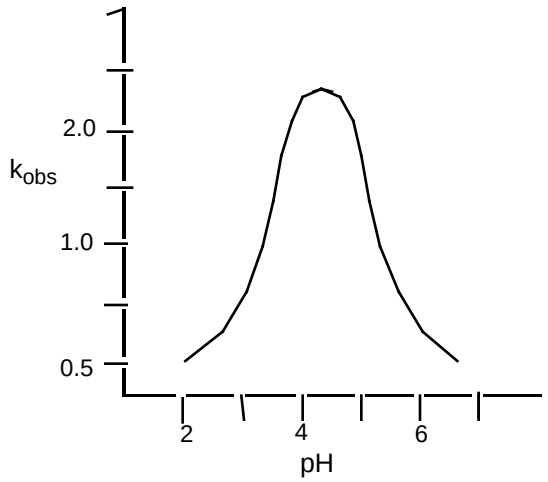
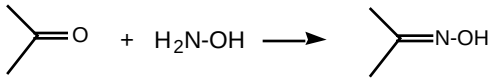
Chemistry 304B, Spring 1999 Problem Set 5 Due: Friday, March 12th in lecture

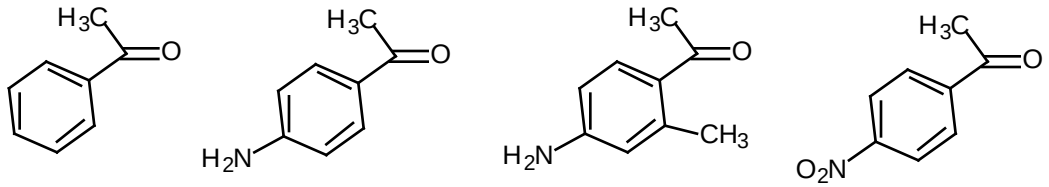
1. The chart here show the "pH vs rate" profile for the reaction of acetone with hydroxylamine in water
Note that the reaction goes through a maximum at pH about 4.2.



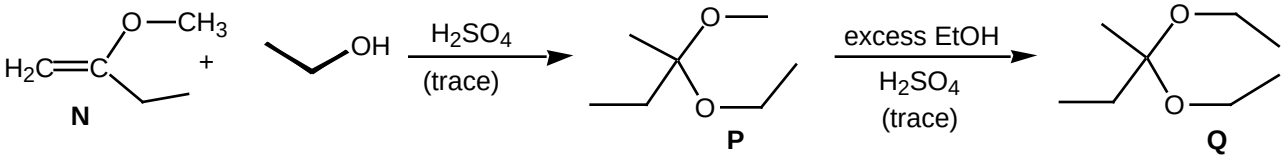


a. Write the stepwise mechanism for this reaction, showing all intermediates.
b. Why is the reaction slow at low pH?
c. Why is the reaction slow at high pH?

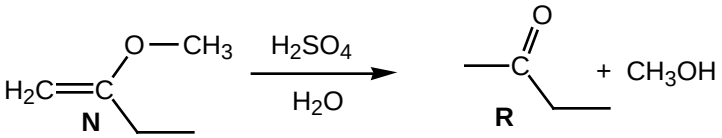
2. Arrange the following ketones in order of IR stretching frequency, and explain your choice carefully.



3. **A.** The alkene **N** reacts with ethyl alcohol in the presence of a small amount of sulfuric acid to give **P**; if the reaction continues with excess ethyl alcohol a new product appears, **Q**. *Write a mechanism to explain these observations.* You need not show every proton transfer, but be sure you make clear the role of the sulfuric acid as a catalyst.



B. *Write a mechanism to account for the somewhat different result, when **N** is allowed to react with water containing sulfuric acid, leading to the ketone **R**.*



4**.** *For the following pair of reactions, predict which will occur faster. Write the organic product(s) for the faster reaction and give the single most important reason for the difference (explain in detail).*