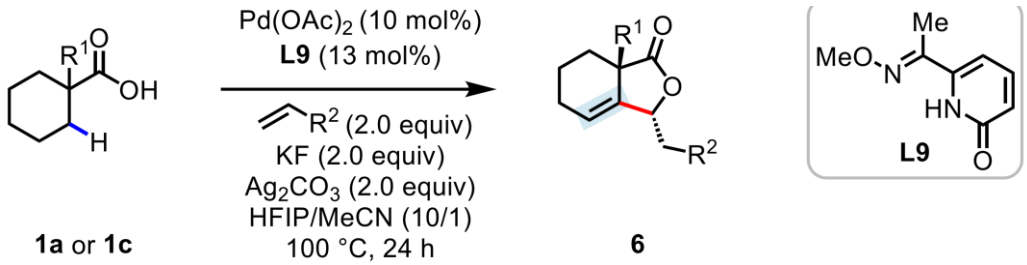
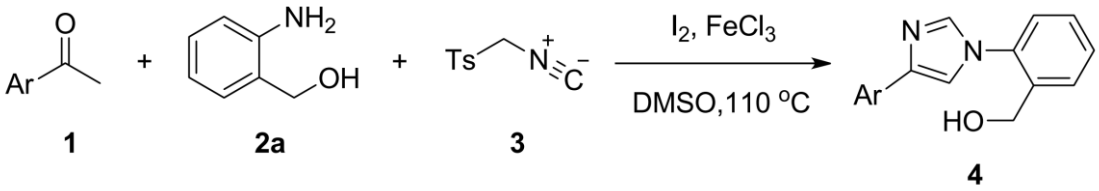
Exercise session 08/09/2022

1. Please provide a plausible mechanism for the following reaction. (*J. Am. Chem. Soc.* **2022**, *144*, 12924−12933)

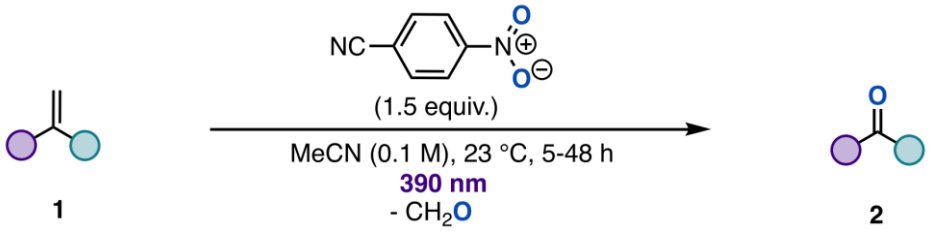


2. Please provide a plausible mechanism for the following reaction. (*Org. Lett.* **2020**, *22*, 140−144)



Reaction conditions: **1** (1.0 mmol), **2a** (1.0 mmol), **3** (1.0 mmol), $\mathbf{I_2}$ (0.8 mmol, 0.8 equiv.), $\mathbf{FeCl_3}$ (1.0 mmol, 1.0 equiv), DMSO 3 mL, 110 °C.

3. Please provide a plausible mechanism for the following reaction. (*J. Am. Chem. Soc.* **2022**, *144*, 15437−15442)



4. Provide the missing structures in the following total synthesis of (-)-Himalensine A and a plausible mechanism for the transformation between compounds **C** and **D**. (*Angew. Chem. Int. Ed*. **2021**, *60*, 9439 –9443):