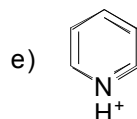


Group Meeting Problems
September 27, 2006

1. Let's start with an easy one. Provide the pKa (in water) for the following 'acids':

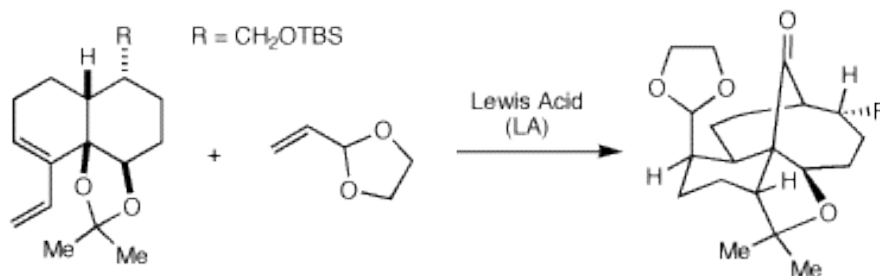
- a) MeOH
- b) acetone
- c) ethyl acetate
- d) H₂
- f) Et₃NH⁺
- g) (iPr)₂NH
- h) acetic acid
- i) benzene
- j) toluene



Without looking up the references, answer the following questions:

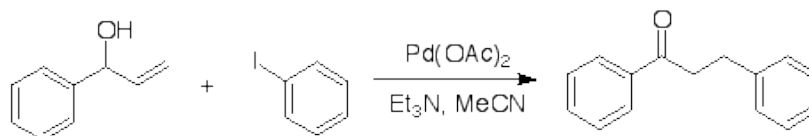
2.

Barriault recently published the following Lewis-acid mediated reaction cascade as a strategy to rapidly assemble highly functionalized bicycloalkanones (*Org. Lett.* **2005**, 7, 5921). Using clear 3D representations, please provide a mechanism that includes a rationalization for the relative stereochemistry observed in the product.



3.

The Heck reaction is one of the most powerful transition metal C–C bond forming reactions (Whitcombe, et al, *Tetrahedron* **2001**, 57, 7449). A typical example of this transformation is shown below.



Provide a plausible mechanism for this transformation and illustrate the individual steps in the catalytic cycle with a series of balanced equations. Note: Pd(OAc)₂ is reduced to form Pd(0) under the reaction conditions. Do not concern yourself with this reduction step.

4. Draw a mechanism for the reduction of Pd(II) to Pd(0) in the previous question.