

**CHEM 330**

**Exam 1**

October 17, 2014

**Your name:** \_\_\_\_\_

**This exam contains 6 pages**

This a closed-notes, closed-book exam

You may use your set of molecular models

Time: 1.5 h

1. \_\_\_\_\_ / 15

2. \_\_\_\_\_ / 20

3. \_\_\_\_\_ / 20

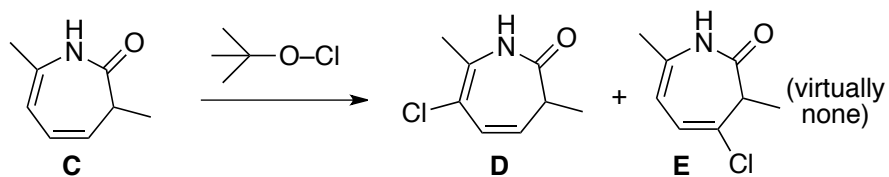
4. \_\_\_\_\_ / 20

5. \_\_\_\_\_ / 25

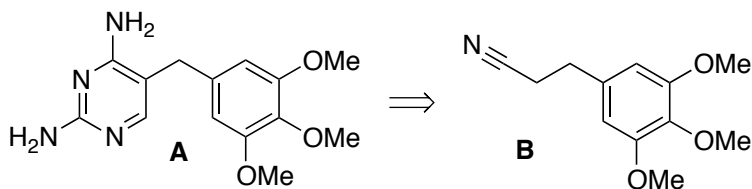
**TOTAL** \_\_\_\_\_ / 100

This exam counts for 25% of your CHEM 330 final grade

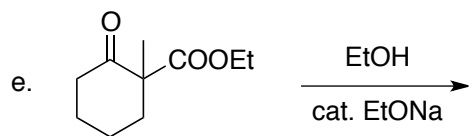
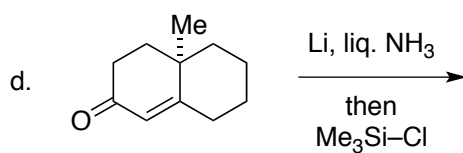
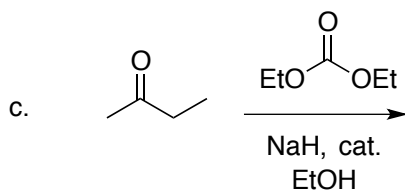
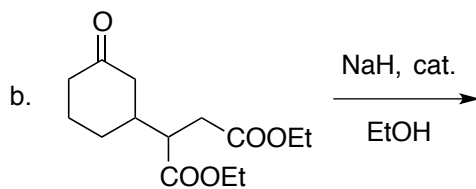
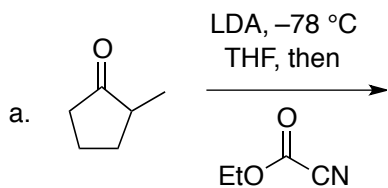
1. (15 pts.) Illustrate how one may invoke the principle of least motion to account for the fact that the reaction of compound **C** below with *tert*-BuO–Cl (a source of  $\text{Cl}^+$ ) yields **D**, accompanied by little – if any – **E** (obviously, it is essential to draw clear mechanisms for the formation of **D** and **E**):



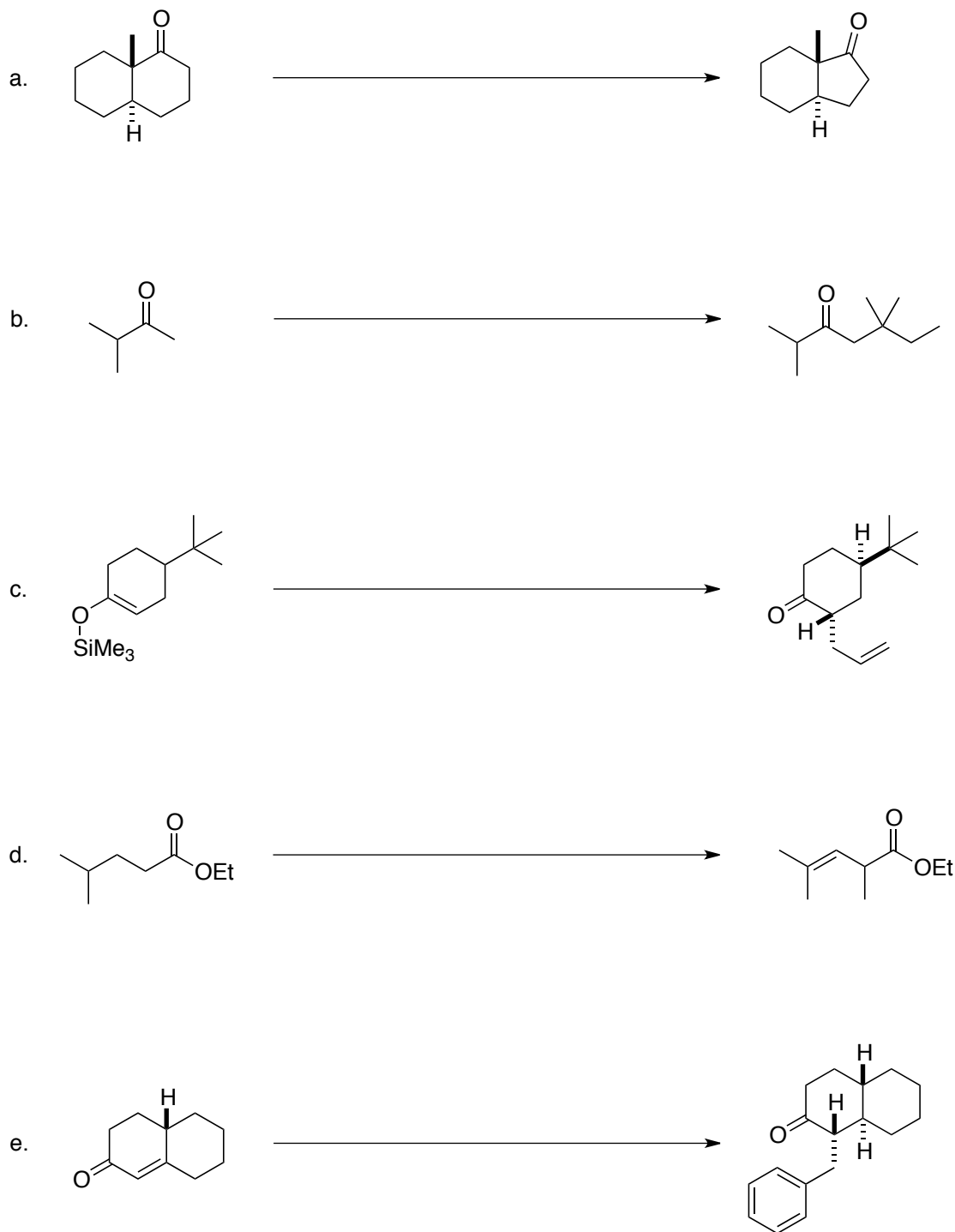
2. (20 pts.) Trimethoprim, **A**, is a bacteriostatic drug that is prepared starting with compound **B**. Draw a reaction flowchart to show how **B** may be converted into **A**. Assume the availability of all needed reagents (acids, bases, alkyl halides, esters, etc.) **Note**: it is not necessary to draw mechanisms. Also, aqueous workups after each reaction are understood and need not be specified.



3. (20 pts.) Draw the structure of the major product expected from the reactions shown below. If no reaction is expected, answer "NO REACTION." **Note:** it is understood that each reaction is subject to a final aqueous workup.



4. (20 pts.) Propose a method to achieve the transformations shown below. In each case, a multistep sequence (= not just one reaction, but several) may be required. Indicate all requisite reagents, in the correct order, as a numbered list above/below the reaction arrow. **Aqueous workups after each step are understood and there is no need to specify them.**



5. (25 pts.) Propose a method to synthesize the substances shown below starting from the indicated materials. Assume the availability of all reagents needed to convert the starting compound into the product (e.g. acids, bases, alkyl halides, etc.). Present your answer as a flowchart. **It is not necessary to draw mechanisms. Also, aqueous workups after each step are understood and do not need to be indicated.**

