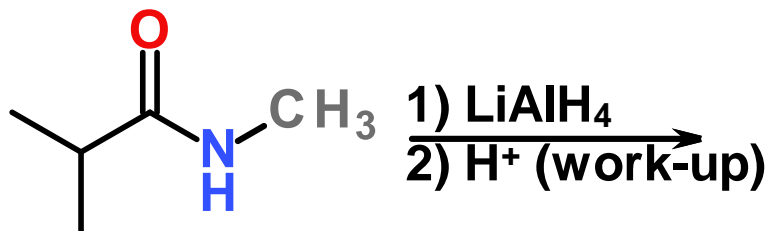
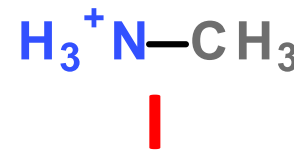
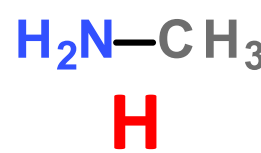
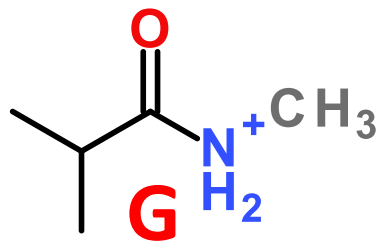
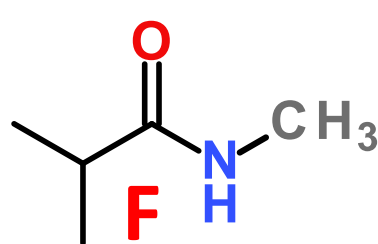
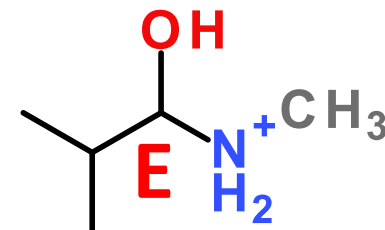
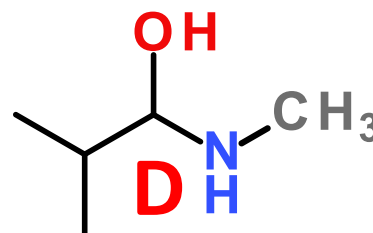
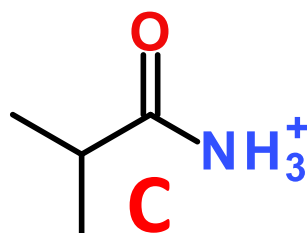
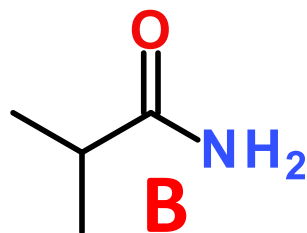
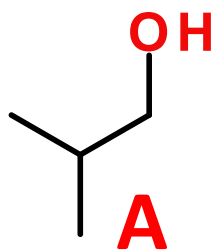


Give the major organic product(s) of the following reaction.

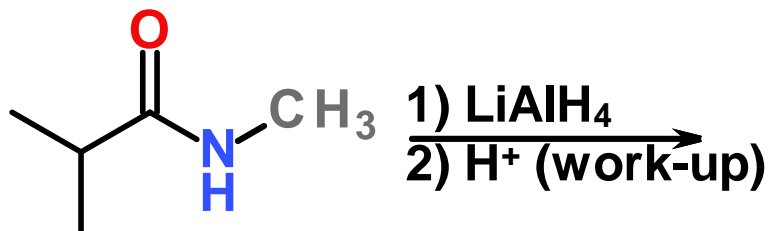


2016-09-30 Q1

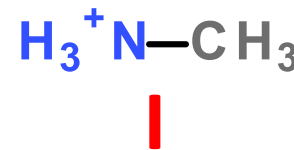
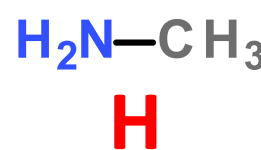
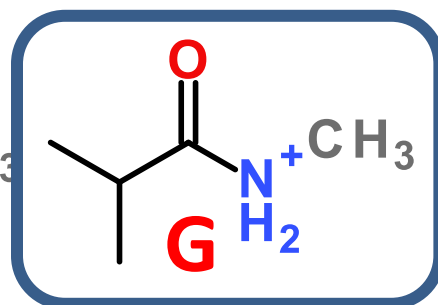
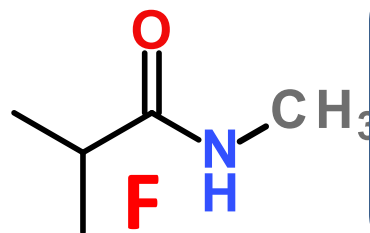
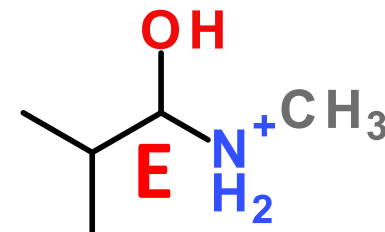
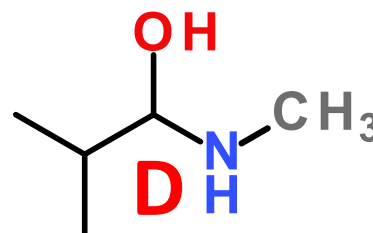
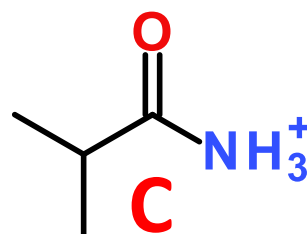
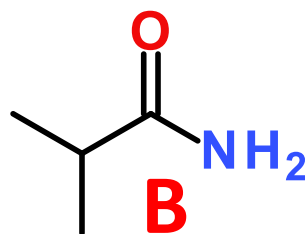
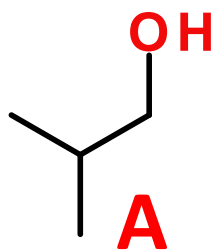


**J** - None of these products are a major product of the reaction that is shown.

Give the major organic product(s) of the following reaction.



2016-09-30 Q1



**J** - None of these products are a major product of the reaction that is shown.

# Exam 2

- **Time:**
  - Tuesday, October 18: 7:00 – 9:00PM OR
  - Wednesday, October 19: 7:00 – 9:00PM OR
  - Thursday, October 20: 7:00 – 10:00PM
- **Location – Soc/Anthro Testing Center**
  - Chapters will be covered in this order: Chapter 19, 12
- **Practice Exams are Posted**
  - Ex2-14-98 Practice Exam 2A
  - Ex2-14-98 Practice Exam 2B
- **Deadline for alternate arrangements is Monday, 10/17/2016 at 4:30 PM (i.e., close of business)**
  - An oral make-up exam will be required for making up the exam for all students not taking the exam on the above dates or having already made prior arrangements

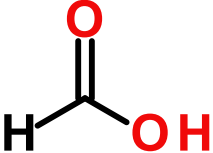
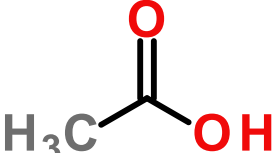
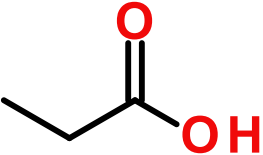
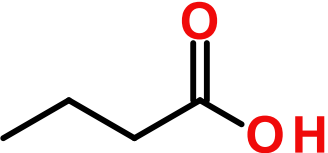
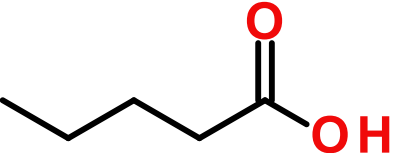
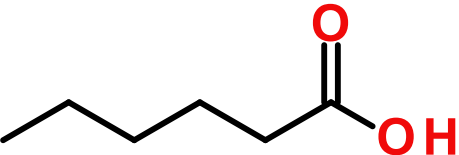
# Order of Coverage (Exam 2)

	Homework Assignment	Due Date
1	Ex2-01-B7-19-08A Aryl Side Chain Rxns	Saturday, September 24, 2016
2	Ex2-01-B7-19-08B Aryl Side Chain Rxns	Sunday, September 25, 2016
3	Ex2-02-B7-19-09A Arylamines	Monday, September 26, 2016
4	Ex2-02-B7-19-09B Arylamines	Tuesday, September 27, 2016
5	Ex2-03-B7-12-01A Grignard Rxns	Wednesday, September 28, 2016
6	Ex2-03-B7-12-01B Grignard Rxns	Thursday, September 29, 2016
7	Ex2-04-B7-12-02A Hydride Reductions	Friday, September 30, 2016
8	Ex2-04-B7-12-02B Hydride Reductions	Saturday, October 1, 2016
9	Ex2-05-B7-12-01A Naming Carboxylic Acids	Sunday, October 2, 2016
10	Ex2-05-B7-12-01B Naming Carboxylic Acids	Monday, October 3, 2016
11	Ex2-06-B7-12-02A Prep Carbox Acids	Tuesday, October 4, 2016
12	Ex2-06-B7-12-02B Prep Carbox Acids	Wednesday, October 5, 2016

# Order of Coverage (Exam 2)

	Homework Assignment	Due Date
13	Ex2-07-B7-12-03A Carbox Acid Rxns	Thursday, October 6, 2016
14	Ex2-07-B7-12-03B Carbox Acid Rxns	Friday, October 7, 2016
15	Ex2-08-B7-12-04A Naming Carbox Acid Derivatives	Saturday, October 8, 2016
16	Ex2-08-B7-12-04B Naming Carbox Acid Derivatives	Sunday, October 9, 2016
17	Ex2-09-B7-12-05A Rxns Acid Chlorides	Monday, October 10, 2016
18	Ex2-09-B7-12-05B Rxns Acid Chlorides	Tuesday, October 11, 2016
19	Ex2-10-B7-12-06A Rxns Esters	Wednesday, October 12, 2016
20	Ex2-10-B7-12-06B Rxns Esters	Thursday, October 13, 2016
21	Ex2-11-B7-12-07A Rxns Amides	Friday, October 14, 2016
22	Ex2-11-B7-12-07B Rxns Amides	Saturday, October 15, 2016
23	Ex2-12-B7-12-08A Step Growth Polymers	Sunday, October 16, 2016
	Exam 2	October 18, 19, 20

# Nomenclature of Carboxylic Acids

	IUPAC Name	Common Name
	Methanoic acid	Formic acid
	Ethanoic acid	Acetic acid
	Propanoic acid	Propionic acid
	Butanoic acid	Butyric acid
	Pentanoic acid	Valeric acid
	Hexanoic acid	Caproic acid

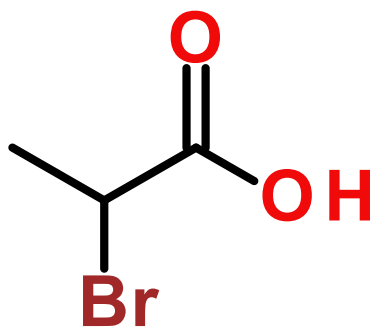
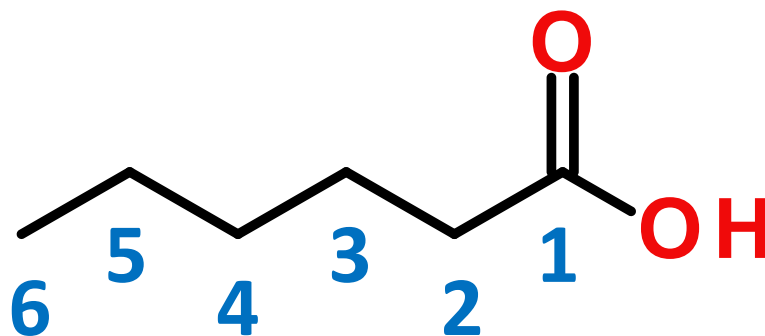
# Nomenclature Origin

- Formica – Ant (Latin)
- Acetum – Tang of Vinegar (Latin)
- Priopionic
  - Protos – First (Greek)
  - Pion – Fat (Greek)
- Butyrum – Butter (Latin)
- Valerian – Plant (Latin)
- Caper (capr-) – Goat (Latin)

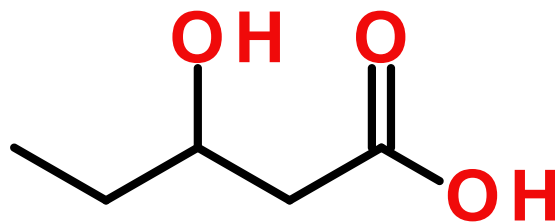


Valerian

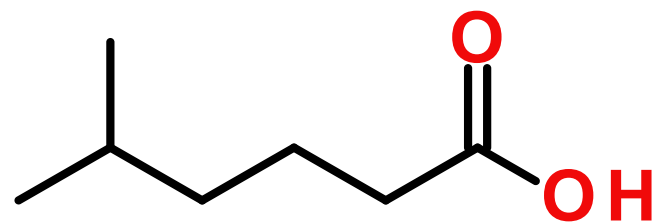
# Numbering of Carboxylic Acid Substituents in the IUPAC System



2-bromopropanoic acid



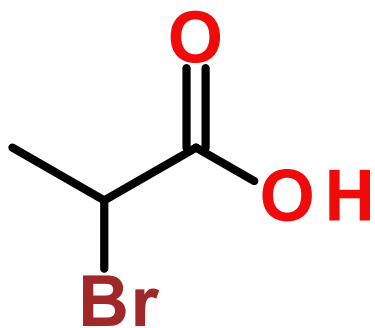
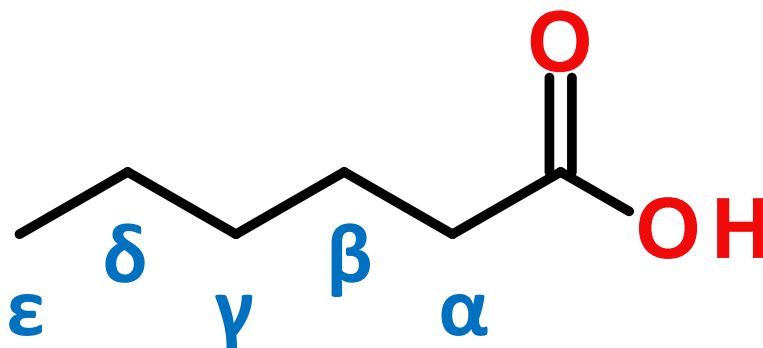
3-hydroxypentanoic acid



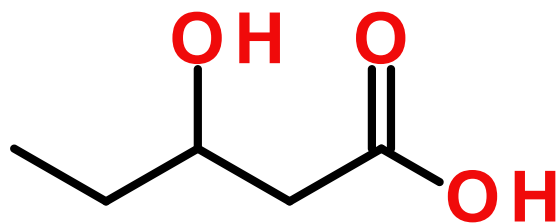
5-methylhexanoic acid



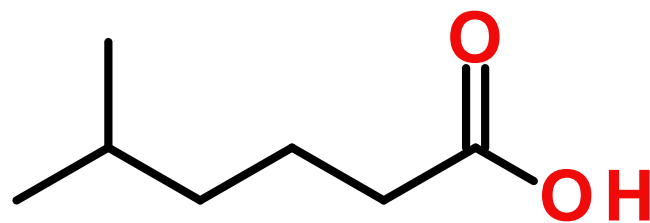
# Numbering of Carboxylic Acid Substituents in the Common System



$\alpha$ -bromopropionic acid

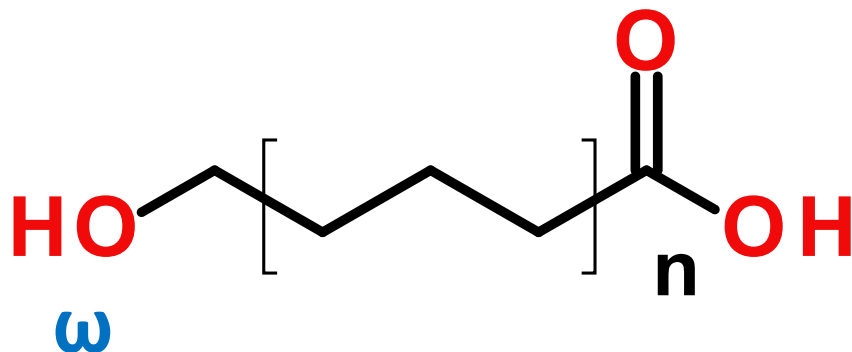


$\beta$ -hydroxyvaleric acid

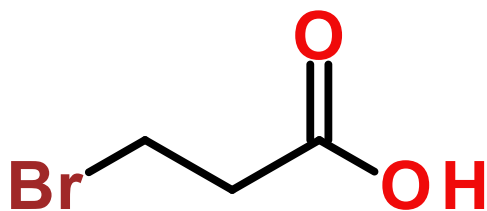


$\delta$ -methylcaproic acid

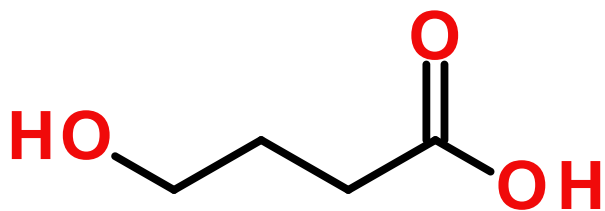
# Special Circumstance in the Common System



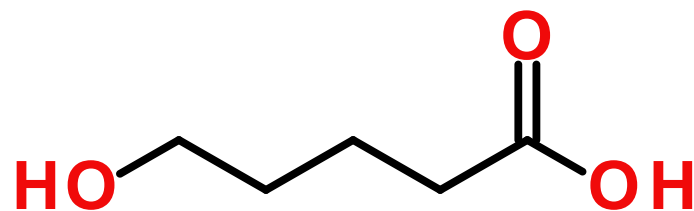
ω is the last letter of the Greek alphabet



ω-bromopropionic acid

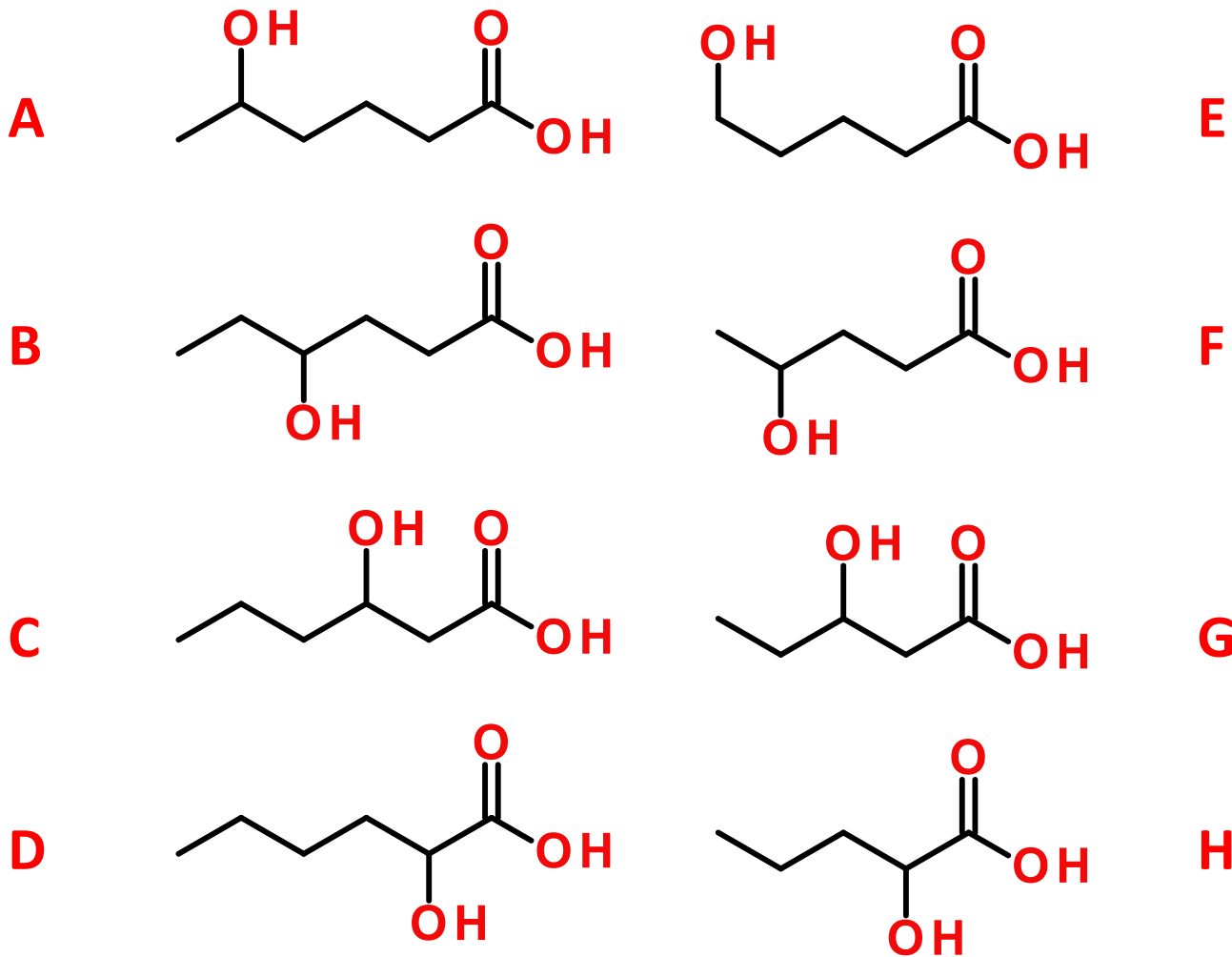


ω-hydroxybutyric acid

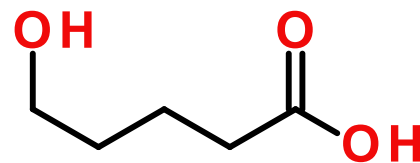
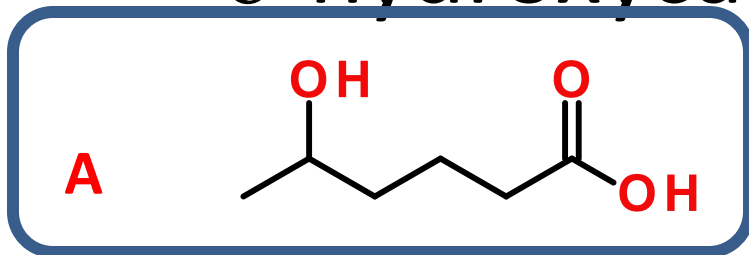


ω-hydroxyvaleric acid

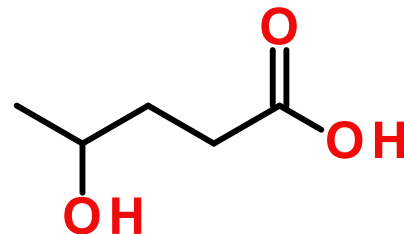
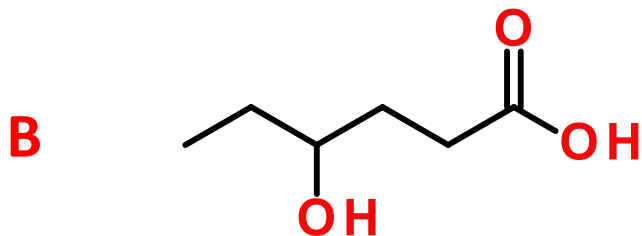
Which of the following compounds is  $\delta$ -hydroxycaproic acid? 2016-09-30 Q2



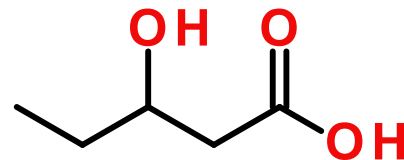
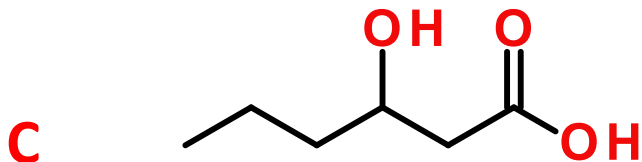
Which of the following compounds is  $\delta$ -hydroxycaproic acid? 2016-09-30 Q2



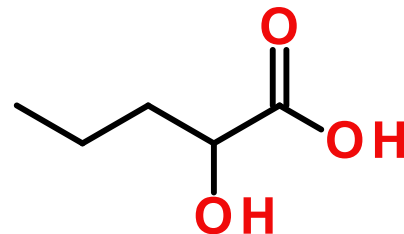
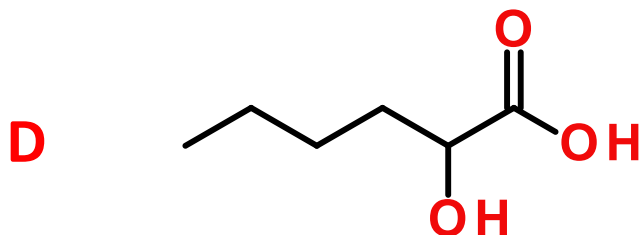
**E**



**F**

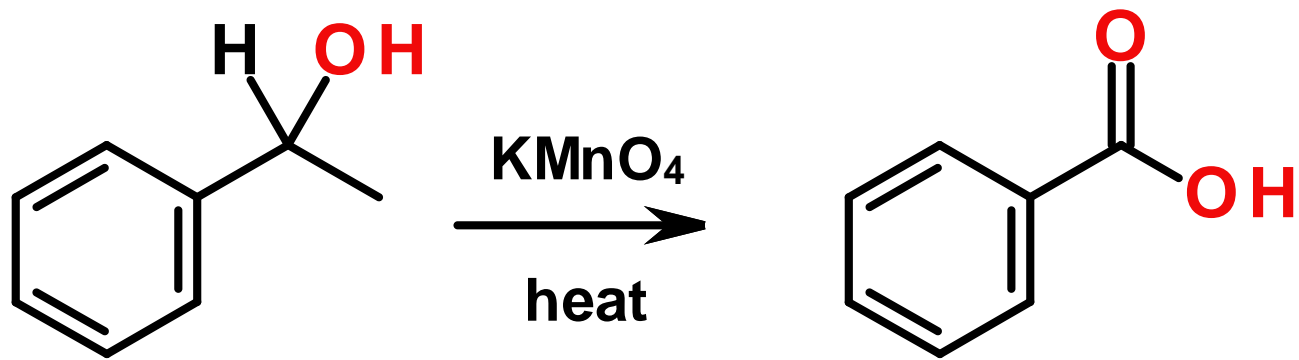


**G**



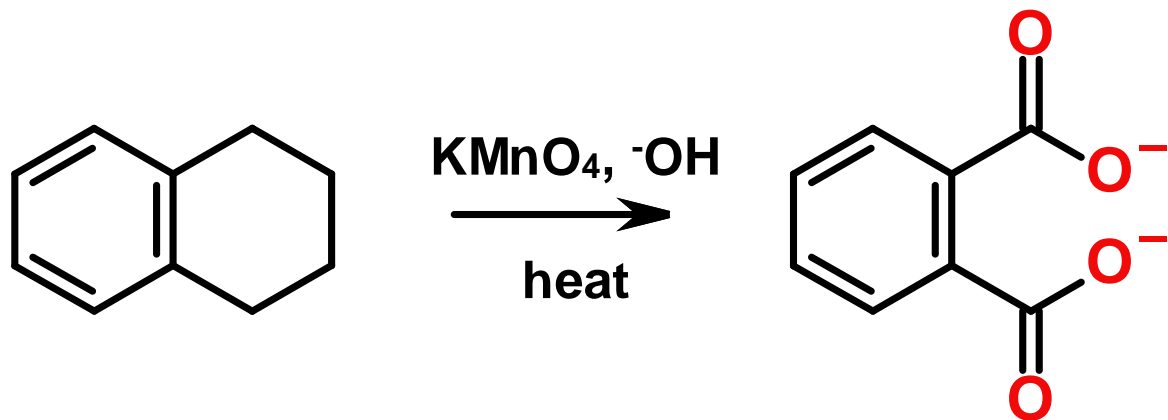
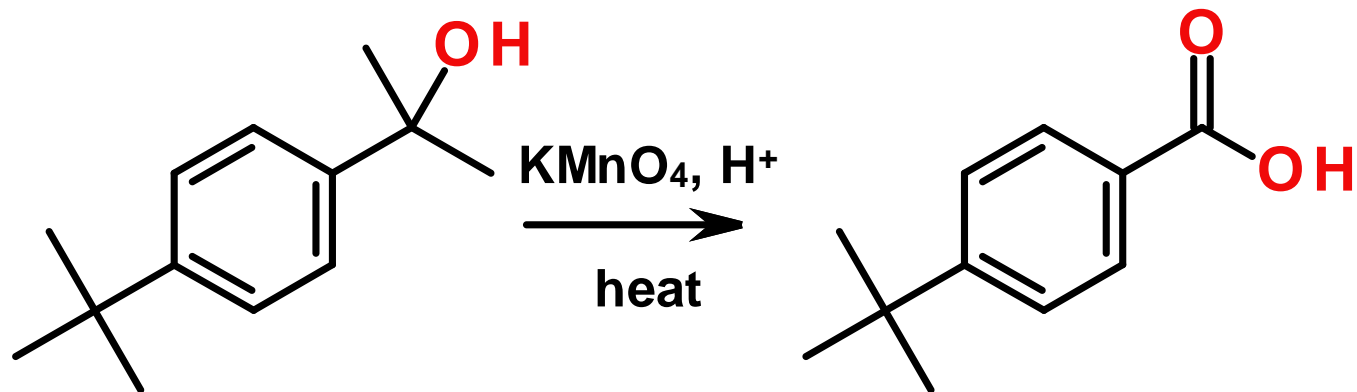
**H**

# Preparation of Carboxylic Acids – Oxidation of Arenes

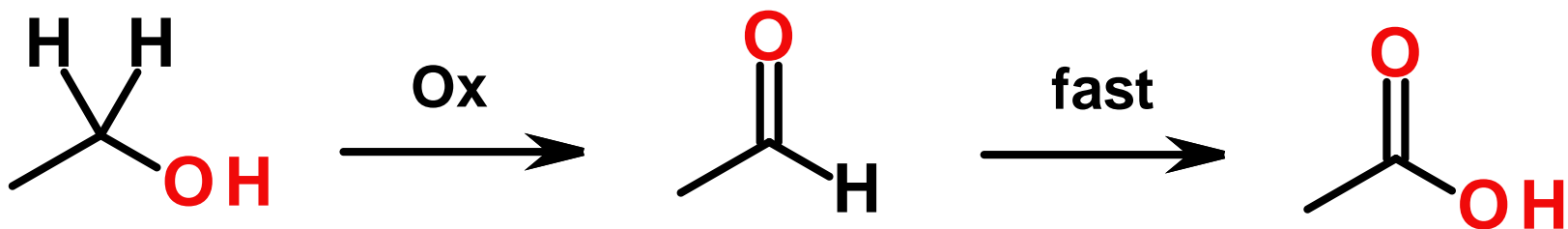


- ✓ Any  $\alpha$ -H or  $\alpha$ -O will result in oxidation to the carboxylic acid
- ✓ Heat makes the reaction go to the carboxylic acid
- ✓ Reaction works with either acid ( $\text{H}^+$ ) or base ( $^-\text{OH}$ )
  - ✓ Reactions in acid result in the carboxylic acid ( $\text{RCO}_2\text{H}$ )
  - ✓ Reactions in base result in the carboxylate ( $\text{RCO}_2^-$ )

# Examples: Oxidation of Arenes to Carboxylic Acids

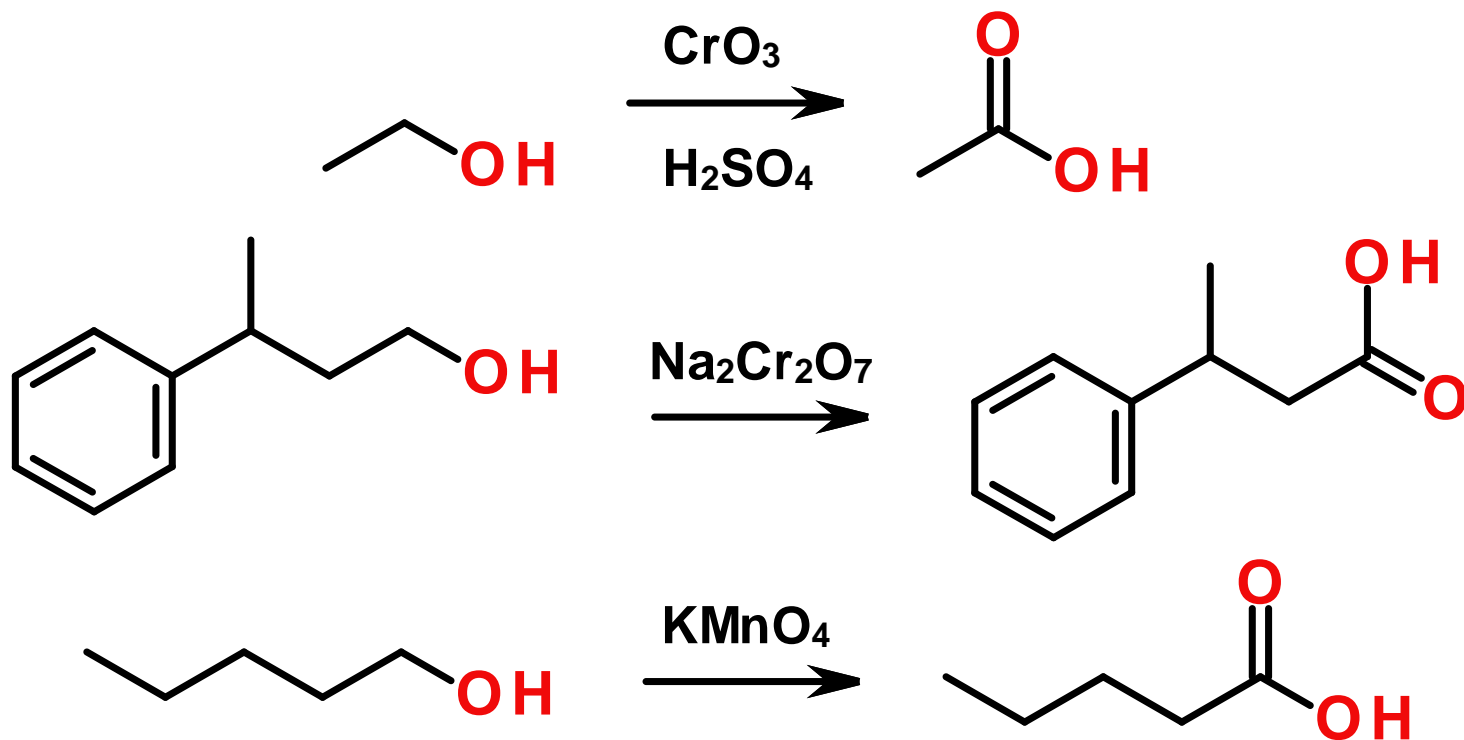


# Oxidation of Primary Alcohols



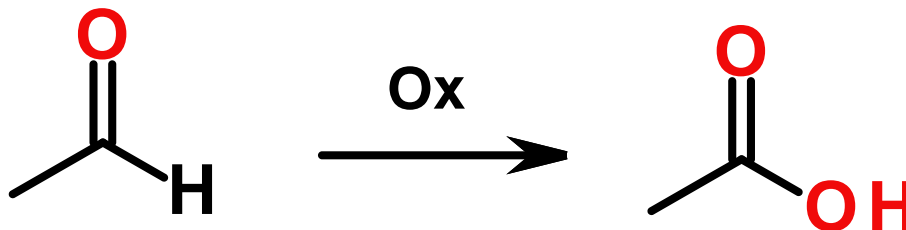
- ✓ Any of several strong oxidizing reagents
  - ✓ CrO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>
  - ✓ Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
  - ✓ KMnO<sub>4</sub>
- ✓ Reaction works with either acid (H<sup>+</sup>) or base (-OH)
  - ✓ Reactions in acid result in the carboxylic acid (RCO<sub>2</sub>H)
  - ✓ Reactions in base result in the carboxylate (RCO<sub>2</sub><sup>-</sup>)

# Examples: Oxidation of Primary Alcohols



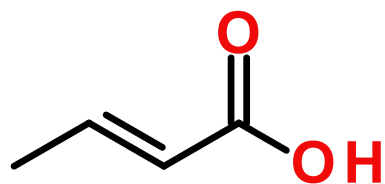
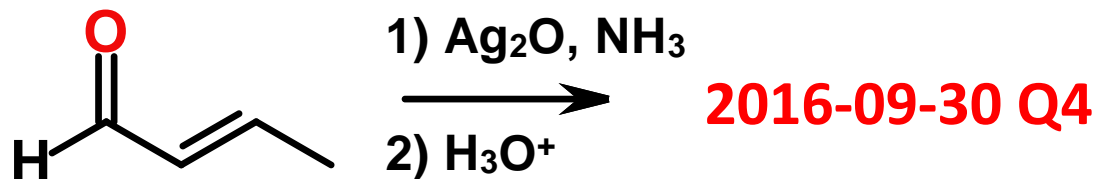


# Oxidation of Aldehydes

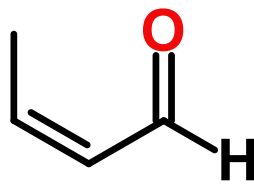


- ✓ Any of several strong oxidizing reagents
  - ✓  $\text{CrO}_3$ ,  $\text{H}_2\text{SO}_4$
  - ✓  $\text{Na}_2\text{Cr}_2\text{O}_7$
  - ✓  $\text{KMnO}_4$
- ✓ Several mild oxidants
  - ✓ Tollen's Reagent ( 1)  $\text{Ag}_2\text{O}$ ,  $\text{NH}_3$ ; 2)  $\text{H}_3\text{O}^+$ )
  - ✓ Benedict's Reagent ( $\text{Cu}^{2+}$ , aq sodium tartrate)
- ✓ Reaction works with either acid ( $\text{H}^+$ ) or base ( $^-\text{OH}$ )
  - ✓ Reactions in acid result in the carboxylic acid ( $\text{RCO}_2\text{H}$ )
  - ✓ Reactions in base result in the carboxylate ( $\text{RCO}_2^-$ )

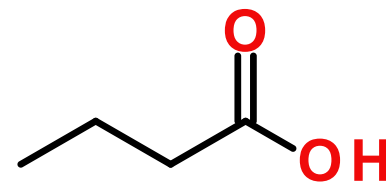
Give the major organic product(s) of the following reaction.



A



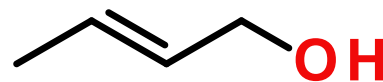
B



C



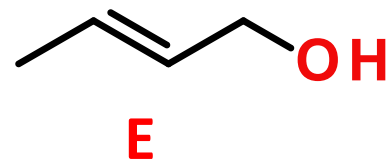
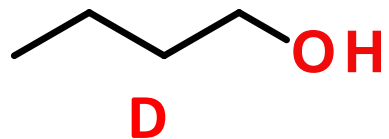
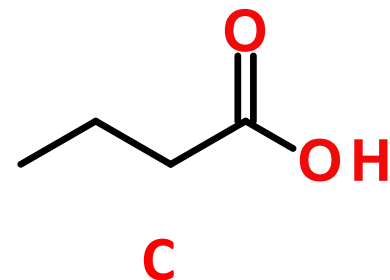
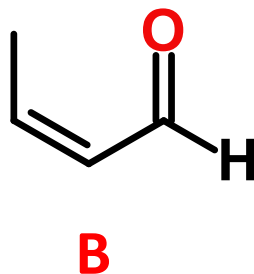
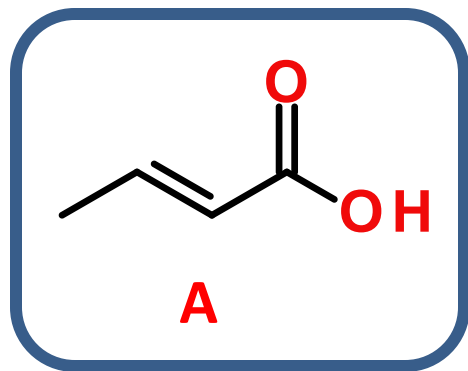
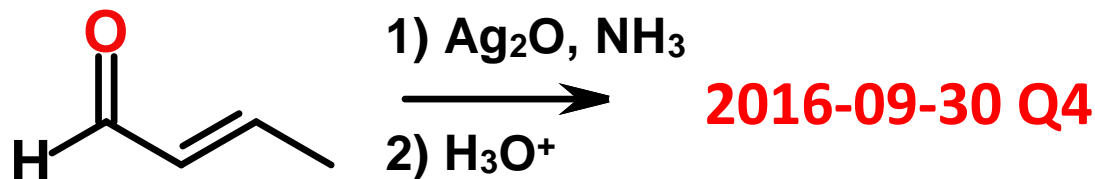
D



E

F - None of these products are a major product of the reaction that is shown.

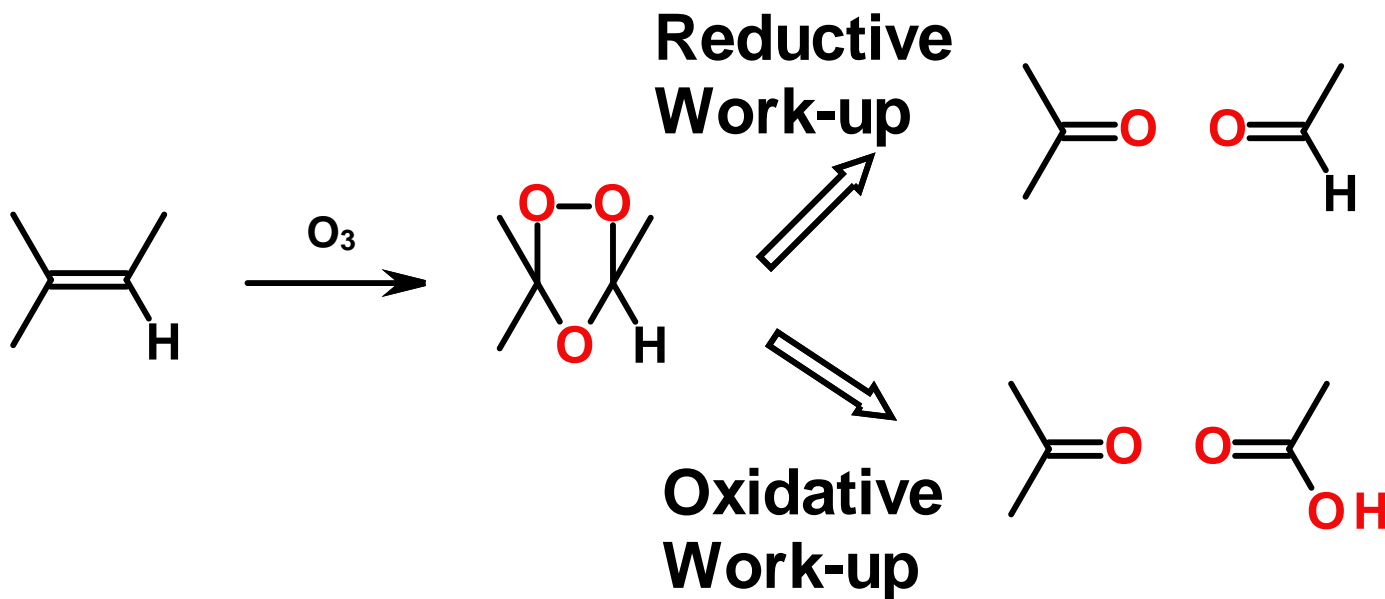
Give the major organic product(s) of the following reaction.



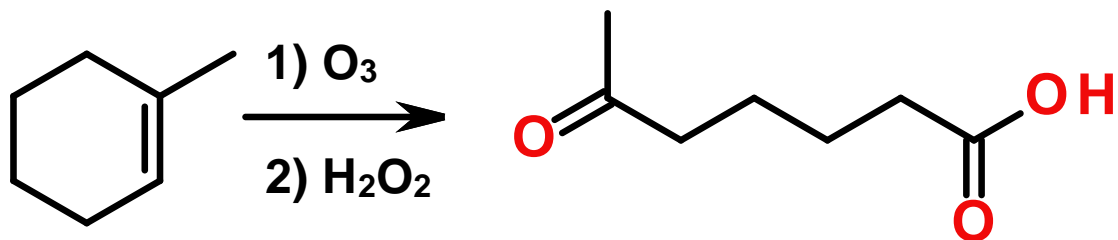
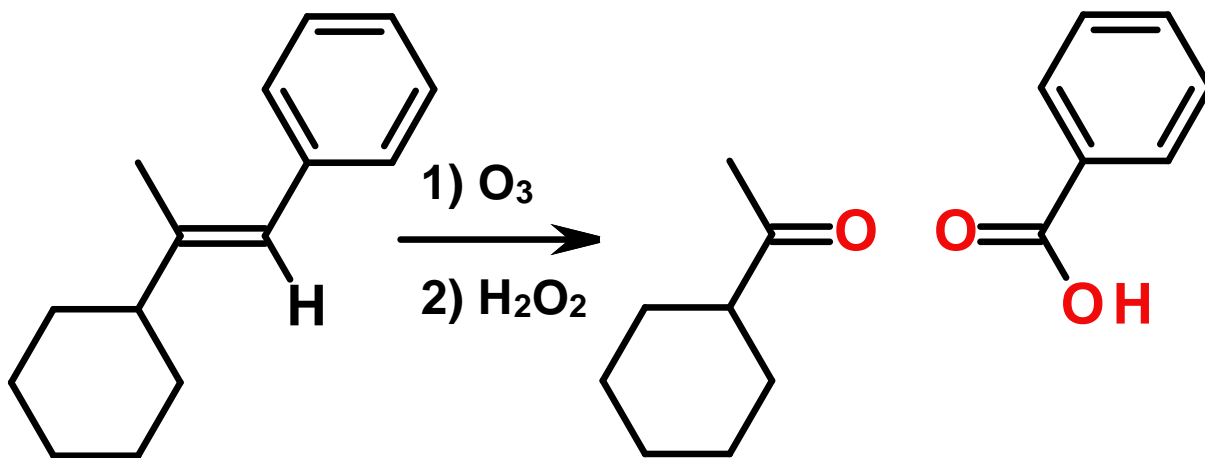
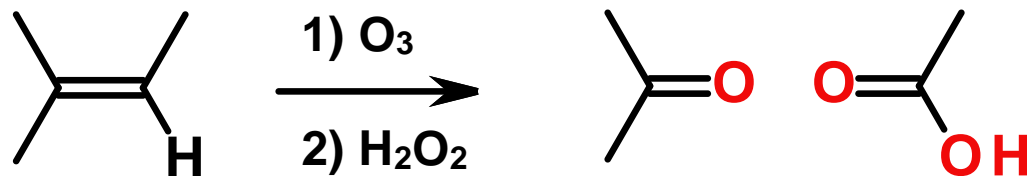
F - None of these products are a major product of the reaction that is shown.

# Alkene Oxidation: Ozonolysis

- $O_3$ , followed by work-up cleaves alkenes
  - C-substituents result in C-substituents
  - H-substituents may be changed
    - Reductive work-up results in aldehydes
    - Oxidative work-up results in carboxylic acids

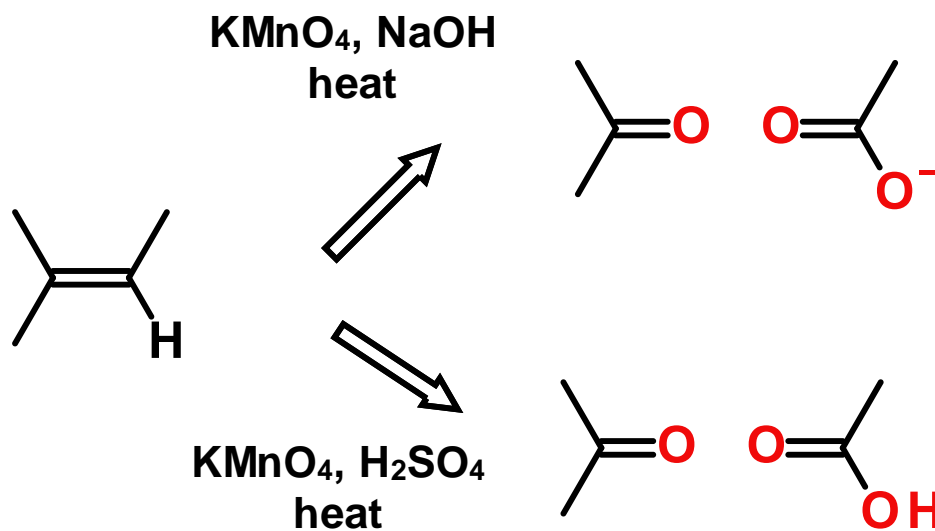


# Examples: Alkene Ozonolysis



# Alkene Lysis by $\text{KMnO}_4$

- $\text{KMnO}_4$  with heat
  - Acidic reaction results in carboxylic acids
  - Basic reaction results in carboxylates
- Same rules as ozonolysis



# Examples: Alkene Lysis by $\text{KMnO}_4$

