
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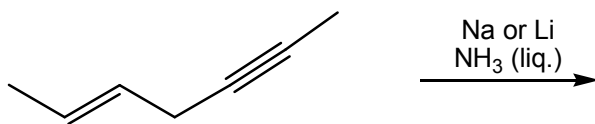
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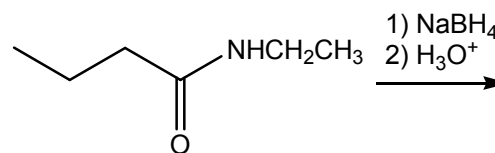
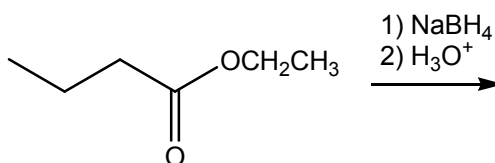
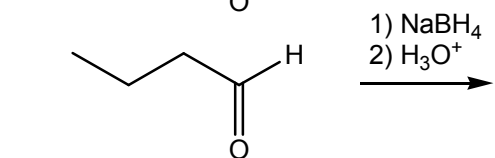
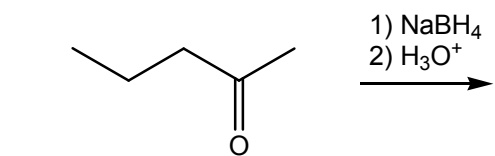
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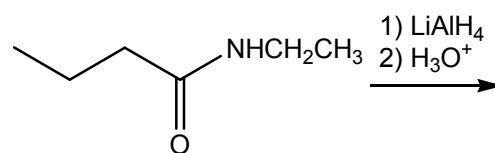
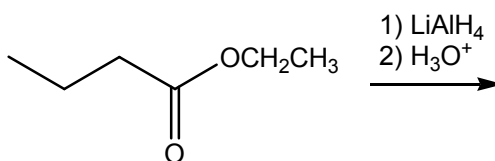
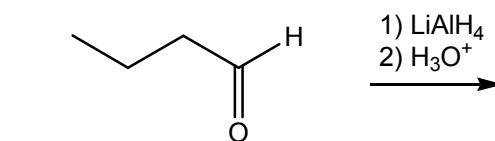
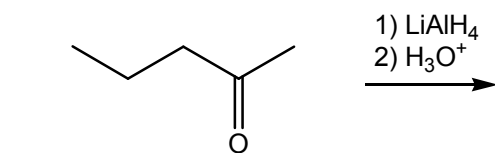
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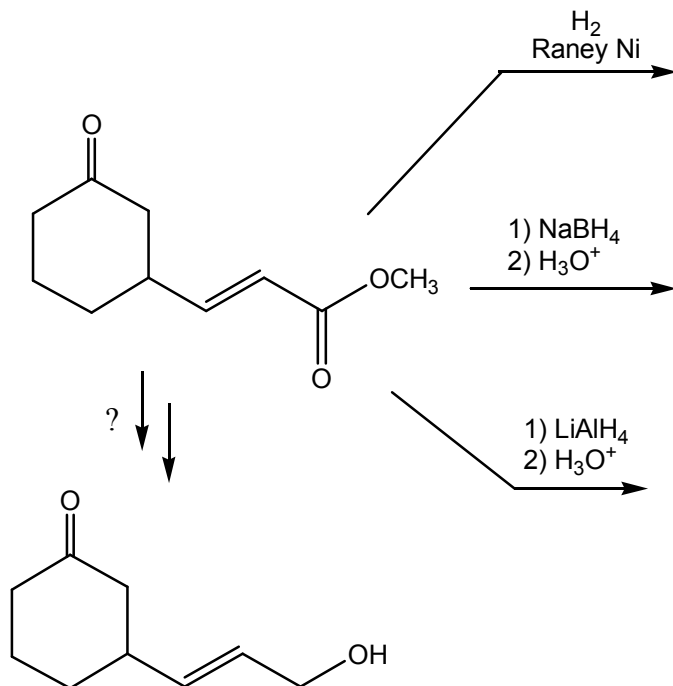
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H.



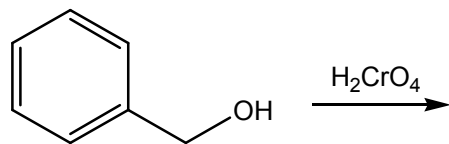
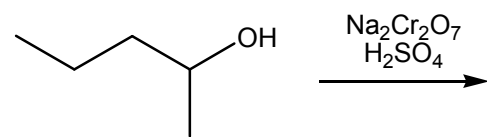
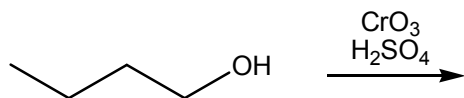
I.



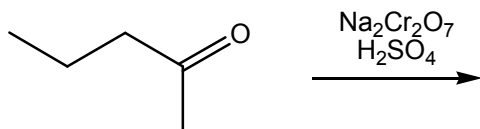
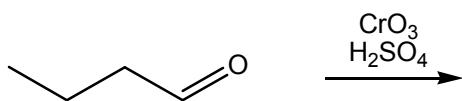
19.2 Oxidation of Alcohols\* and 19.3

Oxidation of Aldehydes and Ketones\*

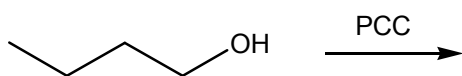
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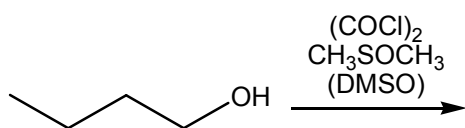
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C.

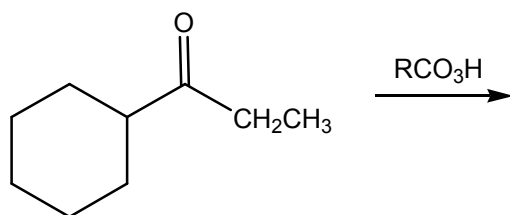
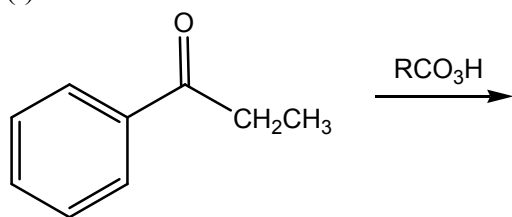


D. Swern oxidation



## E. Baeyer-Villiger oxidation

(i)



(ii) Mechanism

(iii) Relative migration tendency

$\text{H} > 3^\circ \text{ alkyl} > 2^\circ \text{ alkyl} > 1^\circ \text{ alkyl} > \text{methyl}$

## 19.4 Designing a Synthesis VIII: Controlling Stereochemistry

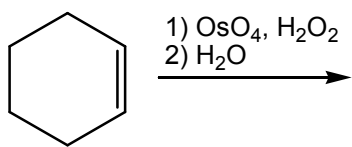
### A. Oxidation of Alkenes with Peroxyacids



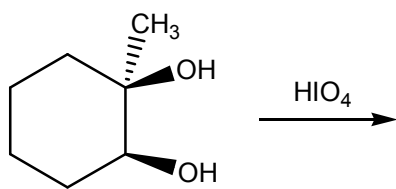
### B. Example

19.5 Hydroxylation of Alkenes and 19.6 Oxidative Cleavage of 1,2-Diols

A.

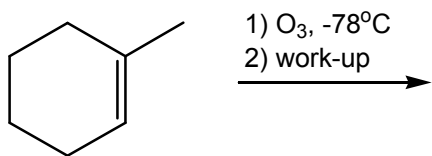


B.



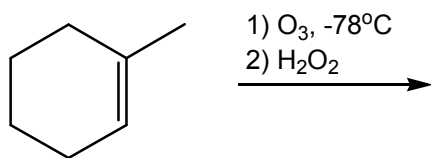
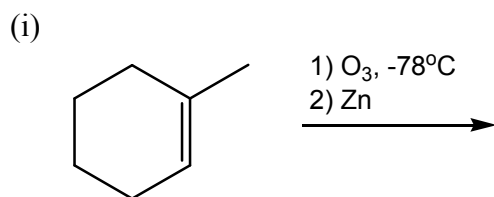
## 19.7 Oxidative Cleavage of Alkenes

### A. Ozonolysis

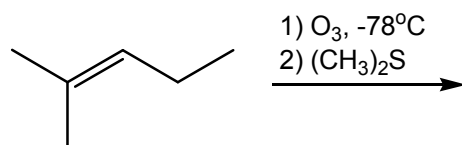
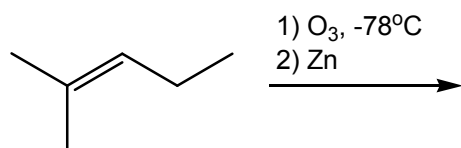


### B. Mechanism of the first step

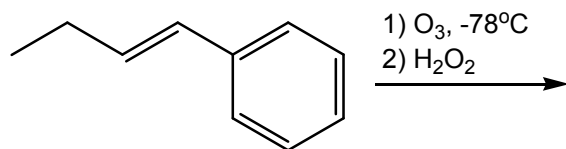
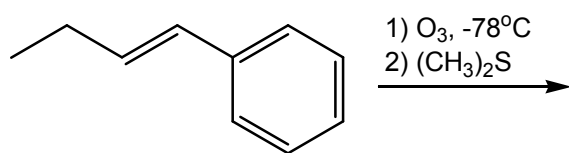
### C. Examples



(ii)



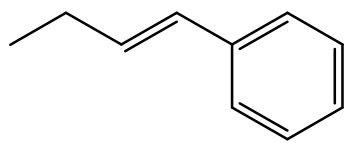
(iii)



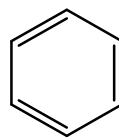
19.9 Designing a Synthesis IX: Functional Group Interconversion

A.

synthesis

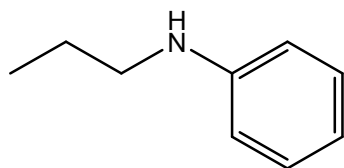


from



B.

synthesis



from

