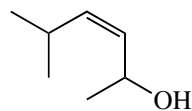


CHE 535, SPRING 2006
Midterm Exam

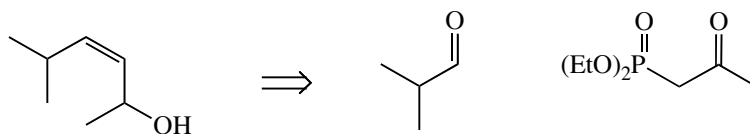
Name: _____

1. (50 points) Undergraduate researcher Sally Humdinger has been asked to prepare the following racemic alkene.



She has come up with several routes to this compound and has asked for your help in evaluating each one. Be *brief* but *specific* in your evaluation of each route.

Route A:



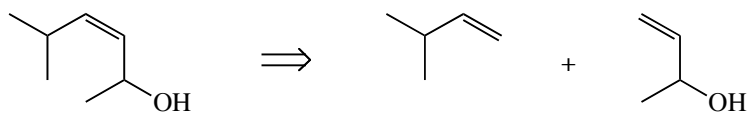
(a) What problem(s) might Sally encounter in executing Route A?

Route B:



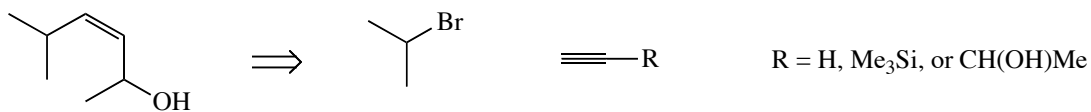
(b) What problem(s) might Sally encounter in executing Route B?

Route C:



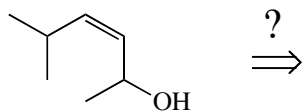
(c) What problem(s) might Sally encounter in executing Route C?

Route D:

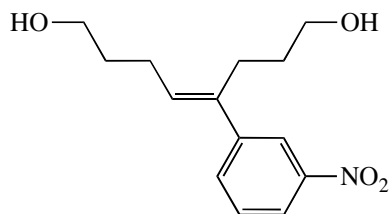


(d) What problem(s) might Sally encounter in executing Route B?

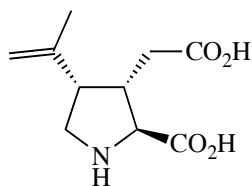
(e) Suggest to Sally a different route to the target compound that is more likely to be successful, and discuss how it would largely solve the problems associated with routes A through D. Show BOTH a brief retrosynthetic analysis AND a forward synthesis. *Your starting materials must be sold by Aldrich or another commercial supplier.*



2. (25 points) The stereoselective synthesis of alkenes is one of the themes we have emphasized during the first half of the semester. Design a stereoselective synthesis of the trisubstituted alkene below from one or more compounds *available for sale from Aldrich or another commercial supplier*. Show both your retrosynthetic analysis and a forward synthesis. Be as specific as you can be about the necessary reagents. (I understand that you do not have access to Beilstein right now.)



3. (25 points) Kainic acid is an important neurobiological tool. For several years it was in very short supply, because the one factory in the world that isolated it from its natural source stopped doing so!



kainic acid

(a) Discuss the elements of complexity present in kainic acid.

(b) Suggest a reaction by which the alkene moiety in kainic acid could be introduced, and draw the precursor and reagent(s) required by your method.

(c) A single reaction of an acyclic compound can be used to make kainic acid or (maybe) the precursor you drew in part (b). *Considering the disposition of the functional groups* in kainic acid or the precursor you drew in part (b), what is this reaction? Draw the substrate(s) for this reaction.