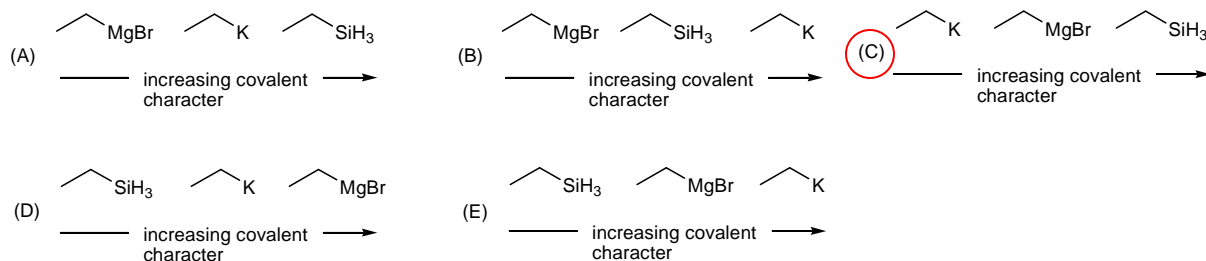
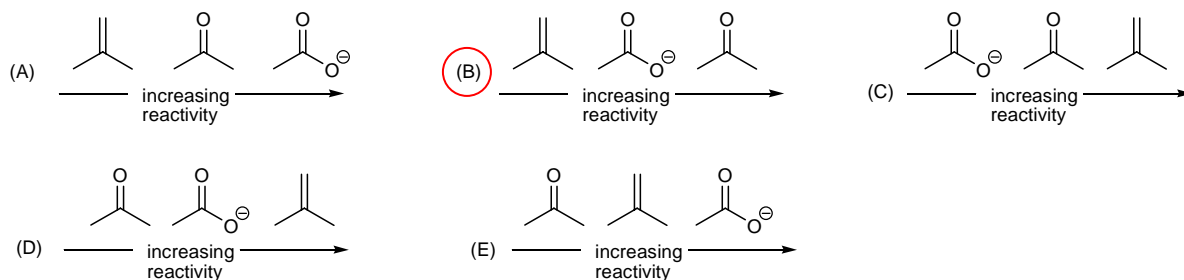


## Multiple Choice Questions. 60 points

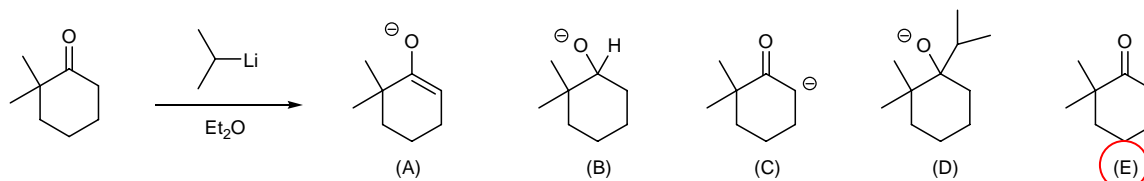
1. Choose the order that has the following compounds *correctly* arranged with respect to increasing covalent character of the carbon metal bond.



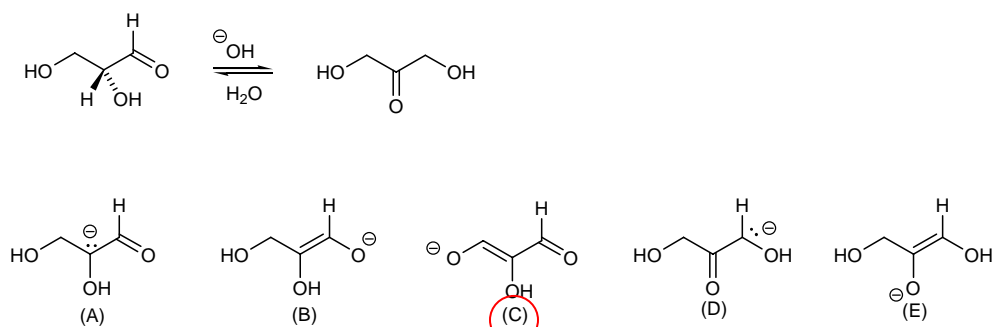
2. Choose the order that has the following compounds correctly arranged with respect to increasing reactivity with methyl lithium ( $\text{CH}_3\text{-Li}$ ).



3. Choose the *least likely* product to be formed in the following reaction.

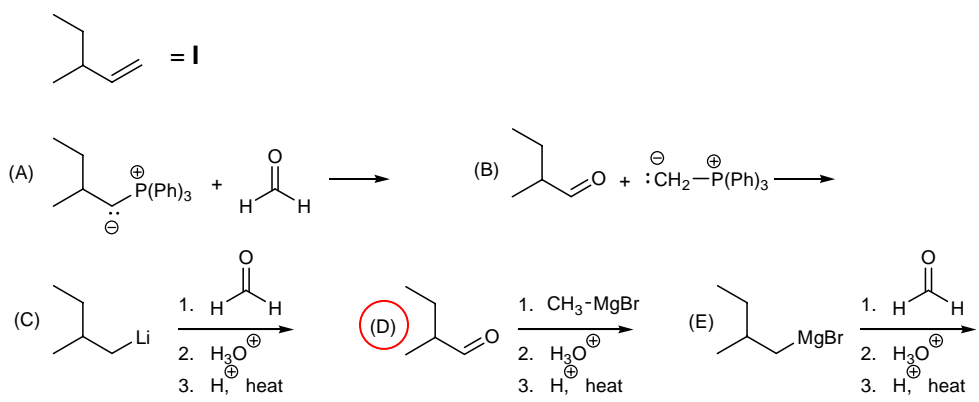


4. Glyceraldehyde and dihydroxyacetone interconvert in the presence of base. Choose the structure that would *not* be predicted to be an intermediate in this interconversion.

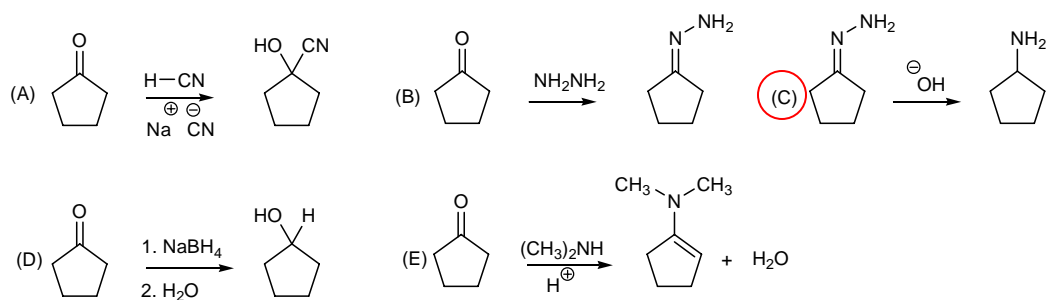


# Form 0

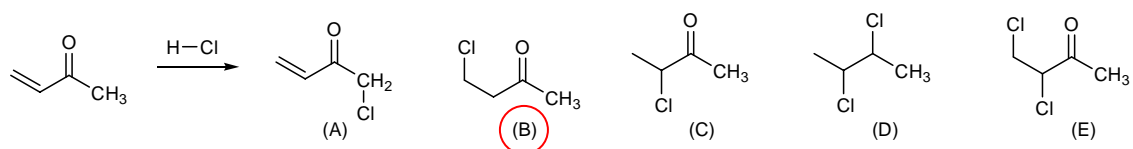
5. Choose a reaction scheme least likely to be successful for the alkene **I** shown below.



6. Choose the reaction that is least likely to occur as shown.

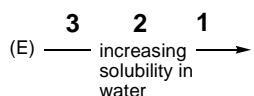
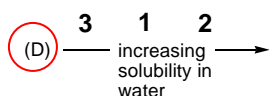
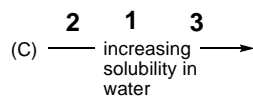
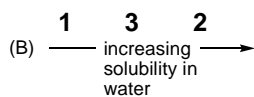
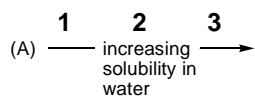
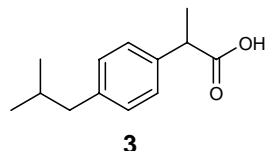
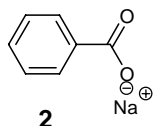
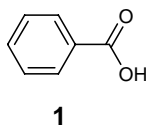


7. Choose the most reasonable product of the following reaction.

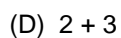
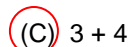
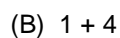
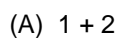
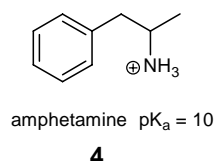
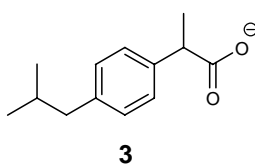
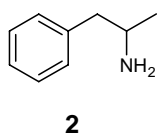
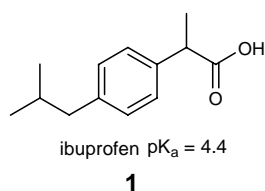


Form 0

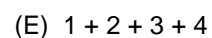
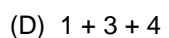
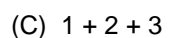
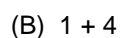
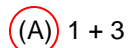
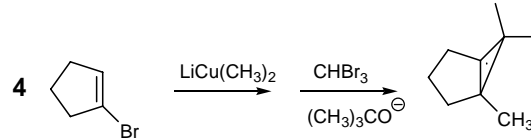
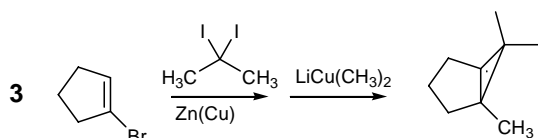
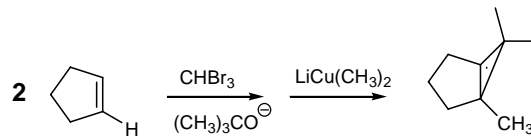
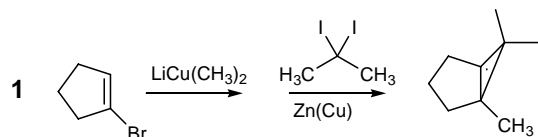
8. Choose the order that has compounds 1, 2, and 3 correctly arranged with respect to increasing solubility in water.



9. Choose the major species that would be present in a solution buffered at pH = 7.2.

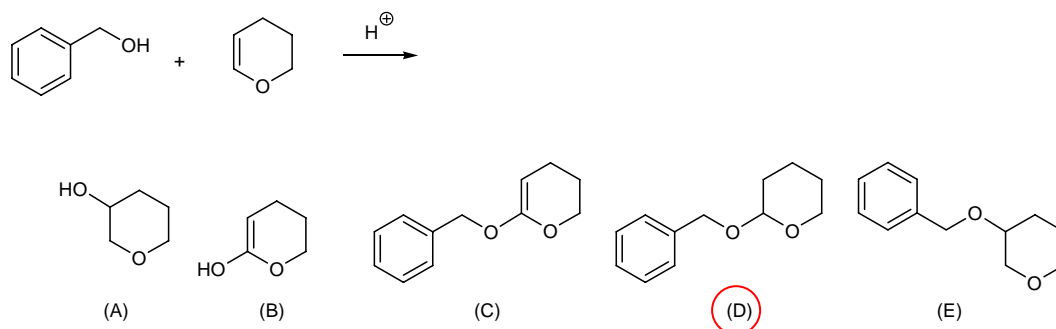


10. Choose those reaction schemes that would be predicted to produce the compound shown.

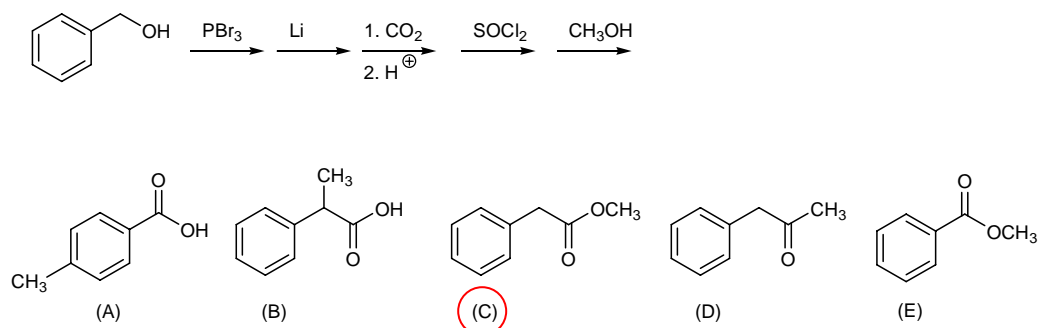


## Form 0

11. Predict the product of the following reaction.



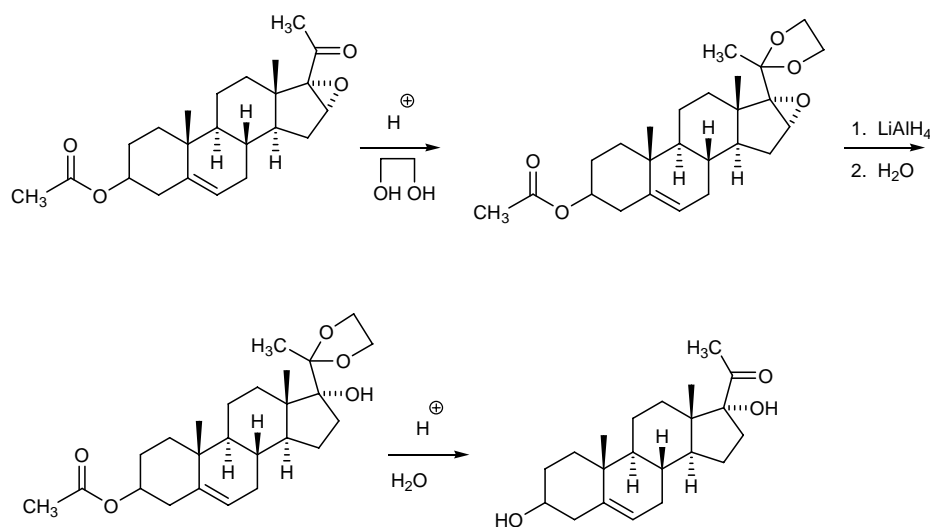
12. Choose the major product produced in the following reaction sequence.



### Short Answer Questions. 40 points.

13. Suggest a procedure for performing the following transformation. Hint: More than one step and protecting groups are necessary.

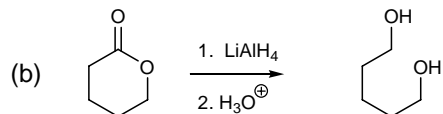
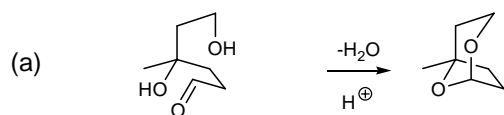
Note: A correct answer does not require drawing the steroid structure. All that is necessary is to clearly show the reactants and reagents for each step. 10 pts.



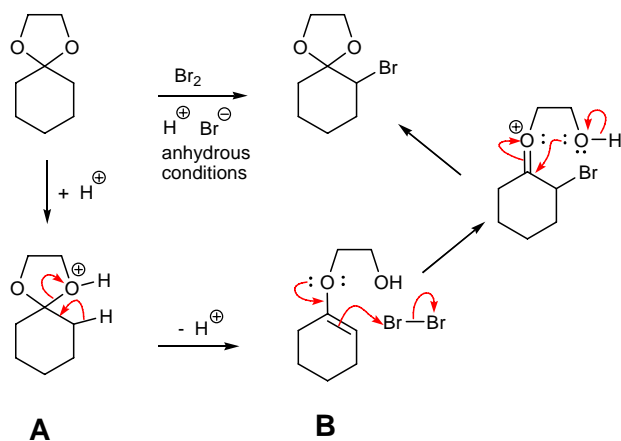
This transformation was first accomplished by Percy L. Julian (*J. Amer. Chem. Soc.*, **1949**, 71, 756.)

## Form 0

14. Give the correct structure for the missing species in the following reactions.



15. The following reaction has been reported. The reaction mechanism does not involve free radicals. 10 pts



(a) The first step in the mechanism of the above reaction is the simple protonation of the reactant to give structure **A**. The second step is the loss of a proton to give structure **B**. Give the structures of intermediates **A** and **B**.

(b) Complete the reaction mechanism from structure **B** to the final product.

16. Knowing that diols can be prepared from alkenes using  $\text{OsO}_4$ , propose a synthesis of the following carbonyl compound from reactants containing four carbon atoms or less. 10 pts

