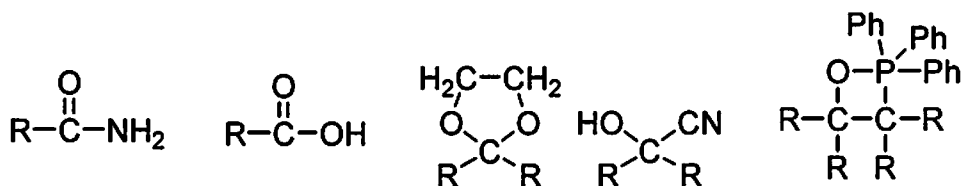
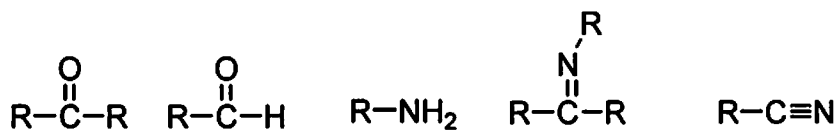
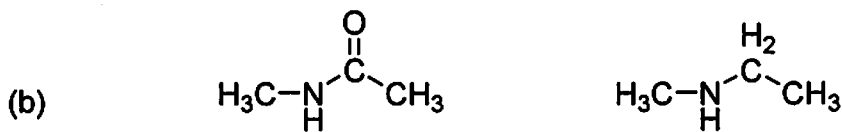
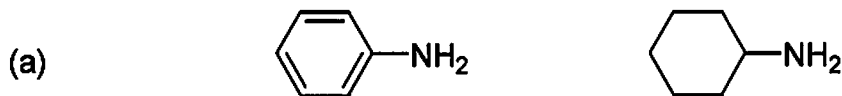


NAME: _____

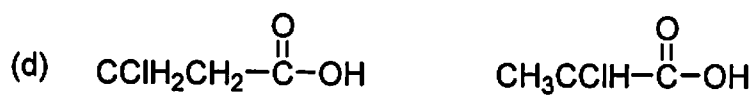
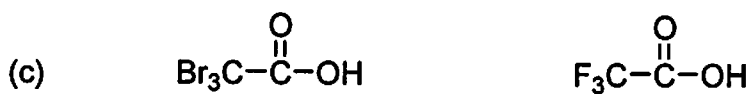
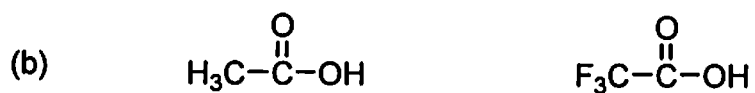
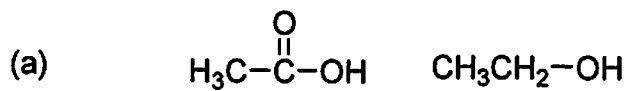
- 1) Name the general class of organic molecules that each of these molecules belong to, and circle the most reactive molecule with respect to undergoing nucleophilic attack. (11 pts)



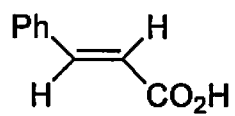
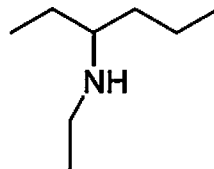
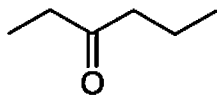
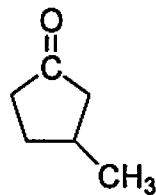
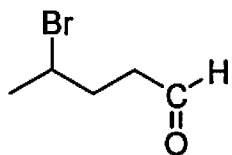
- 2) Circle the stronger base in the following pairs, and in a sentence explain your choice. (6pts)



3) Circle the stronger acid in the following pairs, and in a sentence explain your answer. (12pts)

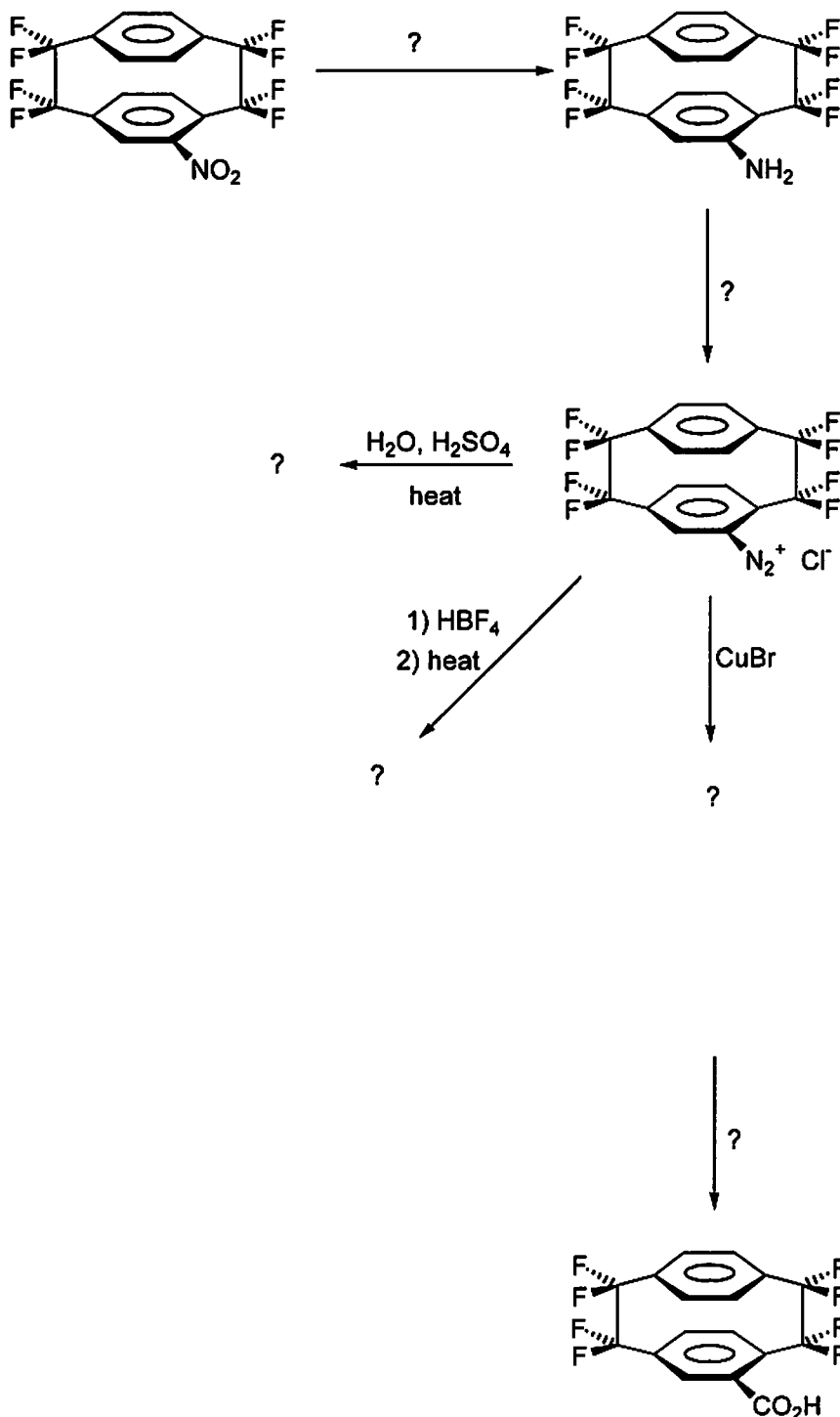


4) Name the following compounds in IUPAC acceptable terms. (15pts)

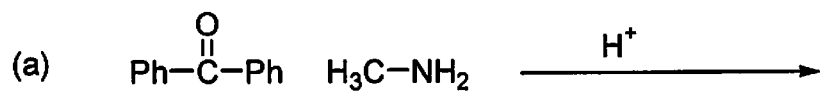


- 5) Explain why propanal is more reactive than propanone towards nucleophilic attack. (10pts)

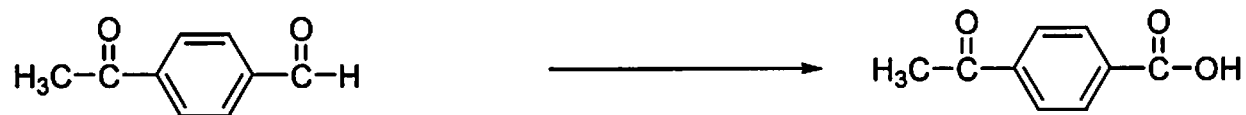
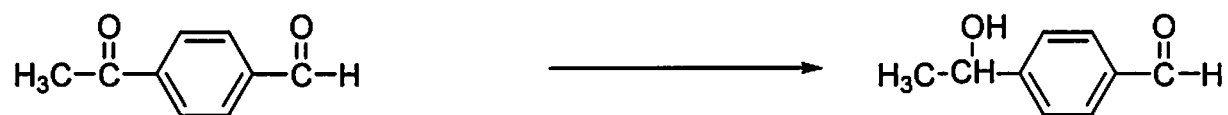
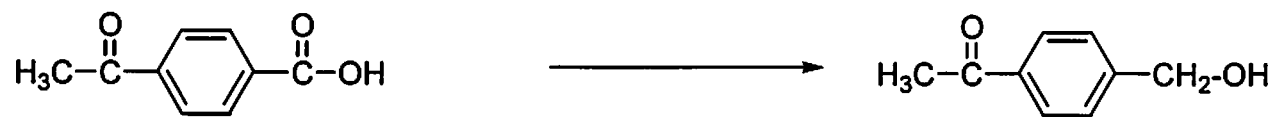
6) The following is taken from a forthcoming publication in the *Journal of Organic Chemistry*, where a bright young chemist is using classic Diazonium salt chemistry to functionalize some fluorinated cyclophanes. However he was distracted by the wrestling on the TV and left some blanks in his report, help him by filling in the missing products or reagents. (15pts)



7) Give the products formed in **five** of the following reactions. (15pts)



8) Give reagents for the following oxidations and reductions, bearing in mind the (in)compatibility of some of the functional groups. (9pts)



9) Methylamine has $pK_b = 3.36$ and ammonia has $pK_b = 4.74$.
Indicate which is the stronger base, and explain why one is a stronger base than the other. (7pts)

Or

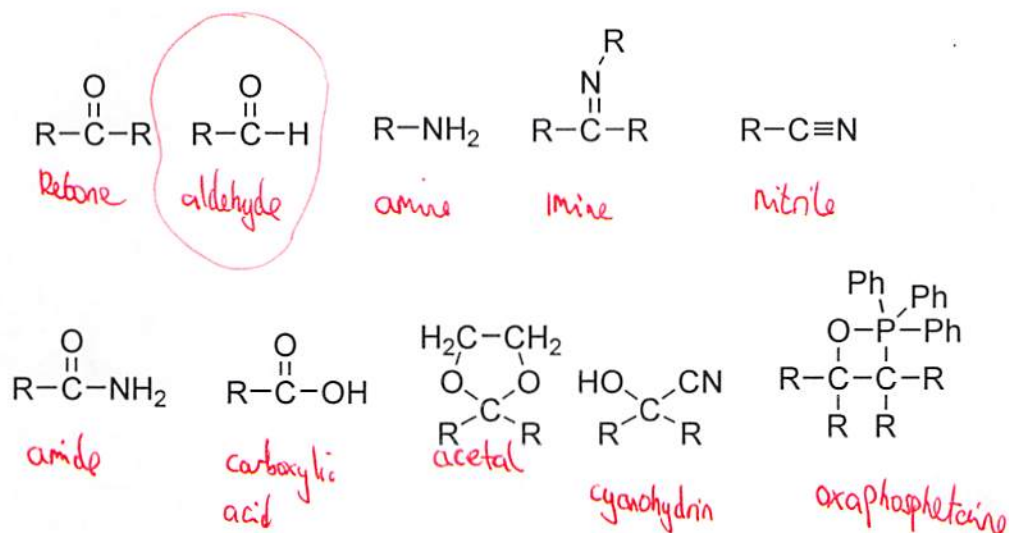
Write both the mechanisms for the **acid** and **base** catalyzed hydration of acetone. (also 7pts)

***Bonus question* (up to 4pts)**

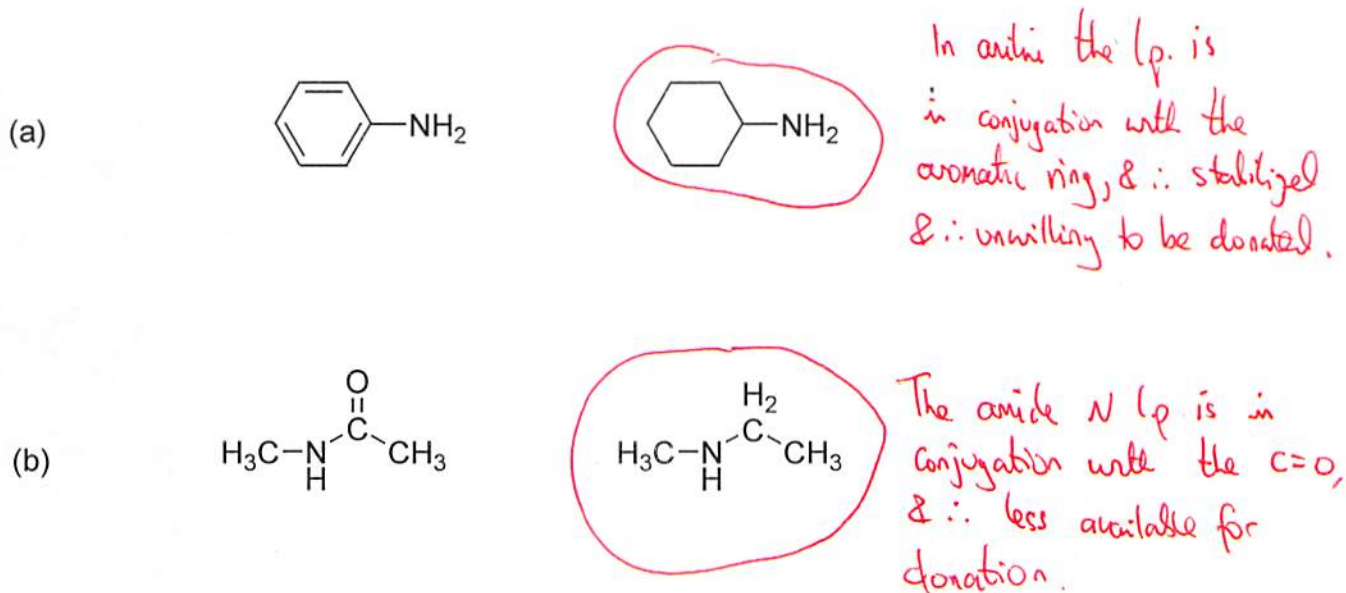
Why are the basicities of methylamine and trimethylamine about the same?
(use back if necessary).

NAME: WAYNE DWOPPS ONMAHEAD

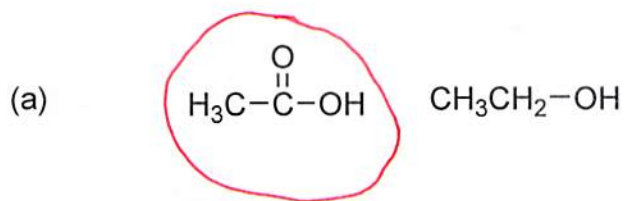
- 1) Name the general class of organic molecules that each of these molecules belong to, and circle the most reactive molecule with respect to undergoing nucleophilic attack. (11 pts)



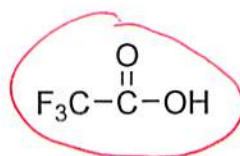
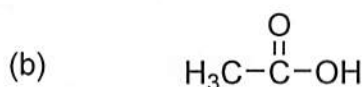
- 2) Circle the stronger base in the following pairs, and in a sentence explain your choice. (6pts)



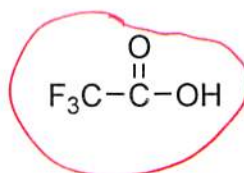
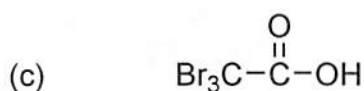
3) Circle the stronger acid in the following pairs, and in a sentence explain your answer. (12pts)



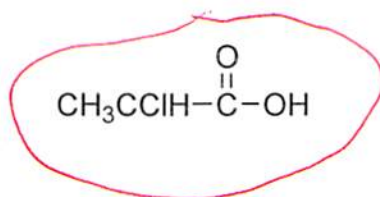
forms a resonance stabilized anion, when it donates a H^+



electron withdrawing CF_3 group helps stabilize the anion

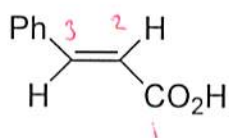
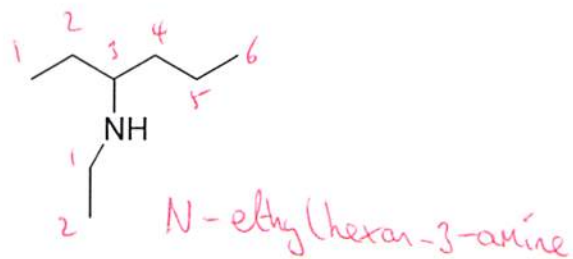
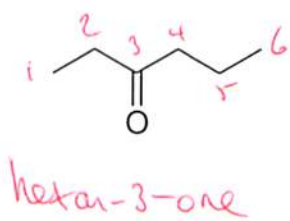
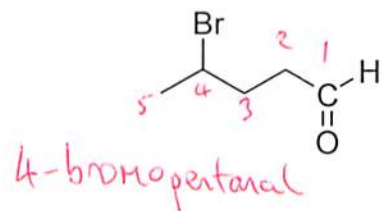


CF_3 more electron withdrawing than CBr_3 , \therefore giving a more stable anion



The electron withdrawing Cl is closer to the $-ve$ charge & \therefore more effective in stabilizing it.

4) Name the following compounds in IUPAC acceptable terms. (15pts)



- 5) Explain why propanal is more reactive than propanone towards nucleophilic attack. (10pts)



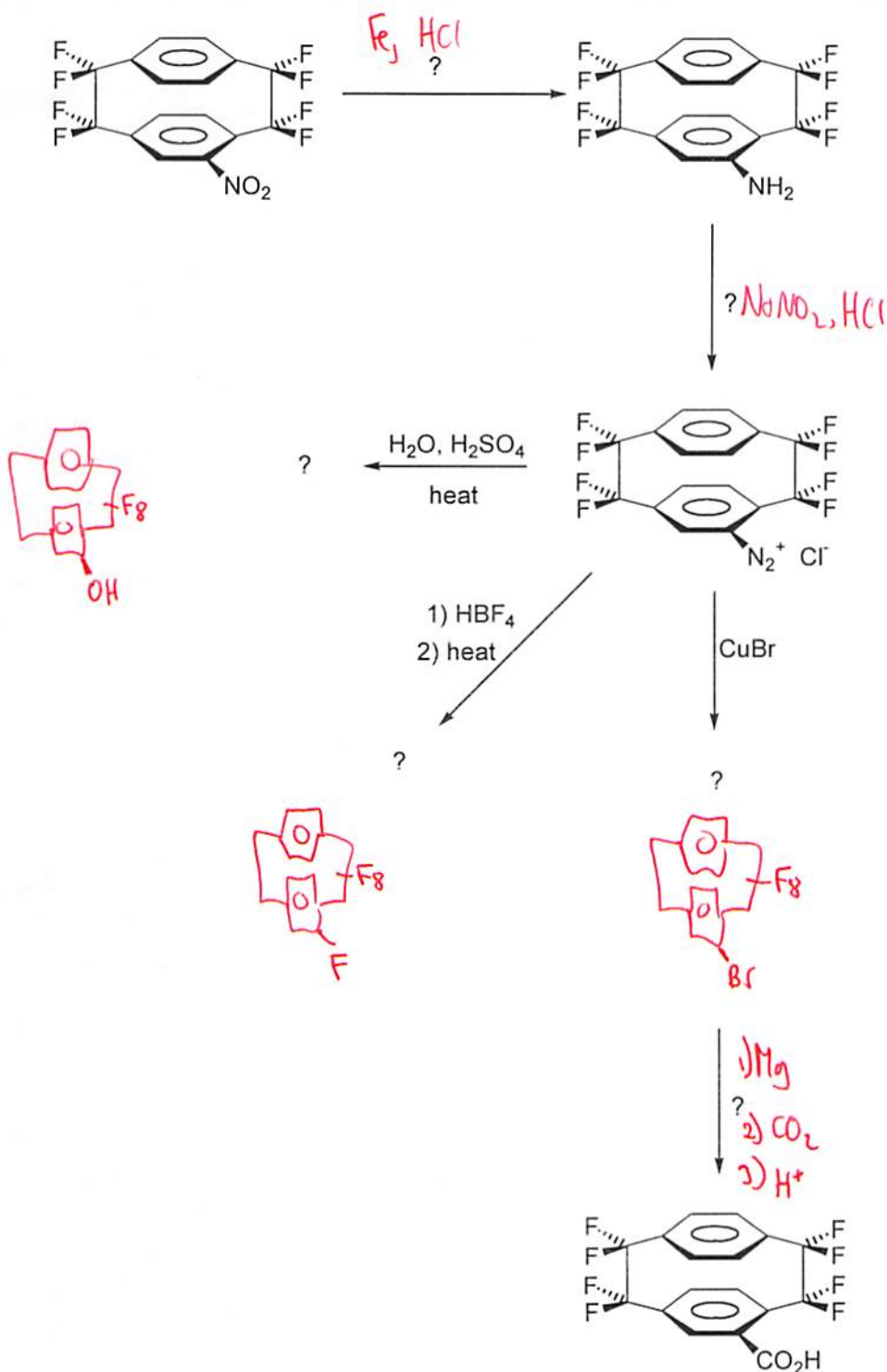
The relative reactivity can be explained by considering two factors: sterics & electronics:

Sterically, the aldehyde is far less hindered, since there is only one alkyl substituent and a hydrogen on the other side. The ketone has two alkyl substituents. Therefore the aldehyde is predicted more reactive.

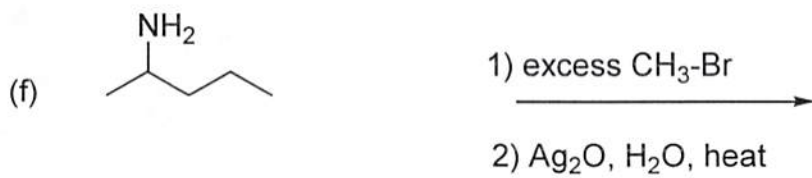
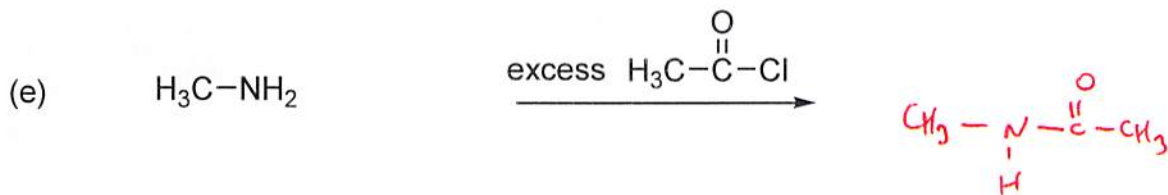
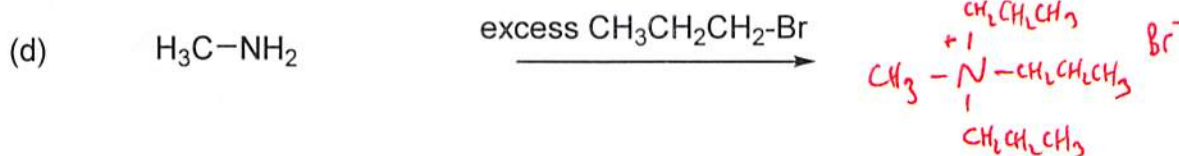
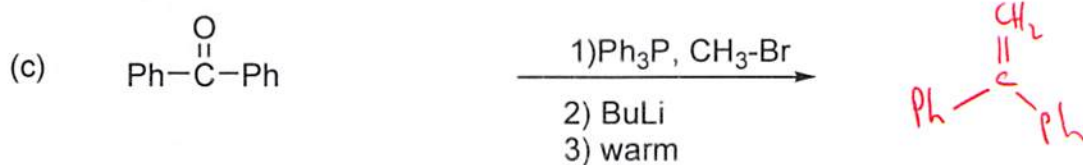
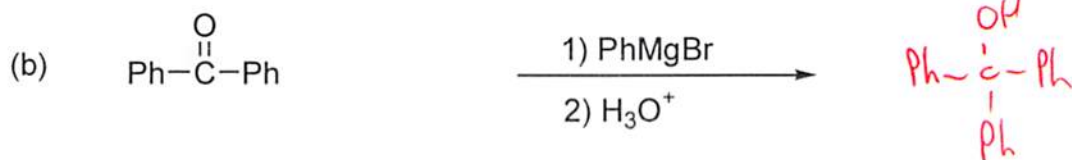
Electronically, the carbonyl carbon on the ketone is less positively charged since there are two alkyl substituents which release electron density to lessen the +ve charge.

The aldehyde carbonyl is more +ve since only one of the substituents donates e^- density. \therefore again the aldehyde is more reactive towards nucleophilic attack.

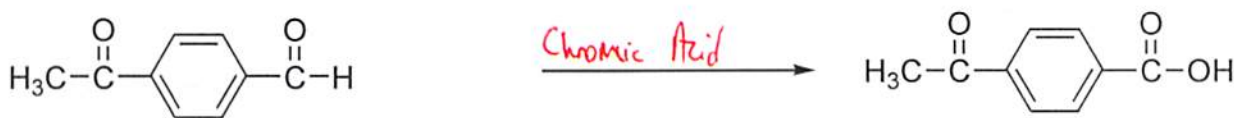
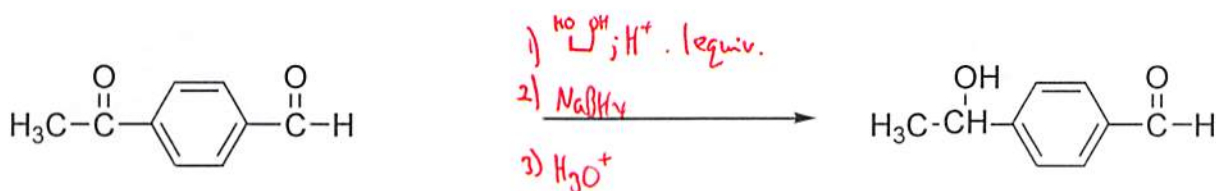
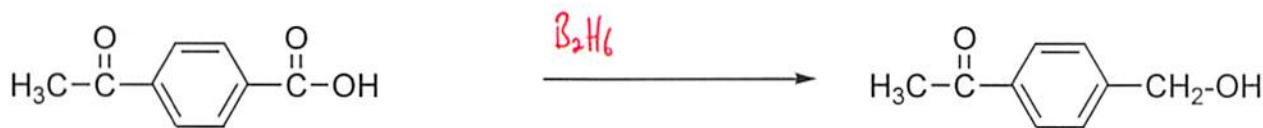
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6) Give the products formed in **five** of the following reactions. (15pts)



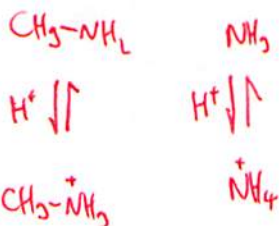
7) Give reagents for the following oxidations and reductions, bearing in mind the (in)compatibility of some of the functional groups. (9pts)



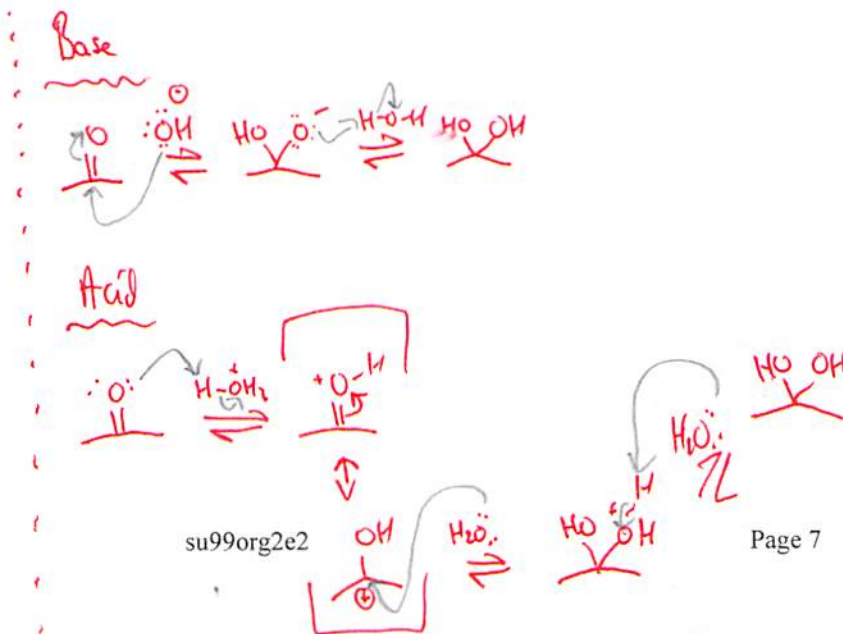
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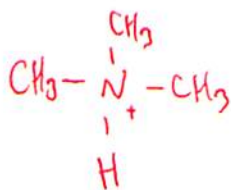
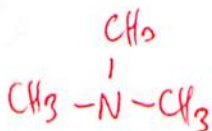
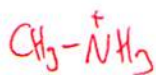
Or

Write both the mechanisms for the **acid** and **base** catalyzed hydration of acetone. (also 7pts)



Methylamine is the stronger base. The alkyl group on the Nitrogen is e^- donating and therefore helps stabilize the +ve charge on the Nitrogen upon protonation occurs.





Even though the increase in alkyl substitution would tend to increase the stability of the ammonium salt formed (and thus increase basicity of parent amine), the increase in alkylation creates

an increase in steric hindrance around the Nitrogen, and also a decrease in solvation energy for the cation. Both these factors decrease the basicity of the parent amine.

The two opposing factors tend to cancel each other out, \therefore their basicities are about the same.

***Bonus question* (up to 4pts)**

Why are the basicities of methylamine and trimethylamine about same? (use back if necessary).