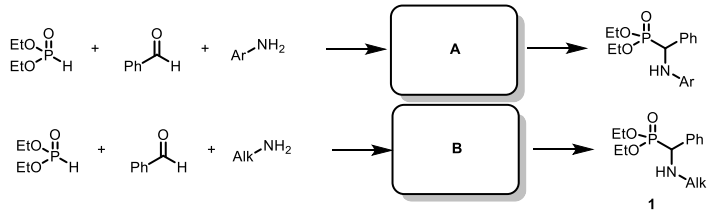
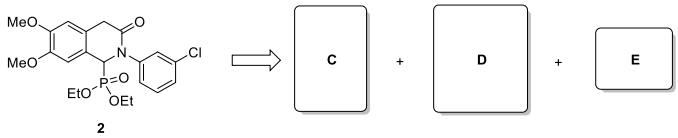
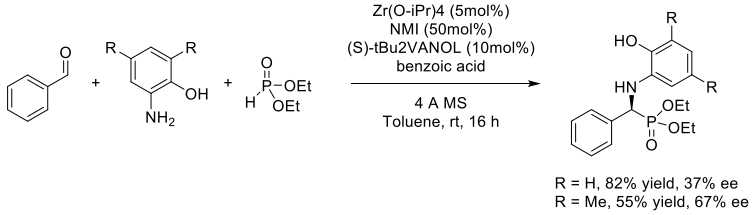
1. Propose the two mechanisms to form the α-amino phosphonate **1** from the aldehyde, the amine and the phosphite and identify the two intermediates **A** and **B** formed during the reaction which depend on the amine used.



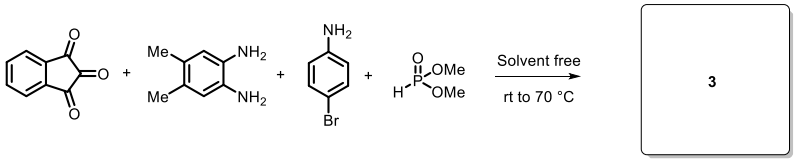
2. The Borse group reported the synthesis of compound **2** (*Tetrahedron Lett.*, **2012**, *53*, 6940-6942). How would you synthesize the following compound by using Kabachnik-Fields reaction?



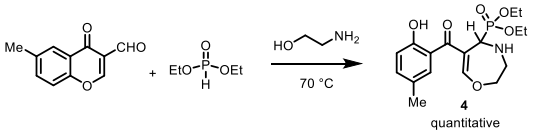
3. Borhan and Wulff groups developed an enantioselective Kabachnik-Fields reaction (*Chem Sci.* **2021**, *12*, 12333-12345) Rationalize the asymmetric induction seen when the substituent goes from H to Me. Propose another substituent that would give higher enantioselectivity.



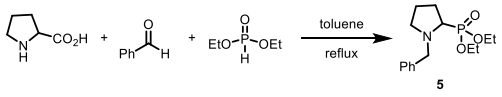
4. In 2015, the group of Ghahremanzadeh reported one-pot four-component Kabachnik-Fields reaction. (*RSC Adv.* **2015**, *5*, 99148-99152) Identify the product **3** formed in this case.



5. Ali et. al. reported the synthesis of the following oxazepine **4** (*Heterocycles*, **2013**, *87*, 2513-2532). Propose a mechanism.



6. Kaboubin et al. reported the synthesis of the following aminophosphonate **5** by using a Kabachnik-Fields reaction with the proline. (*Tetrahedron Lett.*, **2013**, *54*, 4872-4875) Propose a mechanism.



7. Wu's group in 2007 (*Tetrahedron*, **2007**, *63*, 12166-12171; *J. Comb. Chem.* **2007**, *9*, 690-694) reported the following transformation. Identify the two products **6** and **7** and rationalise their formations.