



THE UNIVERSITY OF  
**TOLEDO**  
1872

## CHEM 8410\_6410\_4410 – Organic Synthesis

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### CHEM 8410\_6410\_4410 Spring 2018 – Mid-Term Exam 2 03-15-18

**Time: 10:00am – 11:15am**

**Student Name:** \_\_\_\_\_

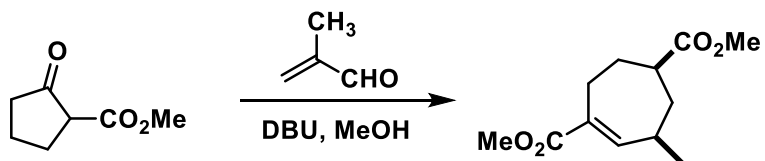
**Student Number:** \_\_\_\_\_

<b>Instructor:</b> Prof. Andreana
<b>Room #:</b> FH 2030





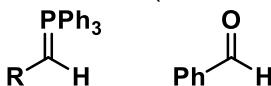
2. **Problem 2:** Please provide a mechanism for the following reaction transformation. (20 Points)



**Answer:**



3. **Problem 3:** Based on your reading of *JACS*, **1988**, 110, 3948 and possibly other sources of information, please explain why the Wittig reaction has a preponderance for (*Z*) selectivity. Your explanation should include the use of properly ordered structures and names of those intermediates you plan to show. Unless you have other structures in mind, please use the ones given below to fully explain your answer. **(20 Points)**

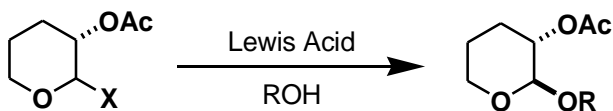


**Answer:**



4. **Problem 4:** Stereoselective formation of the glycosidic linkage is the principal challenge in the synthesis of biologically important oligosaccharides. Anchimeric assistance (neighboring group participation) can be a powerful tool for the selective construction of glycosidic bonds. **(25 Points)**

**Part A.** For the following  $\alpha$ -selective glycosylation, please provide a clear mechanism, using three-dimensional representations, that accounts for the observed stereochemical outcome. Indicate all relevant orbital interactions.

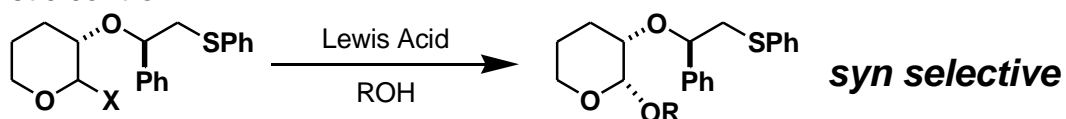


X = activating group

**Answer:**



**Part B.** Boons and co-workers (JACS, 2005) reported a highly selective synthesis of the corresponding *syn* di-substituted system by employing a participating phenyl-2-(phenylsulfanyl)ethyl moiety, as indicated below. Using three-dimensional drawings, provide a rational mechanism for this interesting reaction. Be sure to indicate all favorable and unfavorable interactions, both steric and electronic. N.B: This reaction is under kinetic control.

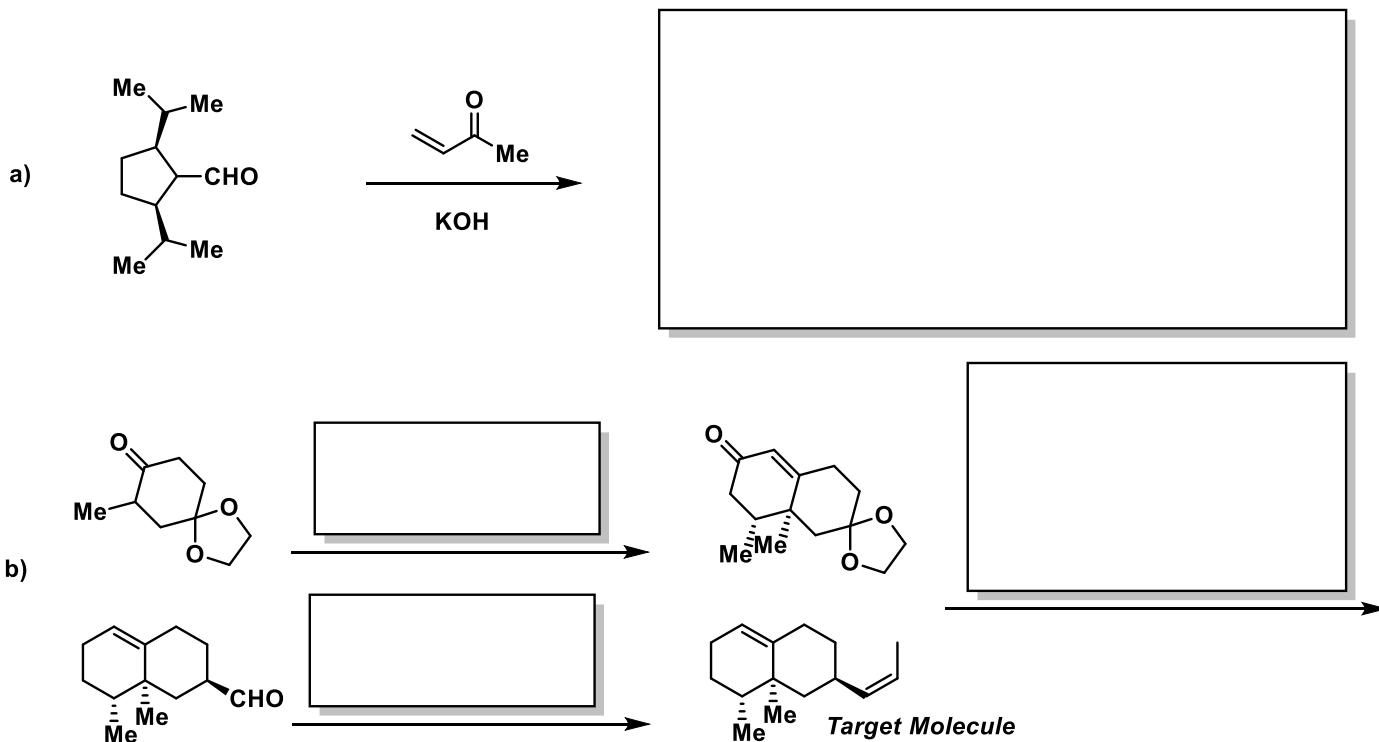


X = activating group

**Answer:**



5. **Problem 5:** Fill in the blanks. There may be more than one reagent necessary to carry out some of the indicated transformations. (10 PTS)



**Work Space (Answers go in boxes):**