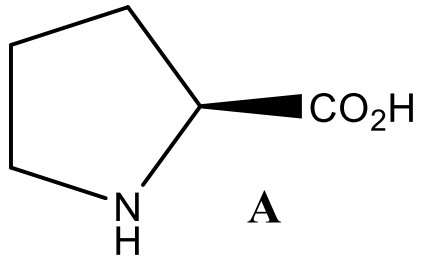
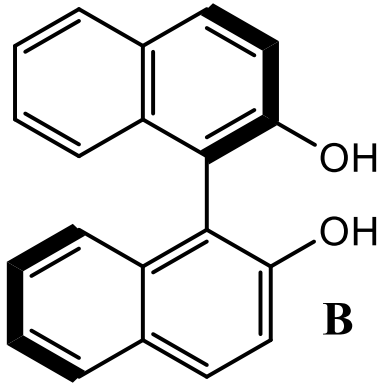
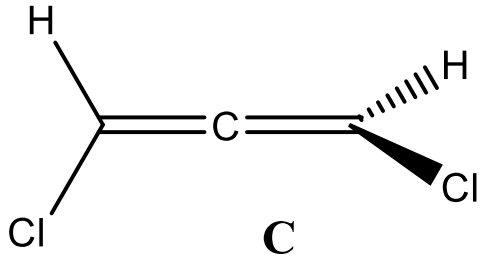
Complete the table



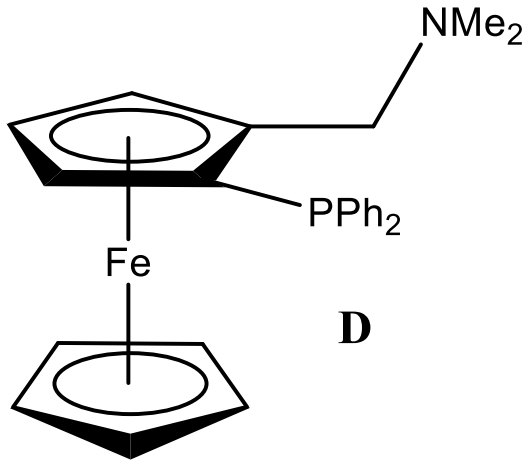
A



B



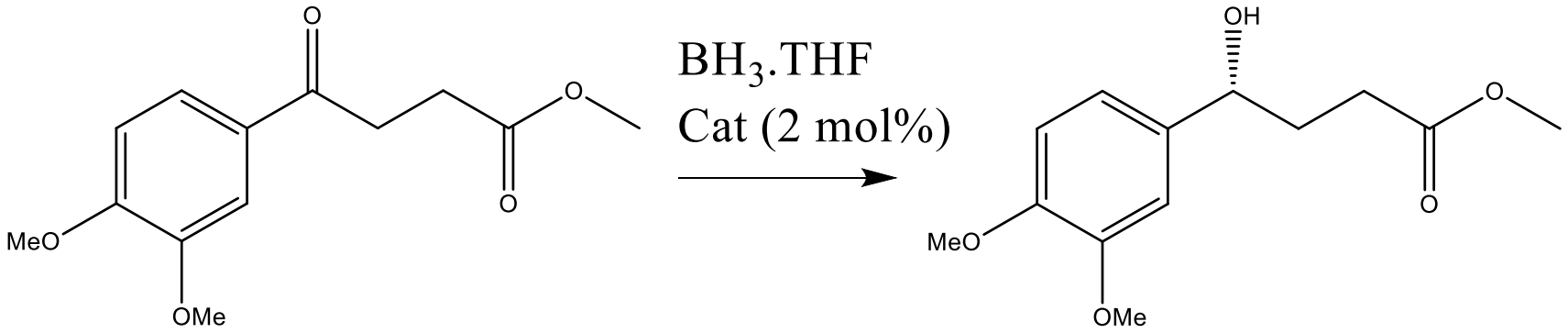
C



D

	A	B	C	D
Type of chirality and configuration				
Percentage of major enantiomer	60 %			20 : 1
Enantiomeric Excess		35 %		
$\Delta\Delta G^{\ddagger}_{(25^{o}C)}$			11.3 kJ mol^{-1}	

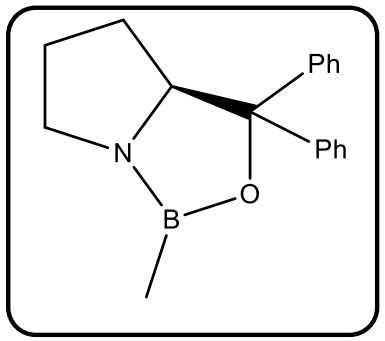
Calculate the Asymmetric Catalyst Efficiency (**ACE**) of the reaction.



Molecular Weight: 252.27

Molecular Weight: 254.28
98%, 95% ee

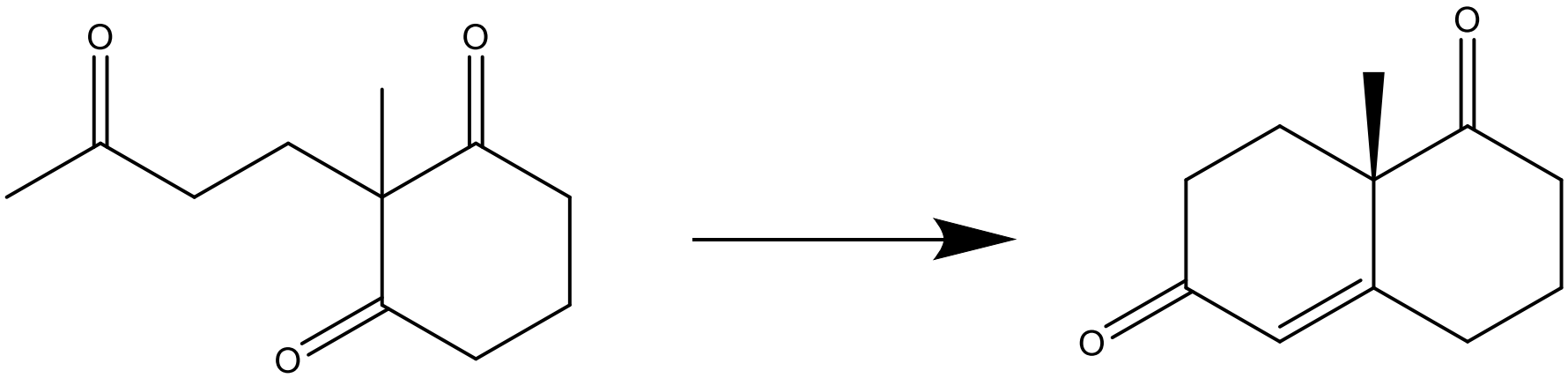
Cat.



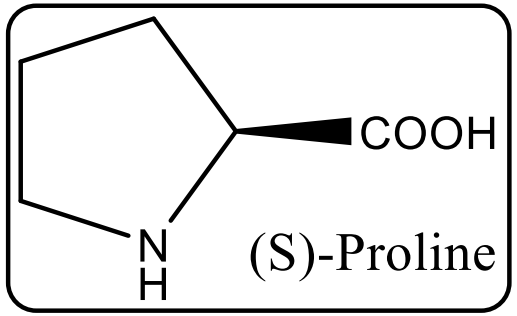
Molecular Weight: 277.17
Cost: £100 per gram

Use the ACE to calculate the **cost** of **1 mmol of the excess** of the **major enantiomer**

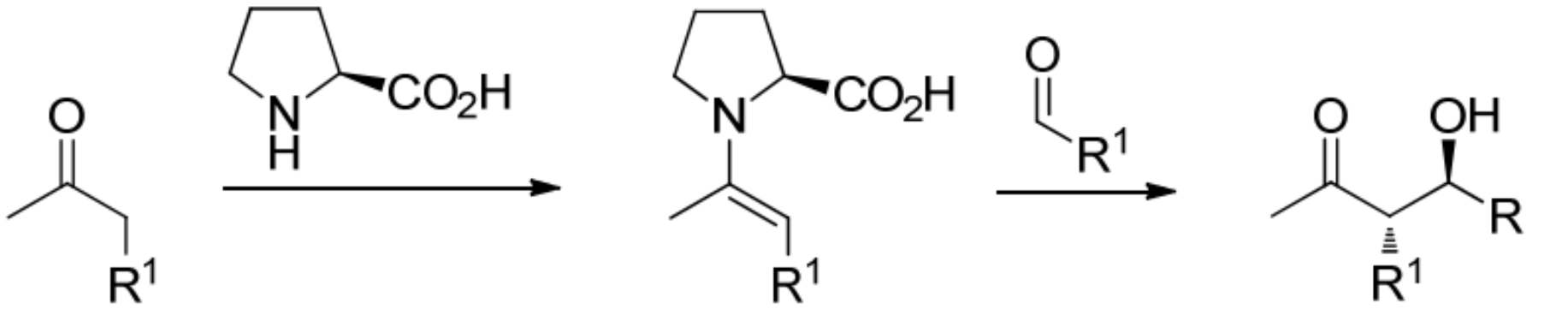
Give the **mechanism** for the following reaction using **LDA**. Is any selectivity displayed, why?



Give the **mechanism** for the catalysed reaction using **(S)-proline** and point out the key differences. (Hint: will need water)



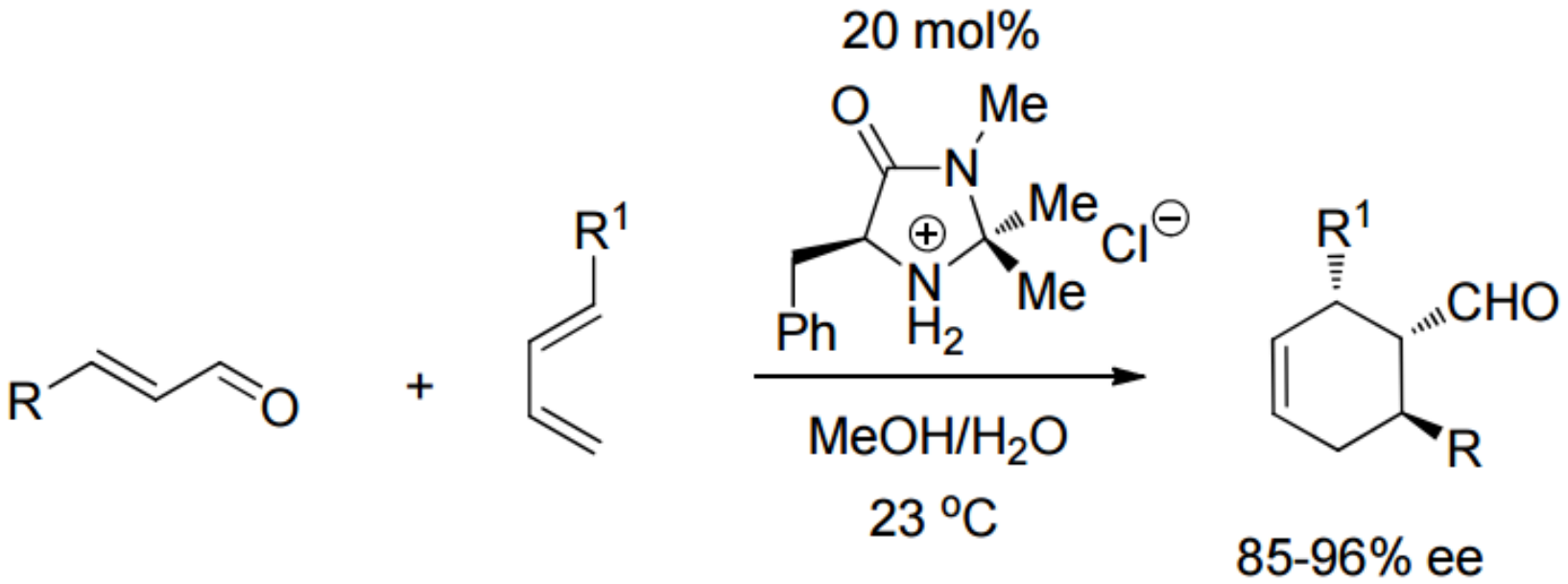
Sketch the **six membered cyclic transition state** in the following reaction and use this to **prove** that the **product is *anti***. (Hint: carboxylic acid can act as source of proton)



trans-enamine

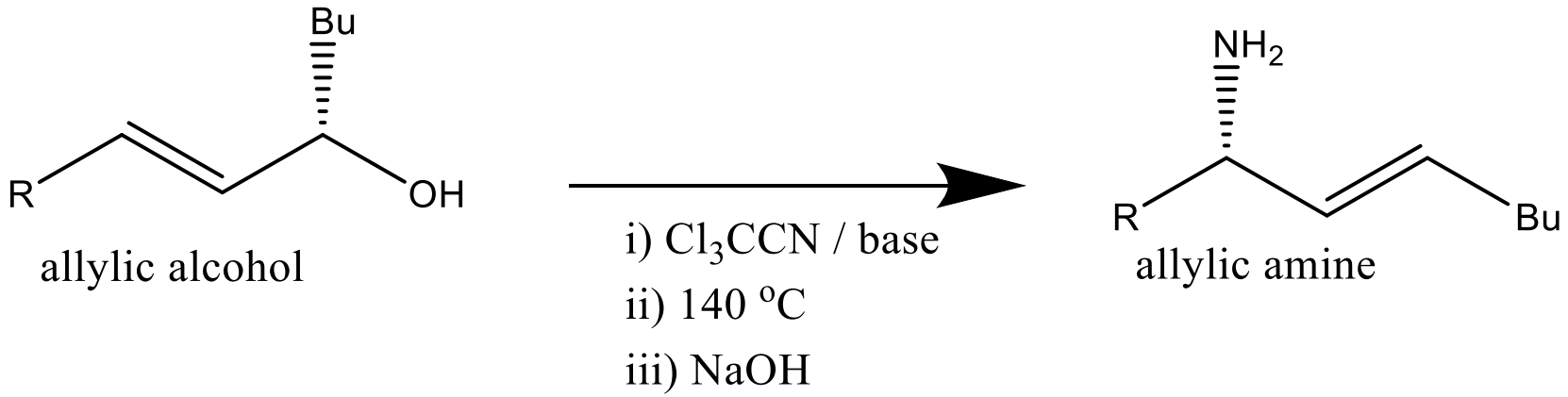
anti-aldol product

Give appropriate intermediates for the reaction to explain the product formed.



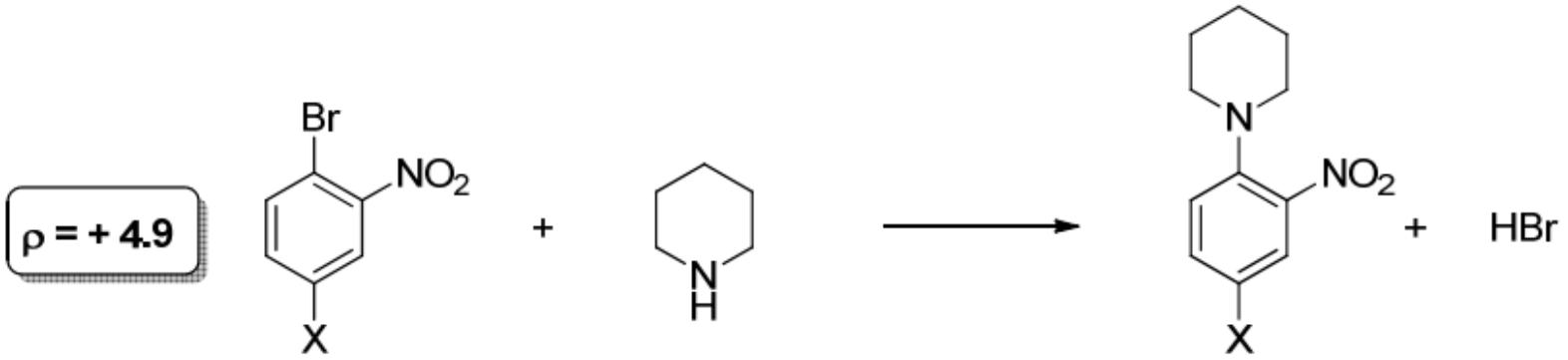
Show the structure of the transition state to explain all stereo chemical outcomes.

Give a plausible mechanism for the following reaction (Stereochemistry not important at this stage so you may get racemic product)

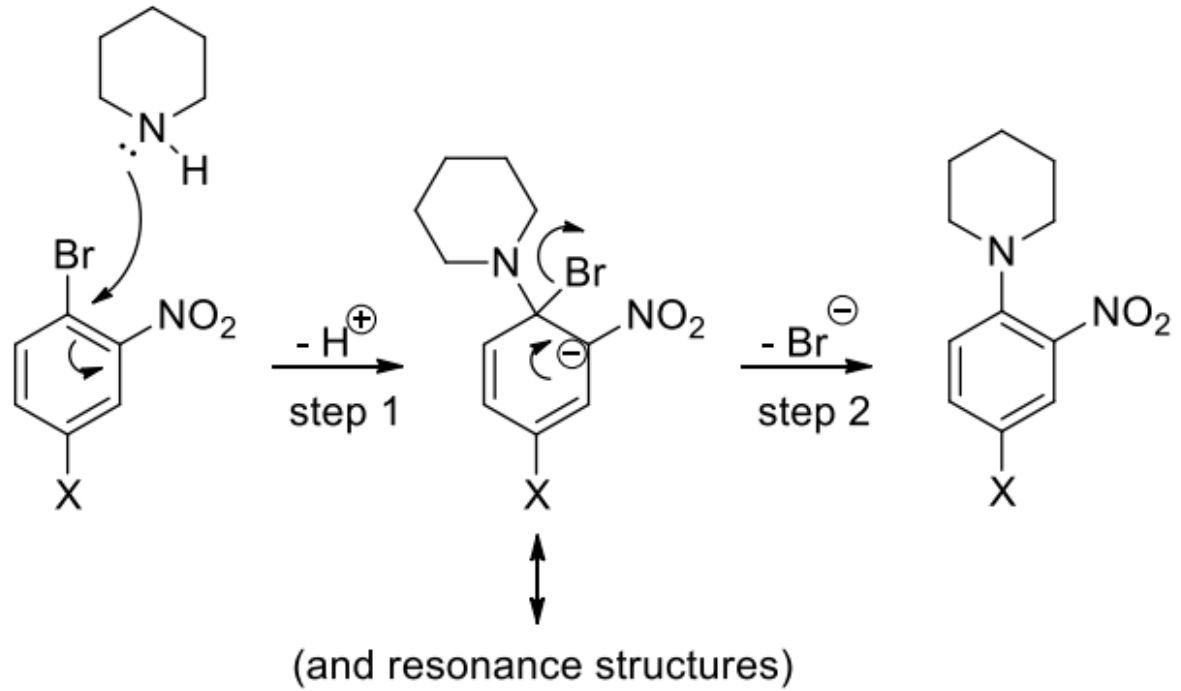


Give the mechanism for the same reaction but catalysed using $PdCl_2(PhCN)_2$. Show how the stereo chemistry of the product is dictated by palladium.
Normally palladium acts as a redox metal where reactions such as oxidative additions take place, however this is not the case here. So how does palladium catalyse the reaction?

What is the rate determining steps in the following reaction? What kind of X group would increase rate of reaction (give one example)?



Mechanism



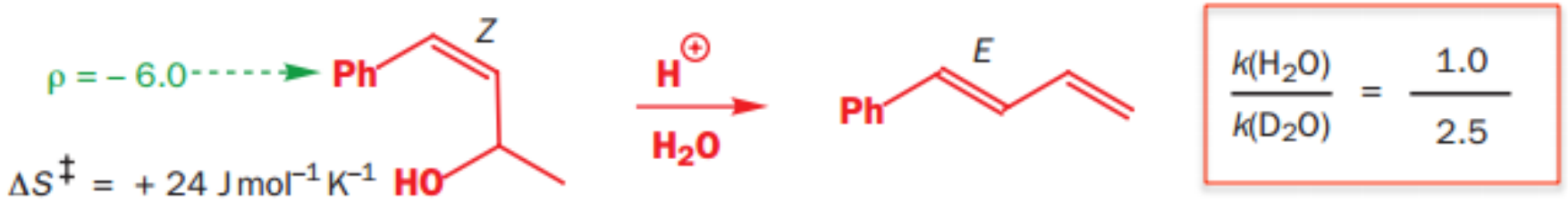
Below is a reaction.

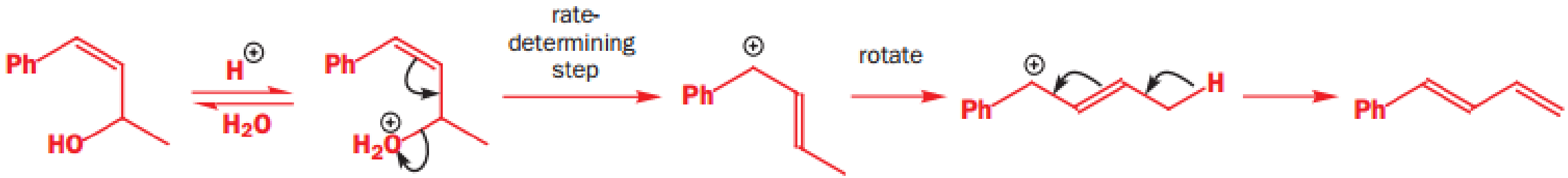
$$A + B + C \rightarrow ABC$$

The reaction was found to be **first order in each A and B** and **zeroth order in C**. Reactants A and B are UV-Vis active and have different peak absorption wavelengths λ_{max}. As of yet there are no methods to directly measure the concentration of reactant C over time.

- Write out a rate equation for the formation of product
- Give a method to how you could prove that there is first order in each A and B?
- Give a method to how you could prove that there is zeroth order in C?
- What is the total order of the reaction?

Would the following reaction be an example of (specific / general) (acid / base) catalysis, or even no effect at all? Explain why.





How does the values of ρ and $\Delta S^{\ddagger}$ conform with the proposed mechanism