

CHEM 8410\_6410\_4410 – Organic Synthesis

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

## Time: 10:00am – 11:15am

Student Name:

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

Instructor:Prof. AndreanaRoom #:FH 2030

CHEM 8410\_6410\_4410 – Organic Synthesis



Mid-Term Exam 2

Time: 10:00 am – 11:15 am Date: March 15, 2018 Room: FH 2030

## 100 Points - Total

1. **Problem 1:** Please provide mechanisms for 5 of the following 10 named reactions: **(25 Points)** - \* indicates this named reaction MUST be one of your 5.

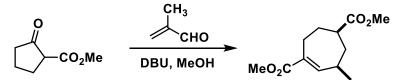
\*Mitsunobu Reaction Meerwein-Pondorf-Verley Reaction Pictet-Spengler Isoquinoline Synthesis Pinner Reaction Quelet Reaction Rubottom Oxidation Ritter Reaction Reissert Reaction Pinacol Rearrangement Peterson Reaction

Answer(s):

Use back of sheet if need be and blank paper  $\rightarrow \rightarrow \rightarrow \rightarrow \rightarrow$ 



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





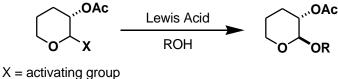
3. **Problem 3:** Based on your reading of *JACS*, **1988**, *110*, 3948 and possibly other sources of information, please explain why the Wittig reaction has a preponderance for (*Z*) selectivity. Your explanation should include the use of properly ordered structures and names of those intermediates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

$$\begin{array}{ccc}
\mathsf{PPh}_3 & \mathsf{O} \\
\mathsf{R} & \mathsf{H} & \mathsf{Ph} & \mathsf{H}
\end{array}$$



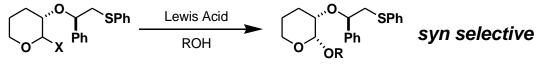
4. **Problem 4:** Stereoselective formation of the glycosidic linkage is the principal challenge in the synthesis of biologically important oligosaccharides. Anchimeric assistance (neighboring group participation) can be a powerful tool for the selective construction of glycosidic bonds. (**25 Points**)

**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.





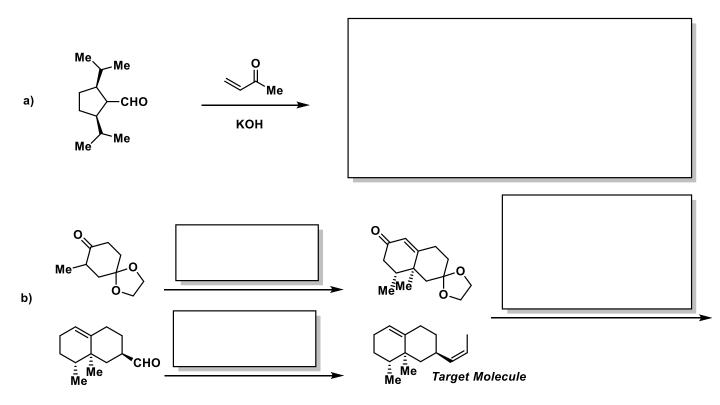
**Part B.** Boons and co-workers (JACS, 2005) reported a highly selective synthesis of the corresponding syn di-substituted system by employing a participating phenyl-2-(phenylsulfanyl)ethyl moiety, as indicated below. Using three-dimensional drawings, provide a rational mechanism for this interesting 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



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



Work Space (Answers go in boxes):