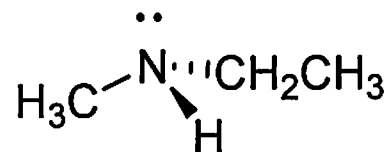


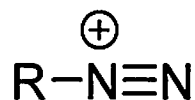
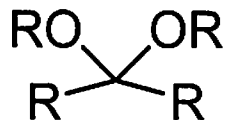
Name: _____

1-10) are True or False (10pts)

- 1) *Primary Amine + Ketone* \rightarrow *Imine + H₂O* is an example of a *condensation* reaction.
- 2) Ketones can be reduced to alkanes.
- 3) Nitriles (RCN) are stronger bases than primary amines (RNH₂).
- 4) *Thionyl chloride* has the formula SO₂Cl.
- 5) The “silver mirror” test is a way to detect primary amines.
- 6) NaBH₄ is a good proton donor.
- 7) Aldehydes are more sterically hindered than ketones.
- 8) Aldehydes are produced by careful oxidation of carboxylic acids.
- 9) Amines are bases, and can be protonated to produce ammonium salts.
- 10) This secondary amine has an (R) chiral center.

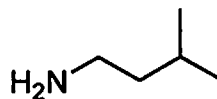
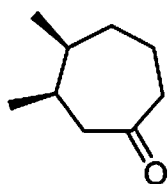


11) (2pts) Name the general class of organic compound (functional group) that each of these molecules belong to.



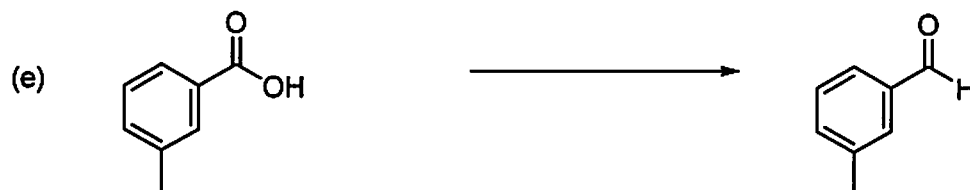
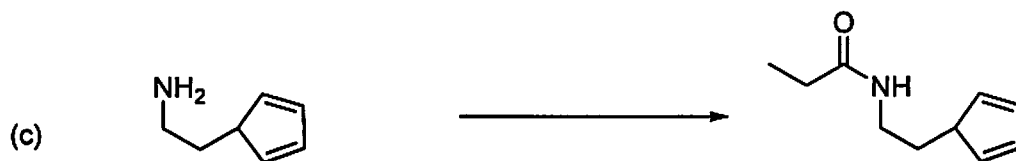
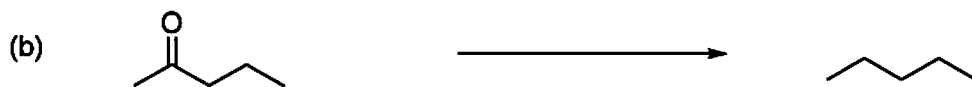
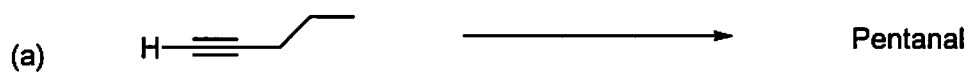
12) How many pairs of non-bonding electrons, **in total**, are on the two functional groups shown in Q11? (1pt)

13) Name the following compounds in IUPAC acceptable terms. (3+2=5pts)

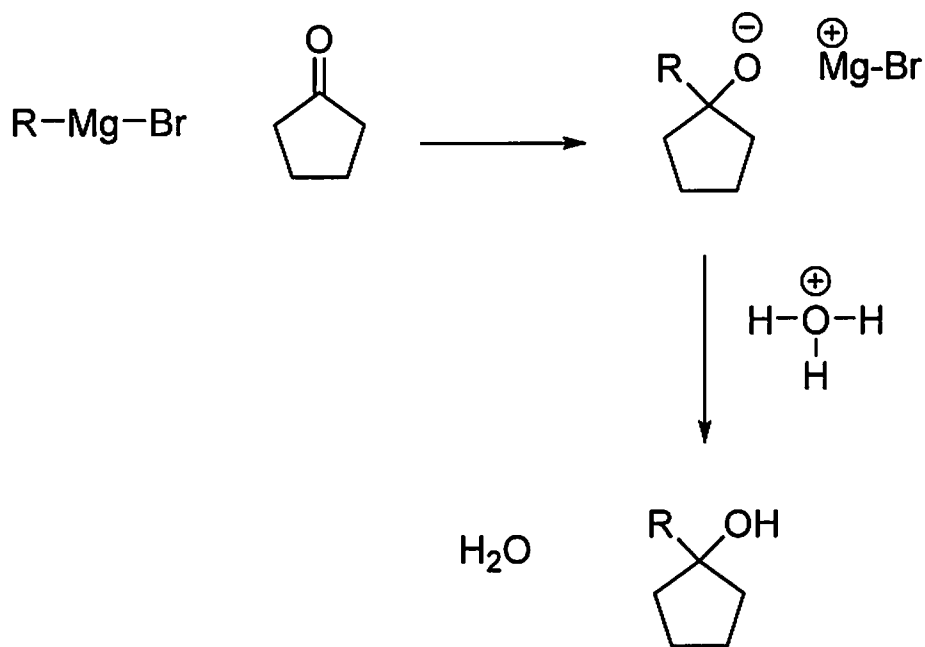


14) Using line angle diagram format (*stick figures*) draw *N,N*-diethylaniline.
(2pts)

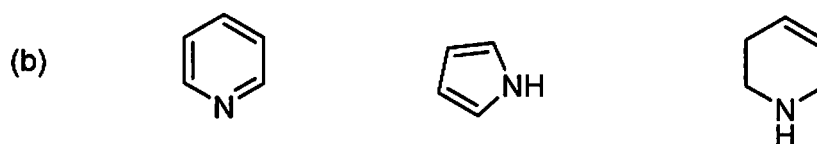
15) Give the reagents to generate the following products. (10pts)



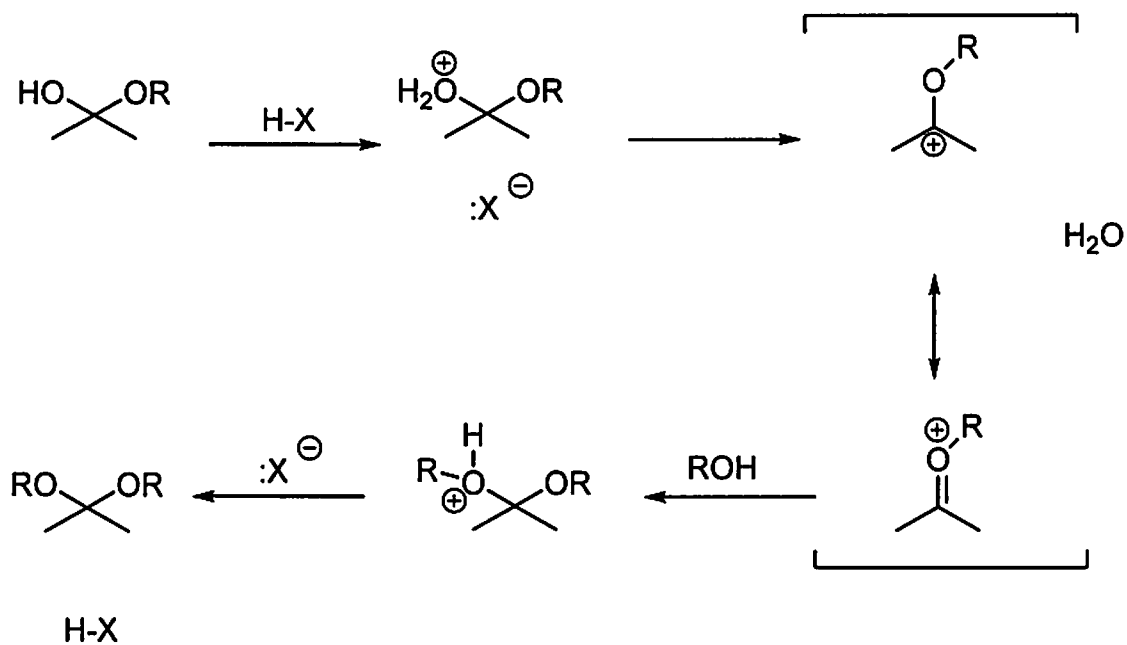
16) Draw in the curly arrows to describe the mechanism for this nucleophilic addition reaction. (3pts)



17) Circle the *strongest* base in the following threesomes. (2pts)

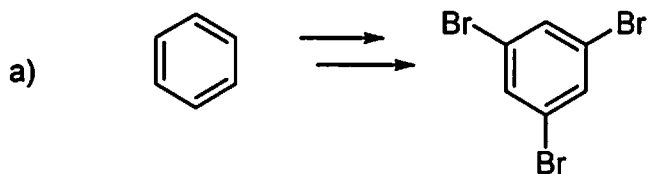


18) Draw in the curly arrows for the following mechanism (4pts).

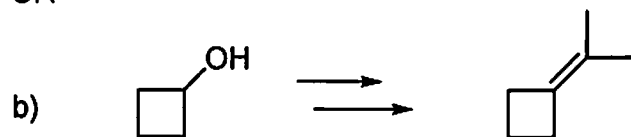


19) Devise a synthetic scheme for *either* (a) or (b) to generate the product from the starting material; bearing in mind more than one step is obviously required. Only attempt one of (a) or (b). (3pts)

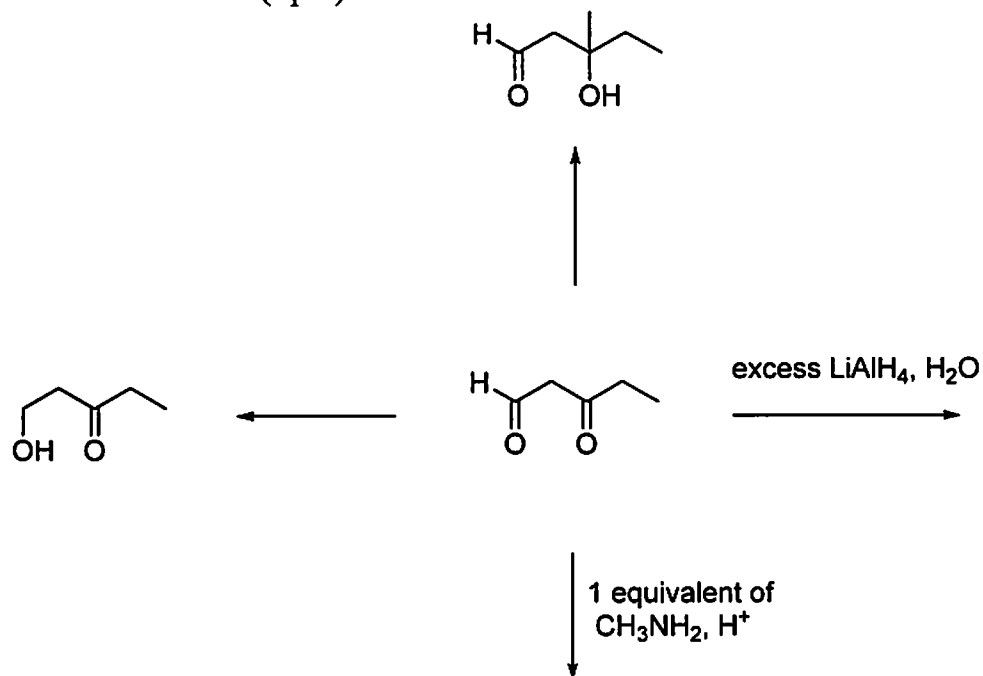
EITHER



OR



20) Give reagents (2+2pts) and products (2+2pts) for the following transformations. (8pts)




****Bonus question (up to 2 pts)****

The pH (acidity) of a CONDENSATION reaction mixture is crucial to its success (often with optimum pH around 4.5).

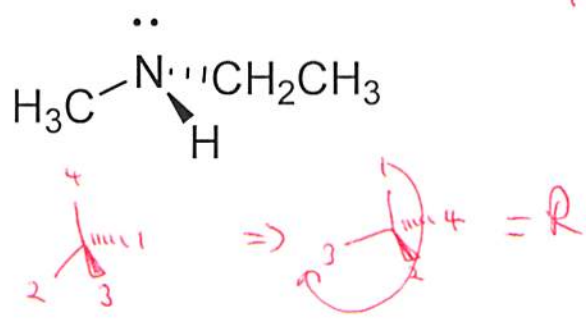
Provide one *mechanistic* reason why acidic conditions are needed.

Provide one *mechanistic* reason why the conditions needed to be controlled so that the reaction mixture is not too acidic.

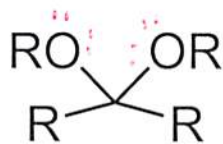
Name: _____  -ing on the floor

1-10) are True or False (10pts)

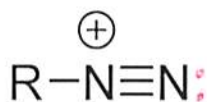
- 1) Primary Amine + Ketone \rightarrow Imine + H_2O T
is an example of a condensation reaction.
- 2) Ketones can be reduced to alkanes. T
- 3) Nitriles (RCN) are stronger bases than primary amines (RNH₂). false
- 4) Thionyl chloride has the formula SO₂Cl. false
- 5) The "silver mirror" test is a way to detect primary amines. false
- 6) NaBH₄ is a good proton donor. false
- 7) Aldehydes are more sterically hindered than ketones. false
- 8) Aldehydes are produced by careful oxidation of carboxylic acids. false
- 9) Amines are bases, and can be protonated to produce ammonium salts. T
- 10) This secondary amine has an (R) chiral center. T



11) (2pts) Name the general class of organic compound (functional group) that each of these molecules belong to.



Acetal

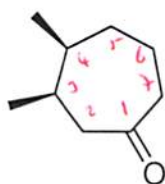


Diazonium cation

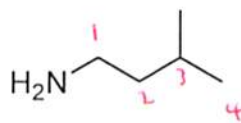
12) How many pairs of non-bonding electrons, **in total**, are on the two functional groups shown in Q11? (1pt)

$$4 + 1 = 5$$

13) Name the following compounds in IUPAC acceptable terms. (3+2=5pts)



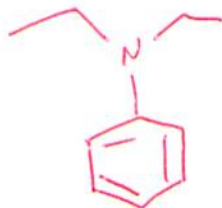
15-3,4-dimethyl cycloheptanone



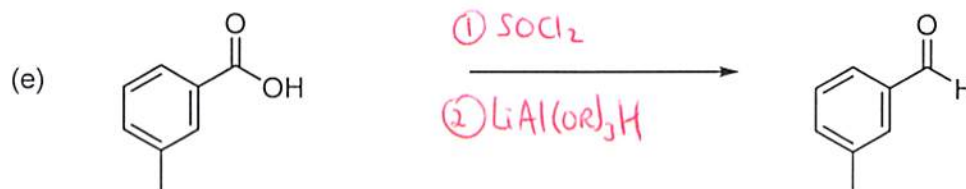
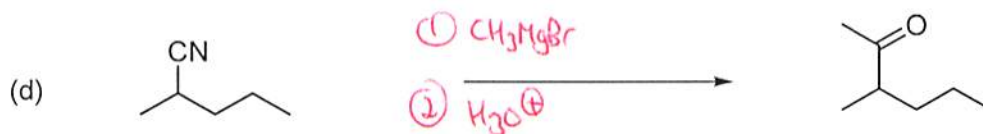
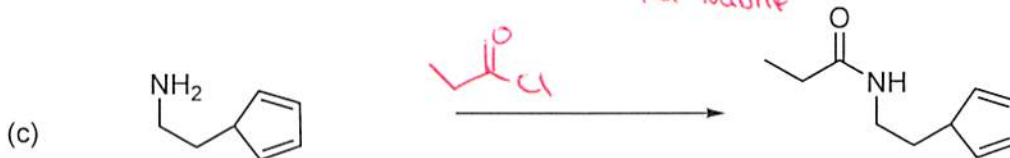
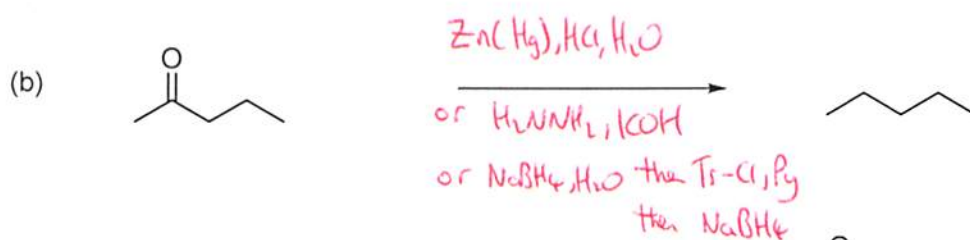
3-methylbutan-1-amine



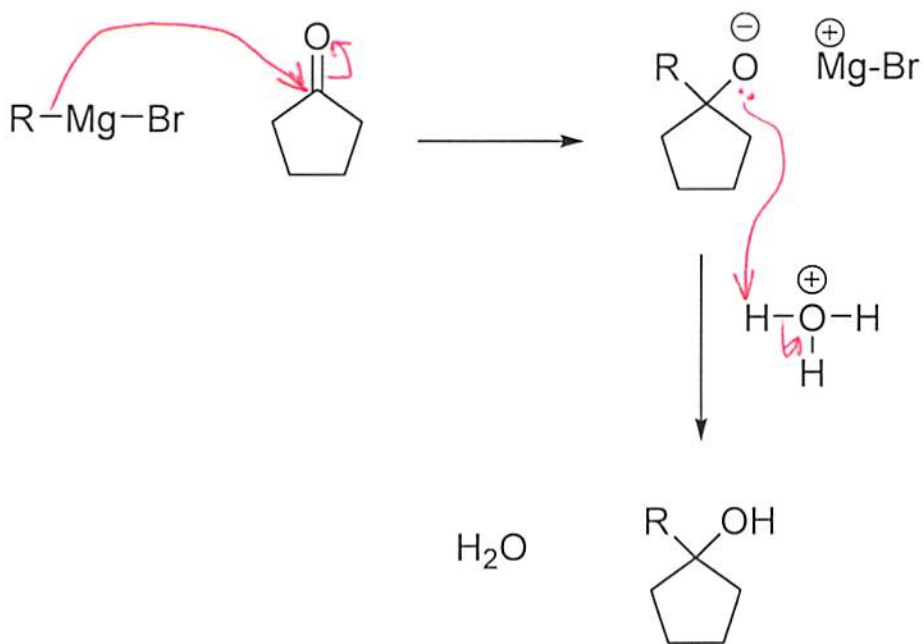
14) Using line angle diagram format (*stick figures*) draw *N,N*-diethylaniline.
(2pts)



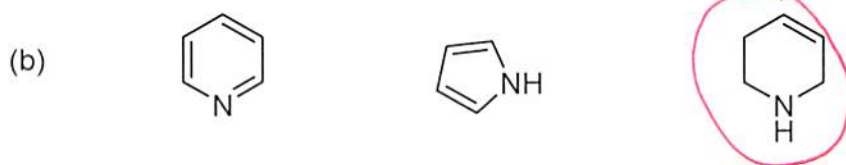
15) Give the reagents to generate the following products. (10pts)



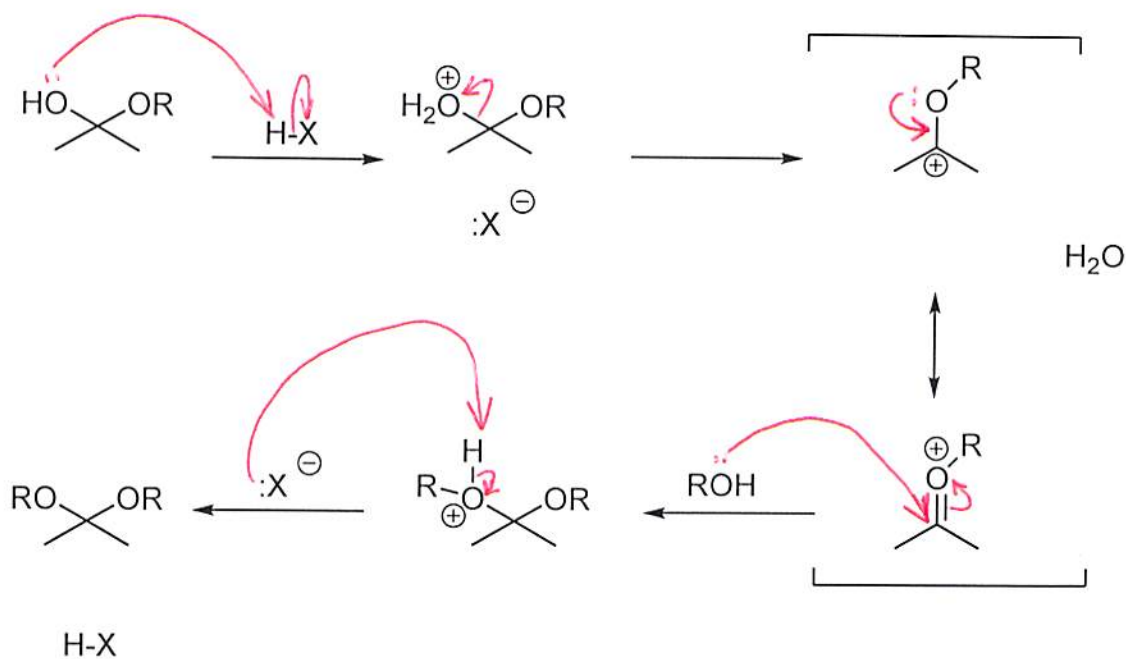
16) Draw in the curly arrows to describe the mechanism for this nucleophilic addition reaction. (3pts)



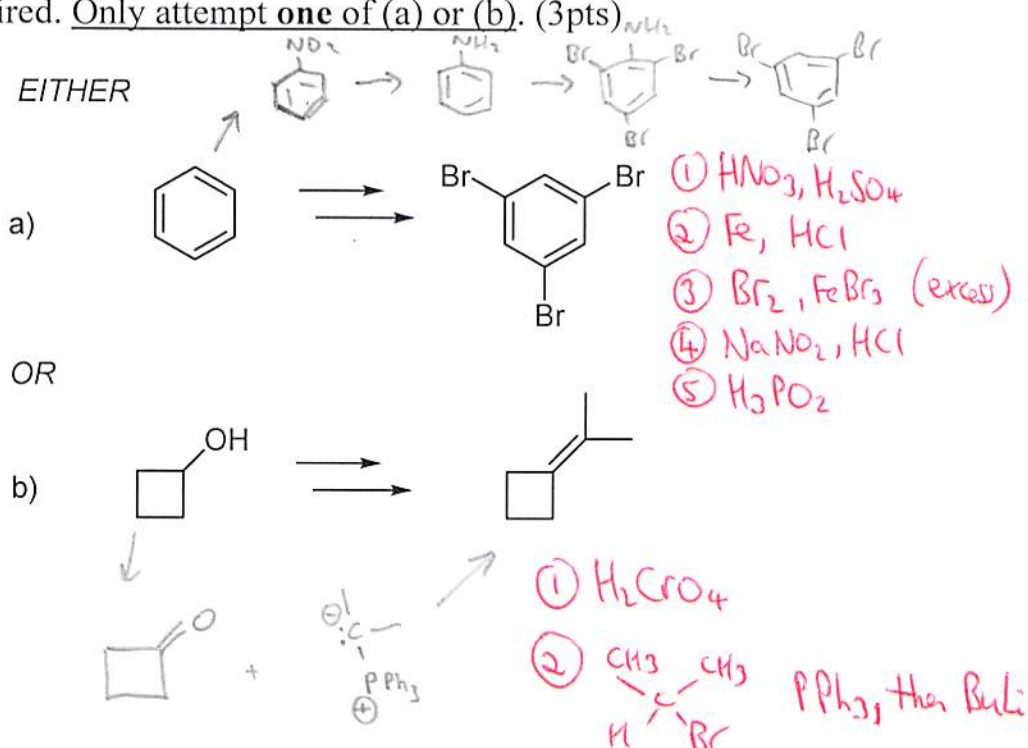
17) Circle the *strongest* base in the following threesomes. (2pts)



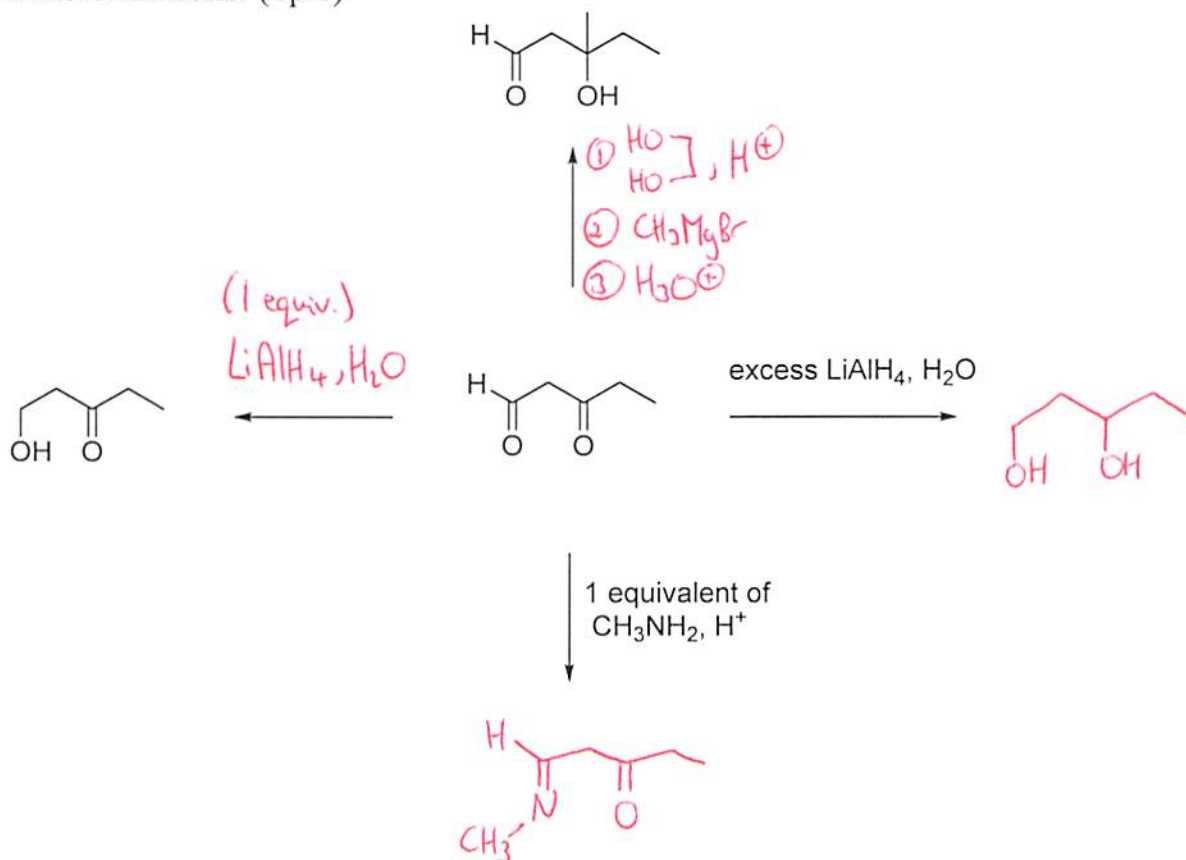
18) Draw in the curly arrows for the following mechanism (4pts).



19) Devise a synthetic scheme for *either* (a) *or* (b) to generate the product from the starting material; bearing in mind more than one step is obviously required. Only attempt one of (a) or (b). (3pts)



20) Give reagents (2+2pts) and products (2+2pts) for the following transformations. (8pts)



****Bonus question (up to 2 pts)****

The pH (acidity) of a CONDENSATION reaction mixture is crucial to its success (often with optimum pH around 4.5).

Provide one *mechanistic* reason why acidic conditions are needed.

You need acid to protonate your leaving group to make it a better leaving group (for the second step in the condensation).

Provide one *mechanistic* reason why the conditions needed to be controlled so that the reaction mixture is not too acidic.

You do not want your nucleophile to become protonated (and therefore "non-nucleophilic").