# UCI DEPARTMENT OF ORGANIC CHEMISTRY PEER TUTORING
## REVIEW SESSION FEEDBACK EVALUATION

<table>
<thead>
<tr>
<th>Quarter: Winter 2018</th>
<th>Date: 3/14/2018</th>
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</thead>
<tbody>
<tr>
<td>Class: Professor Guan</td>
<td>Final Review</td>
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<tr>
<td>Tutors' Names: Lester Gopar, Thinh Nguyen, Lina Nguyen</td>
<td></td>
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</tbody>
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<thead>
<tr>
<th>COMMENTS/ SUGGESTIONS</th>
<th>Lester Gopar</th>
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<tbody>
<tr>
<td>(VERY IMPORTANT!)</td>
<td>Thinh Nguyen:</td>
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<td></td>
<td>Lina Nguyen:</td>
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</tbody>
</table>

**What worked best?**

**What could be improved?**

**What would you like to see next time?**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</thead>
<tbody>
<tr>
<td>This review was interactive and engaging</td>
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<td>Comments</td>
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<td>The presentation volume was acceptable.</td>
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<td>Comments</td>
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<td>The presentation was visually clear and logically organized.</td>
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<td>The review improved/reinforced your understanding of the material.</td>
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<td>Comments</td>
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<tr>
<td>The quality of the review packet was excellent.</td>
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<td>Comments</td>
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Please fill out this evaluation, even if you plan to leave early. Thank you very much.
This page is intentionally left blank on purpose. You can use this page as scratch work if you want.
Final Review Key

Fill in the missing reagents

1

Me机制, just in case you're having trouble seeing it

2. In chapter 15, you learned about polymerization. Using your understanding, fill in the missing monomer used to synthesize the polymer below.

polymer
3. Radicals: Identify if the following statement is true or false

A 3° radical is more stable that an 2° or 1° radical (True)

-Increase alkyl substitution increases radical stability

4. Complete the reaction. Find the product.

\[
\text{Cyclohexane} + \text{Br}_2 \xrightarrow{h\nu \text{ or } \Delta} \text{Cyclohexyl bromide} + \text{H-Br}
\]

5. Draw the major product formed when the following starting material is heated with \( \text{Br}_2 \)

\[
\begin{array}{c}
\text{"X"}
\end{array}
\xrightarrow{\Delta} \begin{array}{c}
\text{Triangular molecule with Br substitution}
\end{array}
\]

Find the most reactive C-H bond or (the most substituted C)

6. Draw the major product and the mechanism

\[
\text{Cyclohexene} \xrightarrow{\text{NBS}, h\nu \text{ or } \text{ROOR}} \text{Bromoalkene}
\]
7. Fill in the missing reagents
8. Rank the following compounds from most to least

a. Fastest to slowest reaction with HCl

\[ \text{B} > \text{A} > \text{C} \]
reason: carbocation stability

b. Highest to lowest oxidation state

\[ \text{B} > \text{C} > \text{A} \]
Number of bonds to heteroatom

c. Highest to lowest frequency C=O stretch

\[ \text{A} > \text{B} > \text{C} \]

d. Strongest to weakest acid

\[ \text{A} > \text{B} > \text{C} > \text{D} \]
reason: electronegativity of the atom bonded to H

9. In the box provided, write the number of signals you expect to see in the NMR spectrum.

\[ ^1\text{H} \]

\begin{tabular}{c|c|c|c|c}
\text{OH} & 3 & \text{CO} & 2 & \text{Br} & 4 & \text{O} & 4 \\
\text{CH}_3 & 2 & \text{CH}_3 & 4 & \text{CH}_3 & 6 & \text{CH}_3 & 5 \\
\end{tabular}

\[ ^1\text{C} \]

\begin{tabular}{c|c|c|c|c}
\text{OH} & 2 & \text{CO} & 4 & \text{Br} & 6 & \text{O} & 5 \\
\end{tabular}
10. Identify the 4 possible products of the following reaction and circle the major product.

Cold conditions favor the kinetic product over the thermodynamic product. 3°-allylic carbocation is more stable than the 2°-allylic carbocation.

11. Provide the reagents, intermediates necessary to complete the following syntheses.

a. 

1. $\text{H}_2$ Lindlar's cat.
2. $\text{H}_2$ CO$_2$Me

Heat + enantiomer
Correction: for 11c, I mean the dienes cannot be cis, cis s-cis conformation.
12. Circle your answer and choose the best reason from the list for your answer.

**Reasons:** electronegativity, inductive effects, radical stability, resonance, ring strain

a. Most electrophilic
   ![Diagram](image)
   Best reason: resonance

b. Most acidic
   ![Diagram](image)
   Best reason: inductive effect

c. Most basic
   ![Diagram](image)
   Best reason: electronegativity

d. Faster reaction with Br₂ in the presence of heat and light
   ![Diagram](image)
   Best reason: radical stability

e. Least stable resonance structure
   ![Diagram](image)
   Best reason: electronegativity

f. Least electrophilic
   ![Diagram](image)
   Best reason: Ring strain
13. Identify whether the molecules are aromatic, not aromatic, or anti-aromatic through observing its resonance and number of pi electrons.

1. Aromatic: (unusually stable)
   a) Cyclic
   b) Conjugated around entire ring
   c) \([4n+2]\) = # of pi electrons
   2, 6, 10, 14, 18, etc
d) planar

2. Anti-Aromatic: (unusually unstable)
   a) Cyclic
   b) Conjugated around entire ring
   c) \([4n]\) = # of pi electrons
   4, 8, 12, 16, etc
d) planar

3. Non-Aromatic:
   Does not have one of the four listed for anti/aromatic.

\[\text{pyrrole}\]
\[\text{cyclopentadienide cation}\]
\[\text{cyclopentadienide}\]

a) Cyclic
b) Conjugated
c) \([4^*1]+2\) = 6 pi e-
   \([4^*1]\) = 4 pi electrons
   Molecule has 6 pi electrons,
   Nitrogen contributes 1 pair
   of pi e-
d) Planar
~Aromatic~
a) Cyclic
b) Conjugated
c) \([4^*1]+2\) = 6 pi e-
   \([4^*1]\) = 4 pi e-
   Molecule has 6 pi e-
   but is a cation so it's missing
   two e- thus making it 4.
d) Planar
~Anti-Aromatic~
a) Cyclic
b) Conjugated
c) \([4^*1]+2\) = 6 pi e-
   \([4^*1]\) = 4 pi e-
   Molecule has 6 pi e-
d) Non planar because of the
   sp3 hybridization carbon.
In other words indicating a
tetrahedral shape.
~Non-Aromatic~

14. Which compound is more stable and why?

\[\text{Furan}\]
\[\text{Pyrrrole}\]

a) Cyclic
b) Conjugated
c) \([4^*1]+2\) = 6 pi e-
   Yes, all 5 sides + 1 e- pair
   From the oxygen because only that
   single pair is delocalized into the
   ring.
d) Planar

a) Cyclic
b) not conjugated
c) \([4^*1]+2\) = 6 pi e-
   Has 5 pi bonds, the conjugate base,
   pyrrole, would be aromatic, but the
   lone pairs are not here to be counted.
d) non planar

~Thus allowing the aromatic structure, Furan, to be
more unusually stable compared to pyrroles conjugate
acid, which is non aromatic.~

Note: Furan is heterocyclic because it has either
an oxygen, nitrogen and sulfur, and at least one lone pair.
15. Which compound is more acidic and why?

Note:
More stable conjugated base is the stronger acid.

16. Draw a pyridine and explain why it's less or more resonance stabilized than benzene in an electrophilic aromatic substitution reaction.

As both molecules are aromatic, pyridine is more stable than benzene because pyridine has a nitrogen molecule, which is more electronegative or electron withdrawing, whereas the benzene has a carbon atom.

17. Complete this synthesis problem.

KOCH3 attacks onto the least substituted carbon.