Name: \_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_

Organic Chemistry Practice Exam 2 Answer Key

Questions 1-10: Determine how you would synthesize the following compounds from acetylene gas (C2H2)

1. 



1. 



1. 



1.  
2. 



1. 



1. 



1. 



1. 



1. 



Questions 11-20: Propose a reasonable retrosynthetic analysis for the following compounds. For the bicyclic compounds (except for 15) you must start with cyclic and/or linear precursors.

1. 



1. 



1. 



1. 



1. 



1. 



1. 



1. 



1. 



1. 



Questions 21-30: Predict the products for the following reactions

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

Questions 31-40: Predict the products for the following reactions of conjugated alkenes

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

Questions 41-45: Provide a reasonable mechanism for the following reactions





1. 



1. 
2. 



1. 



Questions 46-50: Rank each set of compounds in order of increasing acidity and explain your reasoning.

1. 



1. 



1. 



1. 



1. 



Questions 51-55: Identify whether each compound is aromatic, nonaromatic, or antiaromatic. Explain your answer.

1.  Nonaromatic because it has an sp3 hybridized carbon
2.  antiaromatic because it has 4pi electrons
3.  aromatic because it has 10 pi electrons
4. antiaromatic because it has 4 pi electrons
5. aromatic because it has 6 pi electrons

Questions 56-60: Identify which diene/dienophile pair would be better suited for a Diels Alder reaction and explain your answer.

1. 

The left pair is better because the cyclohexadiene is locked into the s-cis conformation that is required for the Diels Alder reaction. The 1,3-hexadiene on the other hand needs to rotate the C-C bond in between the two alkenes to get into the s-cis conformation. This would happen by random chance and only if enough energy is supplied to overcome the steric barrier to rotation and perform the Diels Alder reaction.

1. 

The right pair is better because in traditional Diels Alder, the diene is the nucleophile and therefore benefits from EDG while the dienophile is the electrophile. Because the right pair has the cyclohexadiene molecule with an added OCH3 group in conjugation with the alkene, the right pair benefits from the EDG and therefore would be a better pair in a traditional Diels Alder reaction.

1. 

The left pair is better because as previously mentioned, the diene is the nucleophile and therefore benefits from EDG and is hindered by EWG. The pair on the right has EWG on the diene and EDG on the dienophile, this would make traditional Diels Alder reaction occur slower and therefore the left pair is superior.

1. 

The right pair is better because it is less sterically hindered and the diene has a powerful OCH3 EDG.

1. 

The right pair is better because the left pair CAN NEVER GET TO THE s-cis conformation. Without the s-cis conformation available to the conjugated alkene, the Diels Alder reaction cannot occur. Therefore, the only pair of diene and dienophile that can react the way we want it is the pair on the right because those alkenes are locked into the s-cis conformation while the pair on the left has its alkenes in the diene locked into the s-trans conformation.