Which alkene is the most stable?
Why?
Alkenes are electron deficient
Alkyl groups are electron donor groups.

Which carbonyl is the most stable?
Why?
Carbonyl carbons are electron deficient
Alkyl groups are electron donor groups.

Which carbonyl would form the most stable hydrate?
Which has largest $K_{eq}$?

Will $K_{eq}$ be higher (A) or lower (B) than for acetaldehyde?
Chloral hydrate

\[ \text{H}_2\text{O} + \text{Cl}_3\text{C} = \text{O} \quad K_{eq} = 2000 \]

\[ \text{H}_2\text{O} + \text{F}_3\text{C} = \text{CF}_3 \quad K_{eq} = 1,200,000 \]

Electron Withdrawing Groups destabilize carbonyl
Electron Donating Groups stabilize carbonyl

Acetal

Very important in sugar chemistry

Cyclic hemiacetal

Predict the product

Which two products are possible?

Which one of the two is favored?

A  the 6 membered ring
B  the 7 membered ring

A  i + ii  B  i + iii  C  i + iv
D  ii + iii  E  ii + iv  F  iii + iv

glucose  Chapter 22
Complete this synthesis. What reagents are needed? How many of these would work?

\[ \text{Complete this synthesis.} \quad \text{What reagents are needed?} \quad \text{How many of these would work?} \]

\[ \overset{\text{H}_2\text{O}}{\text{O}} \quad \overset{\text{?}}{\text{O}} \quad \overset{\text{O}}{\text{O}} \quad \overset{\text{OH}}{\text{O}} \]

\[ \overset{\text{A}}{\text{O}} \quad \overset{\text{B}}{\text{1}} \quad \overset{\text{C}}{\text{2}} \quad \overset{\text{D}}{\text{3}} \]

1. Li \quad 2. H_2O

\[ \overset{\text{PCC}}{\text{H}}^{+} \]

Cyclic Acetal

\[ \overset{\text{H}_2\text{O}}{\text{O}} \quad \overset{\text{?}}{\text{O}} \quad \overset{\text{O}}{\text{O}} \quad \overset{\text{OH}}{\text{O}} \]

\[ \overset{\text{A}}{\text{O}} \quad \overset{\text{B}}{\text{1}} \quad \overset{\text{C}}{\text{2}} \quad \overset{\text{D}}{\text{3}} \]

1. Li \quad 2. H_2O

\[ \overset{\text{PCC}}{\text{H}}^{+} \]

Hemiacetal

\[ \overset{\text{H}_2\text{O}}{\text{O}} \quad \overset{\text{?}}{\text{O}} \quad \overset{\text{O}}{\text{O}} \quad \overset{\text{OH}}{\text{O}} \]

\[ \overset{\text{A}}{\text{O}} \quad \overset{\text{B}}{\text{1}} \quad \overset{\text{C}}{\text{2}} \quad \overset{\text{D}}{\text{3}} \]

1. Li \quad 2. H_2O

\[ \overset{\text{PCC}}{\text{H}}^{+} \]

\[ \overset{\text{DIBAL-H}}{\text{H}}^{+} \quad 2. \text{H}_2\text{O} \]

\[ \overset{\text{DIBAL-H}}{\text{H}}^{+} \quad 2. \text{H}_2\text{O} \]

\[ \overset{\text{PCC}}{\text{H}}^{+} \]

What reagents are needed? How many of these would work?

\[ \overset{\text{H}_2\text{O}}{\text{O}} \quad \overset{\text{?}}{\text{O}} \quad \overset{\text{O}}{\text{O}} \quad \overset{\text{OH}}{\text{O}} \]

\[ \overset{\text{A}}{\text{O}} \quad \overset{\text{B}}{\text{1}} \quad \overset{\text{C}}{\text{2}} \quad \overset{\text{D}}{\text{3}} \]

1. Li \quad 2. H_2O

\[ \overset{\text{PCC}}{\text{H}}^{+} \]

\[ \overset{\text{DIBAL-H}}{\text{H}}^{+} \quad 2. \text{H}_2\text{O} \]

\[ \overset{\text{PCC}}{\text{H}}^{+} \]

Dendroctonus frontalis Zimmermann (Coleoptera: Scolytidae)

Southern Pine Beetle

Male elephants woo females with precise chemistry

(+ Frontalin  (- Frontalin)

What molecule would form frontalin by an intramolecular acetal formation?

How would you make this molecule?

Good homework problem.

Amines

Hydrazine

Hydrazine

Instead of an amine use

NH₂OH

Try on your own

Secondary Amines

Secondary Amines

Will be important later for forming C-C bonds.
Know these reactions and be able to draw curved arrow mechanisms

Hydrate or gem-diol

Hemiacetal

Acetal

Imine

Enamine

Wolf-Kishner Reduction of aldehydes and ketones