

Organic Chemistry II
CHM 2211
Sample Exam 2

I. Write Structures for the compounds named below: (12 points)

Acetone

Hydrazine

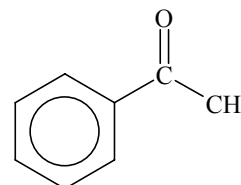
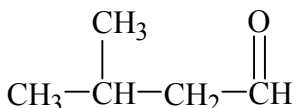
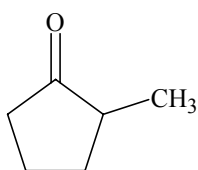
Cyclohexane carbaldehyde

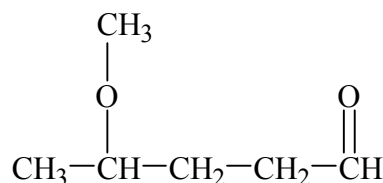
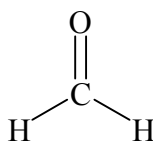
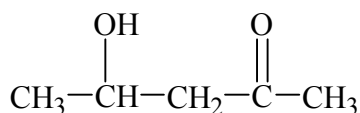
An ethyl ylide of
triphenylphosphine

Any imine

3-Oxo-6-phenylhexanal

II. Name the compounds whose structure is shown below: (6 points)





III. Fill in the Blanks (13 points)

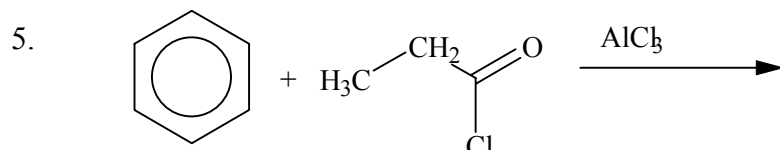
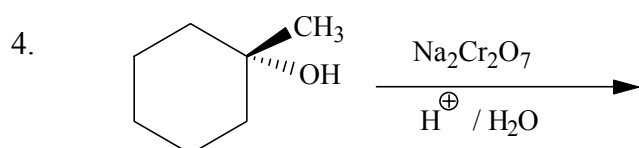
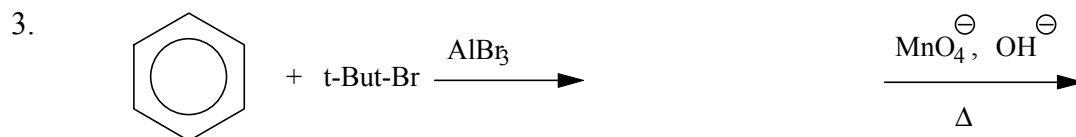
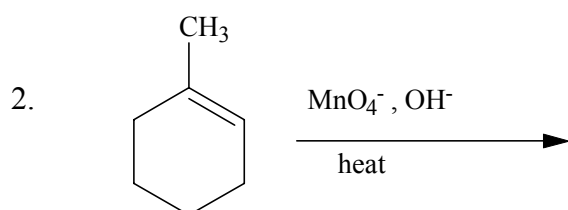
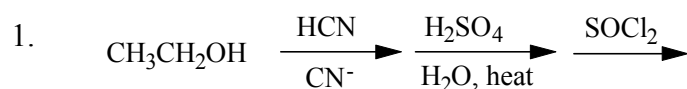
- Why does the carbonyl carbon have a partial positive charge? _____

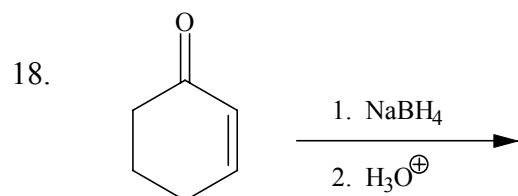
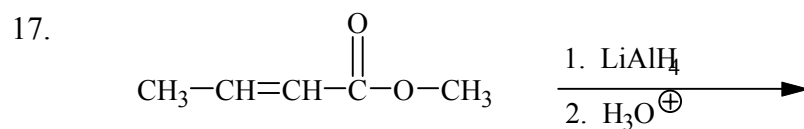
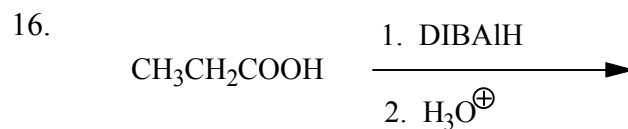
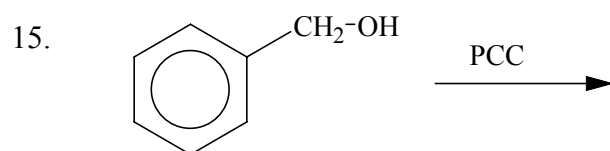
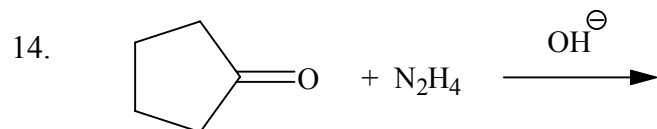
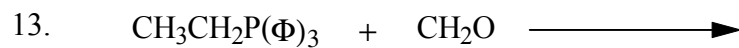
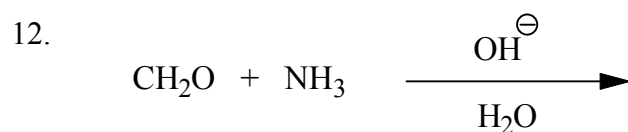
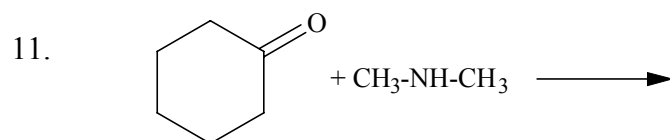
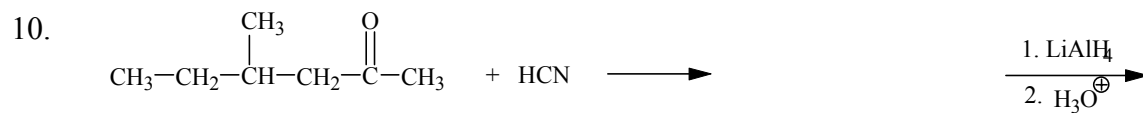
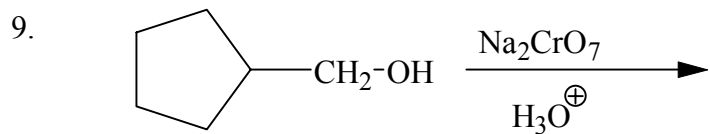
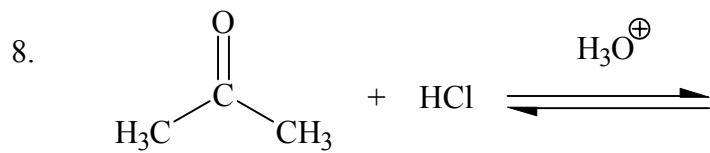
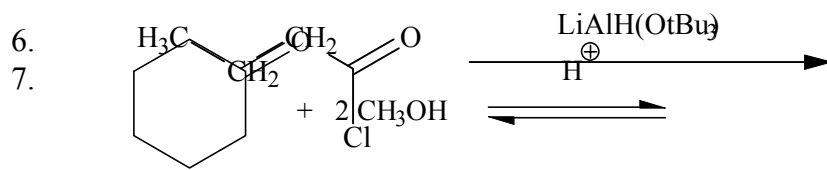
- When an aldehyde is considered as a group, it is called a _____ group.
 When a ketone cannot be named as an -one, it is named as an _____ group.
- An oxidizing agent that can oxidize an alcohol to an aldehyde without going all the way to an acid is (write the whole name) _____.
- CrO_3 in H_2SO_4 is called _____ Reagent while R_2LiCu is called _____ reagent.
- A positive Tollen's test for aldehydes is indicated by _____.

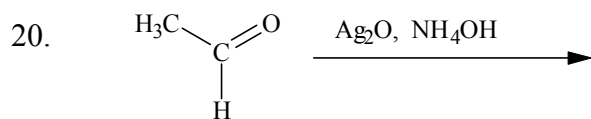
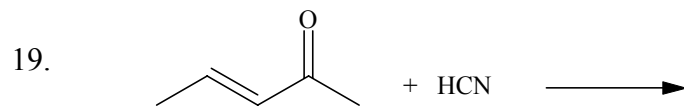
6. Two important types of diols are *geminal* and *vicinal*. Which is the least stable?
_____.
7. The Clemmenson reduction will reduce a(n) _____ to a(n) _____.
8. Which would be easier to identify using IR spectroscopy, an ether or a ketone? _____
9. Alcohols are capable of hydrogen bonding with water but aldehydes are not. (T/F) _____
10. Which would be easier to oxidize with Jones' Reagent, a ketone or an aldehyde?

IV. Write a multi step reaction mechanism for the reaction of phenylmagnesium bromide (ΦMgBr) with acetone to form an alcohol. Indicate intermediates that may or may not be isolated. Use curved arrows to indicate electron attack and show charges and intermediates. (9 points)

V. Complete the following reaction equations by filling in the missing information: (40 points)

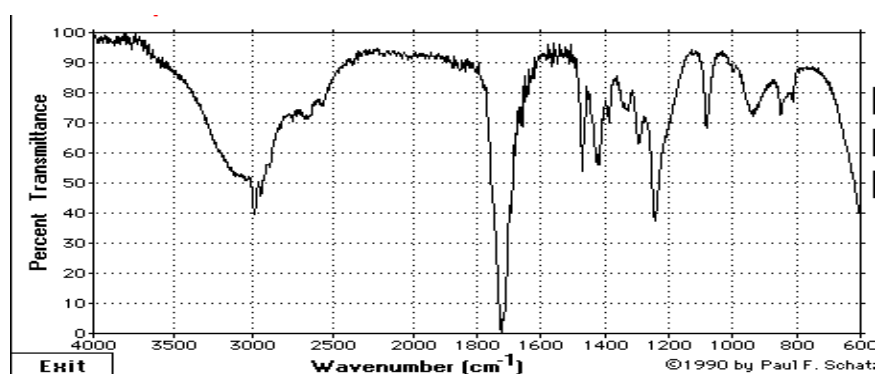






VI. Multiple Choice (Circle the letter of the best answer) (20 points)

1. Below might be the spectrum of a carboxylic acid. Which two features make this likely?



- The broad peak above 3000 cm^{-1} and the sharp peak at 1710 cm^{-1}
 - The peaks at 1240 and 1090 cm^{-1}
 - The sharp peak at 3000 cm^{-1} and the sharp peak at 1240 cm^{-1}
 - This is probably not the spectrum of a carboxylic acid.
2. Which compound will reduce $\text{C}=\text{O}$ but not $\text{C}=\text{C}$ (at least not much)?
- Jones' Reagent
 - PCC
 - LiAlH_4
 - NaBH_4
 - Chromic Acid
3. Which of these is not an oxidizing agent?
- PCC
 - DIBAH
 - $\text{Na}_2\text{Cr}_2\text{O}_7$ in H_2SO_4
 - Jones' Reagent
 - Hypochlorite
4. Alkoxymercuration followed by borohydride reduction would be used to produce
- an alcohol from an alkene.
 - an aldehyde from alcohol.
 - an acid from and alkyne.
 - an ether from an alkene.

- e. an alkene from an aryl halide.
5. Which of the following is not a common reaction of aldehydes?
- Nucleophilic acyl addition
 - Nucleophilic acyl substitution
 - alpha Substitution
 - Carbonyl condensation
 - Reduction to a ketone
6. When CN^- is reacted with carbonyl compounds followed by protonation of the oxygen, what do we call the products?
- Cyanohydrins
 - Nitriles
 - Ketones
 - Imines
 - Enamines
7. In proton NMR, which compound or groups will show a characteristic peak near 10 ppm?
- Alcohols
 - Aldehydes
 - Ketones
 - $\text{C}=\text{O}$
 - Methyl on a carbonyl
8. 2,4 DNP derivatives of carbonyl compounds are often made to
- make the compound soluble.
 - oxidize the compound.
 - confirm the identity of a compound by the MP of the derivative.
 - make the compound colored.
 - produce a Grignard reagent for further reaction.
9. How would you easily tell the difference between a proton NMR (^1H NMR) and a carbon (^{13}C NMR) spectrum?
- by looking at the size of the peaks
 - by looking at the location of the peaks
 - by looking at the horizontal scale
 - by looking at peak splitting
 - by looking for the internal standard peak
10. Hemiacetals and acetals are often found in
- carbohydrates.
 - proteins.
 - fats.
 - oils.
 - DNA.