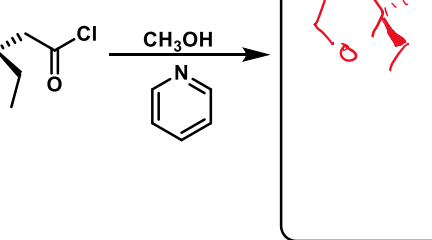
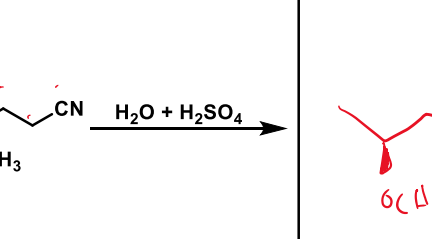
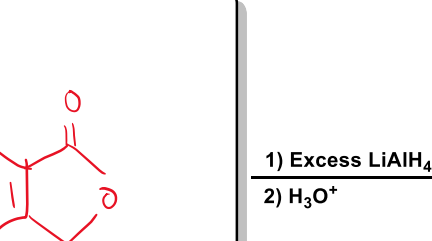
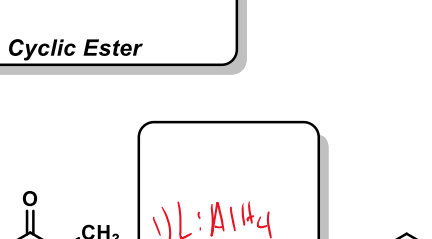


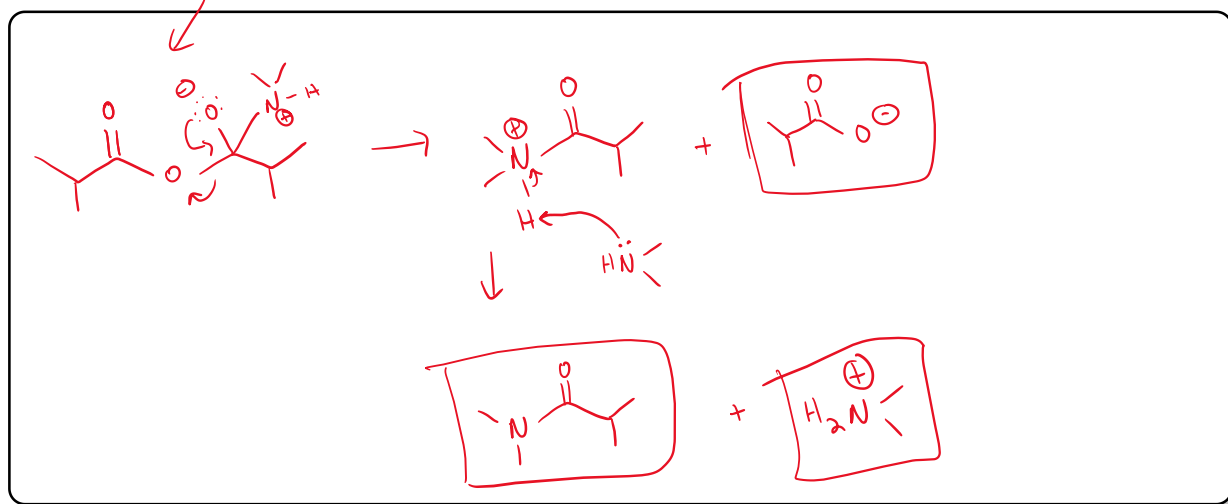
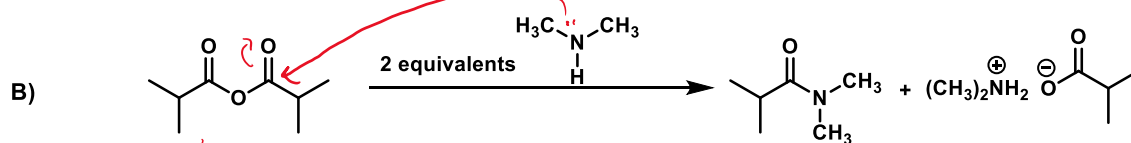
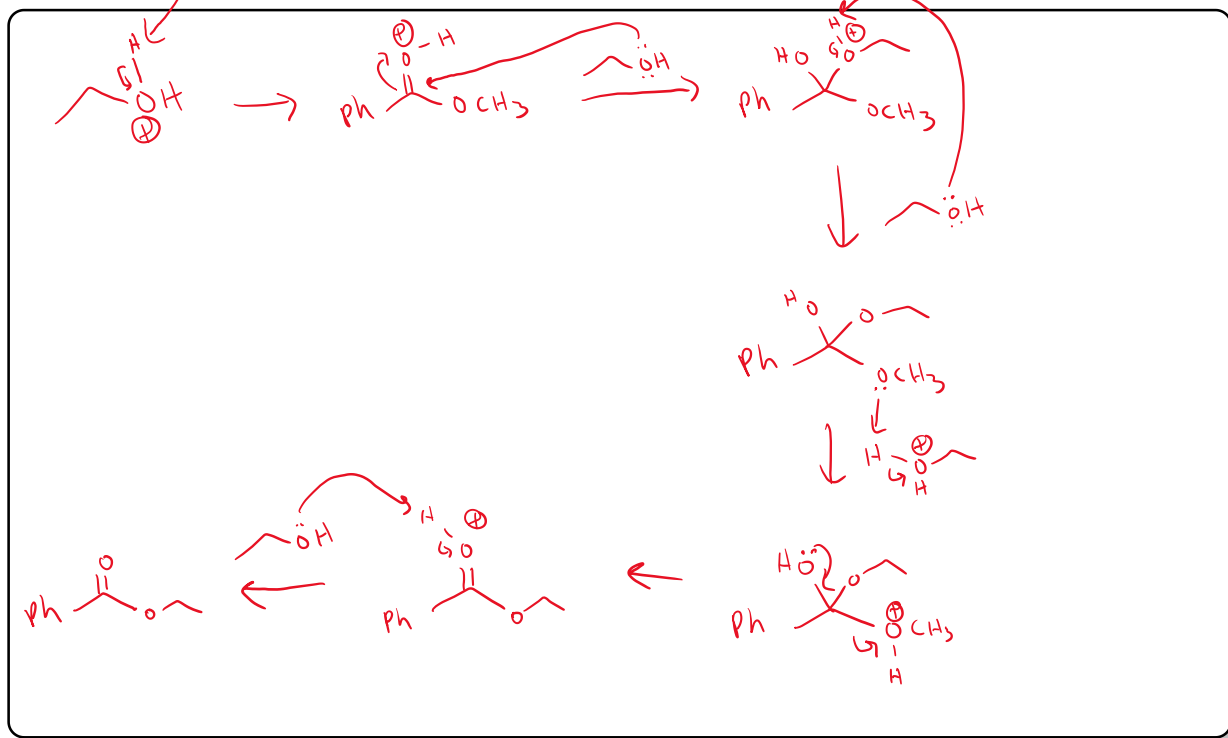
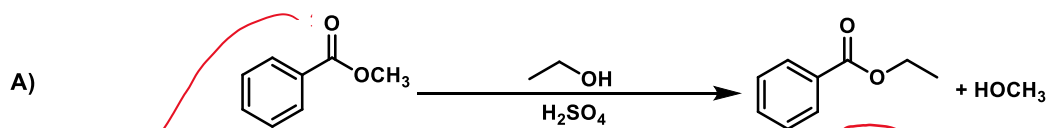
A) 

B) 

C) 

D) 

2. **Mechanisms.** Provide a step-wise mechanism for the following transformations.



Reaction scheme for the synthesis of various products from 3-pyridinecarboxylic acid:

Starting material: 3-pyridinecarboxylic acid (c1ccncc1C(=O)O)

Reaction 1 (Top Left): 3-pyridinecarboxylic acid reacts with SOCl_2 (pyr) to form 3-pyridyl acid chloride (c1ccncc1C(=O)Cl).

Reaction 2 (Top Right): 3-pyridyl acid chloride reacts with 2 equivalents of $\text{HN}(\text{CH}_3)_2$ to form N,N -dimethyl-3-pyridinecarbamate (CN(C)C(=O)c1ccncc1).

Reaction 3 (Middle Right): N,N -dimethyl-3-pyridinecarbamate reacts with 1) Li^+ (isopropyl) and 2) H_3O^+ to form 3-isopropylpyridine (CC(C)c1ccncc1).

Reaction 4 (Bottom Right): 3-isopropylpyridine reacts with 1) NaBH_4 and 2) H_3O^+ to form 3-isopropylpyridine-4-ol (CC(C)[C@H](O)c1ccncc1) + enantiomer.

Reaction 5 (Middle Left): 3-pyridyl acid chloride reacts with 1) $\text{DMSO} + \text{Cl}-\text{C}(=\text{O})-\text{C}(=\text{O})-\text{Cl}$ and 2) NEt_3 to form 3-pyridinecarbaldehyde (O=Cc1ccncc1).

Reaction 6 (Bottom Left): 3-pyridinecarbaldehyde reacts with 1) $\text{HO}-\text{CH}_2-\text{CH}_2-\text{OH}$ and 2) H_2SO_4 (cat) to form 3-(2-(hydroxymethyl)oxy)pyridine (OCC1OC(c2ccncc2)O1) + H_2O .

Reaction 7 (Center): 3-pyridyl acid chloride reacts with 1) $\text{HO}-\text{C}_6\text{H}_{11}-\text{OH}$ and 2) Py to form 3-(cyclohexyloxy)pyridine (OCC1OC(c2ccncc2)O1).