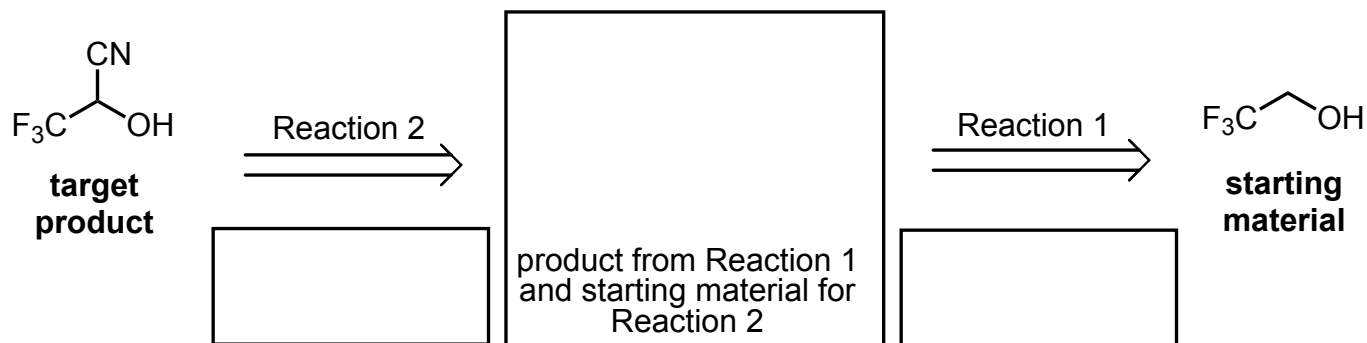


## Retrosynthesis of Carbonyls and Carboxylic Acid Derivatives

1. Perform a retrosynthetic analysis on the target product using the template and guiding questions, labeled as parts A-D.



A. Has the **number of carbon atoms** changed?

B. Are there any **new functional groups**?

C. What types of **precursor(s)** and **reaction(s)** could introduce the new carbon atoms and/or the new functional groups? (e.g. carbonyl addition, carbonyl substitution, reduction/oxidation, etc....).

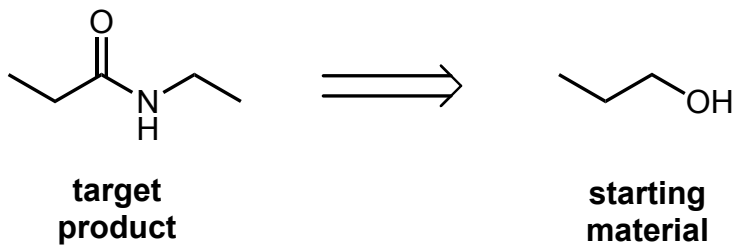
D. Finally, **what order of these reactions** is needed to achieve the target final product?

Working backwards, fill in the boxes above (retrosynthesis).

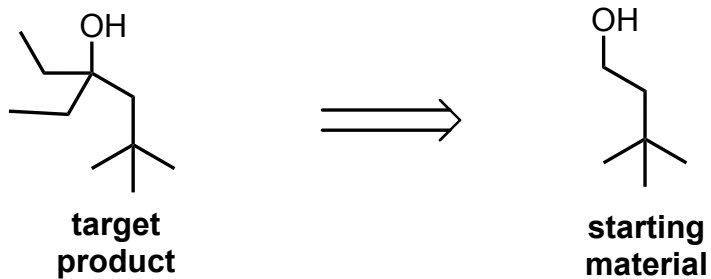
Finally, use the answers to your questions above to **propose a full forward synthesis** associated with your proposed retrosynthesis.



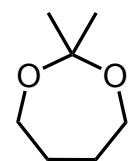
2. **Propose a successful forward synthetic route** for the formation of the shown target final product from the shown initial starting material.



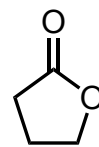
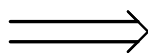
3. In three steps or less, propose a successful forward synthetic route for the formation of the shown target final product from the shown initial starting material.



4. **Propose a successful forward synthetic route** for the formation of the shown target final product from the shown initial starting material.



**target  
product**



**starting  
material**

5. **Propose a successful forward synthetic route** for the formation of the shown target final product from the shown initial starting material.

