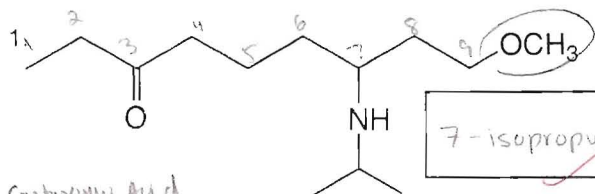
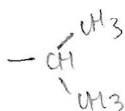


A. Nomenclature: (15 points)

Give an acceptable IUPAC name for each of the following compounds. Be sure to indicate the stereochemistry where appropriate.

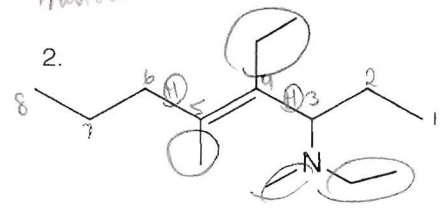


7-isopropylamino-9-methoxy nonan-3-one

+5

- Carboxylic Acid
- Ester
- Amide
- N
- Aldehyde
- Ketone
- Alcohol
- Amine
- Alkene
- Alkyne
- Alkane
- Ether
- Haloide

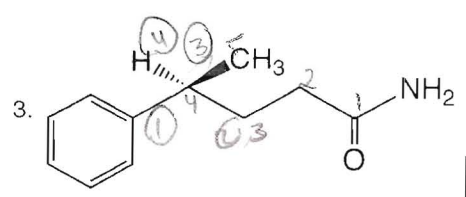
7-isopropylamino
9-methoxy
nonan-3-one



(4E)-4,N-diethyl-N,5-dimethyloct-4-en-3-amine

+5

4,N-diethyl
N,5-dimethyl
(4E) oct-4-en-3-amine



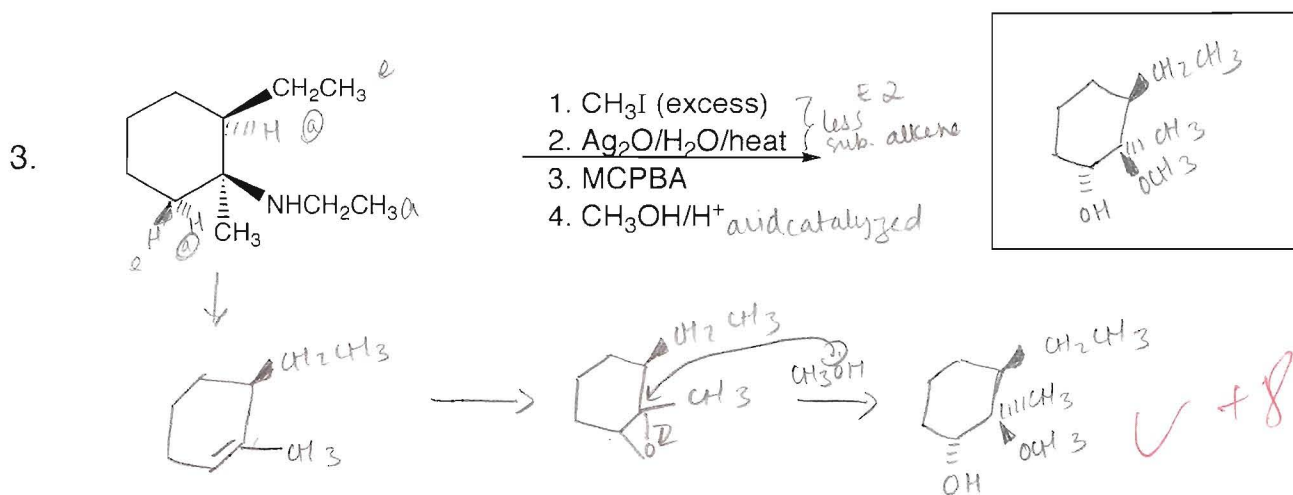
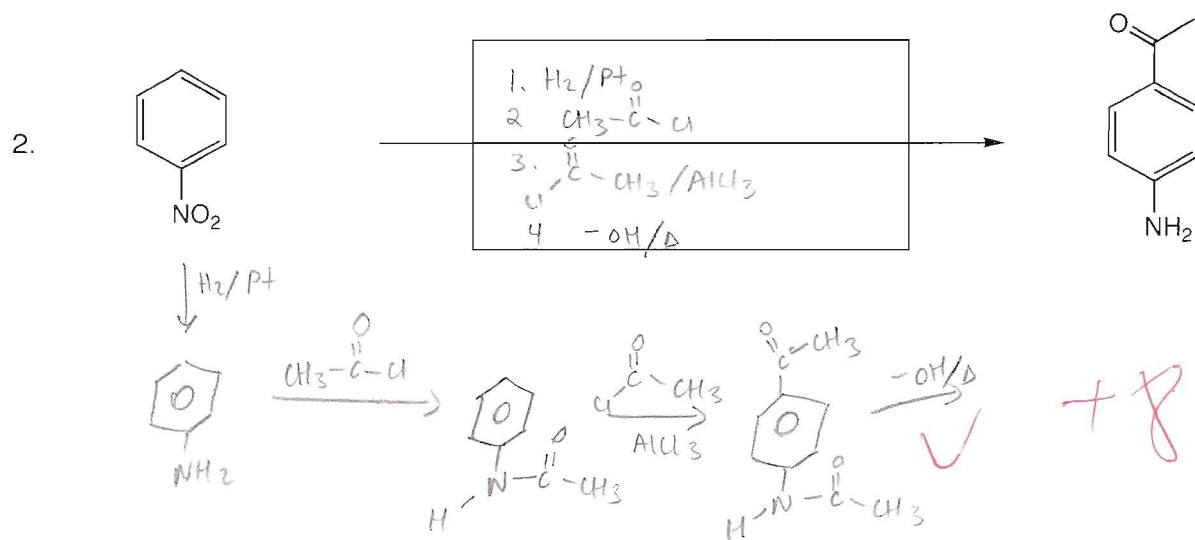
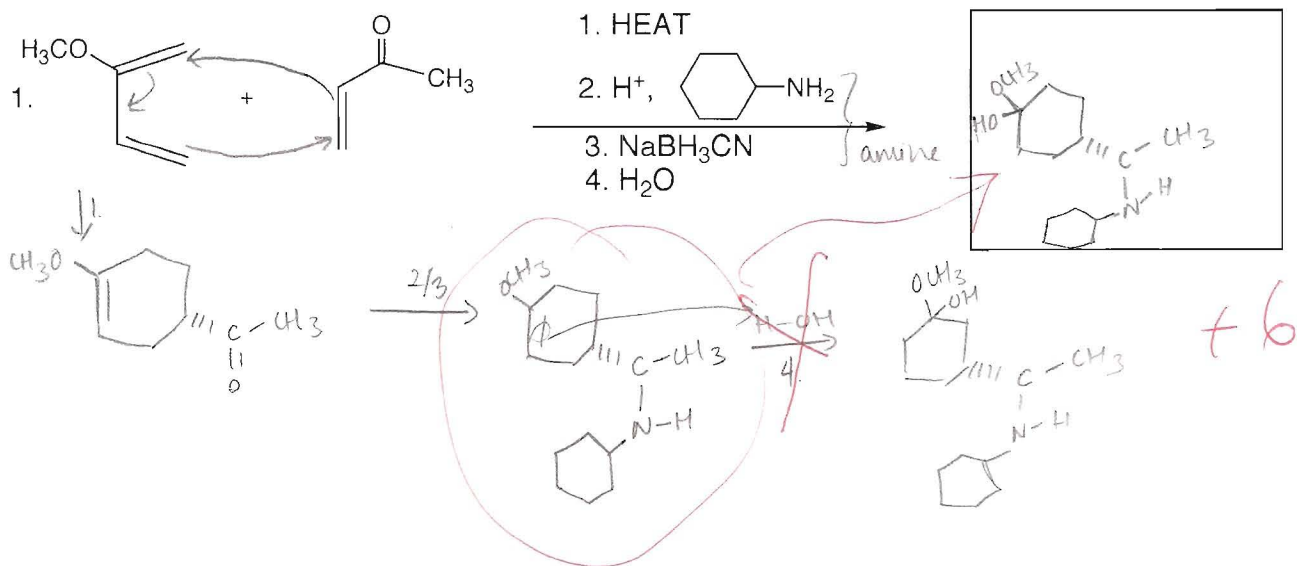
(4S)-4-phenylpentan-1-amide

+5

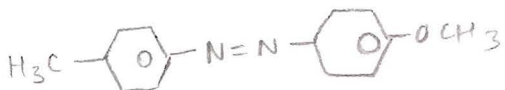
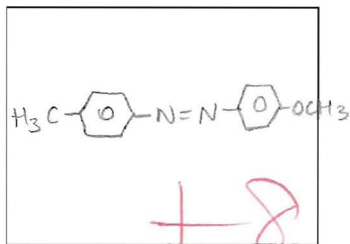
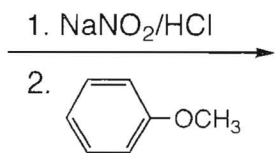
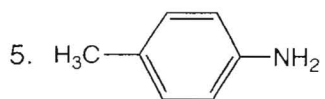
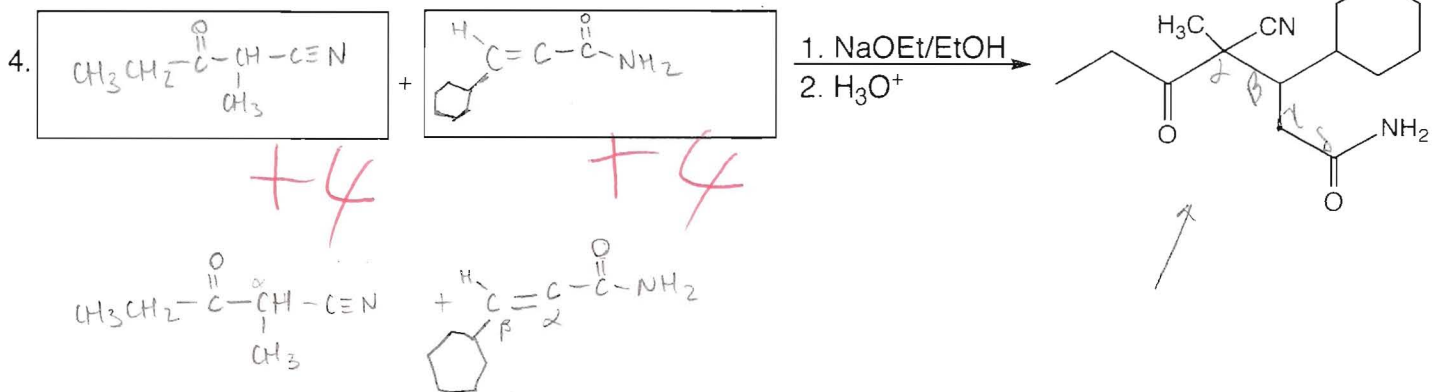
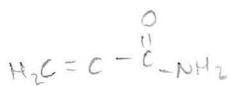
(4S)
4-phenyl
pentan-1-amide

B. Reactions: Total = 40 points, 8 points each

Please provide the starting material, reagents or major product in the answer box. Be sure your drawing indicates **stereochemistry** if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.

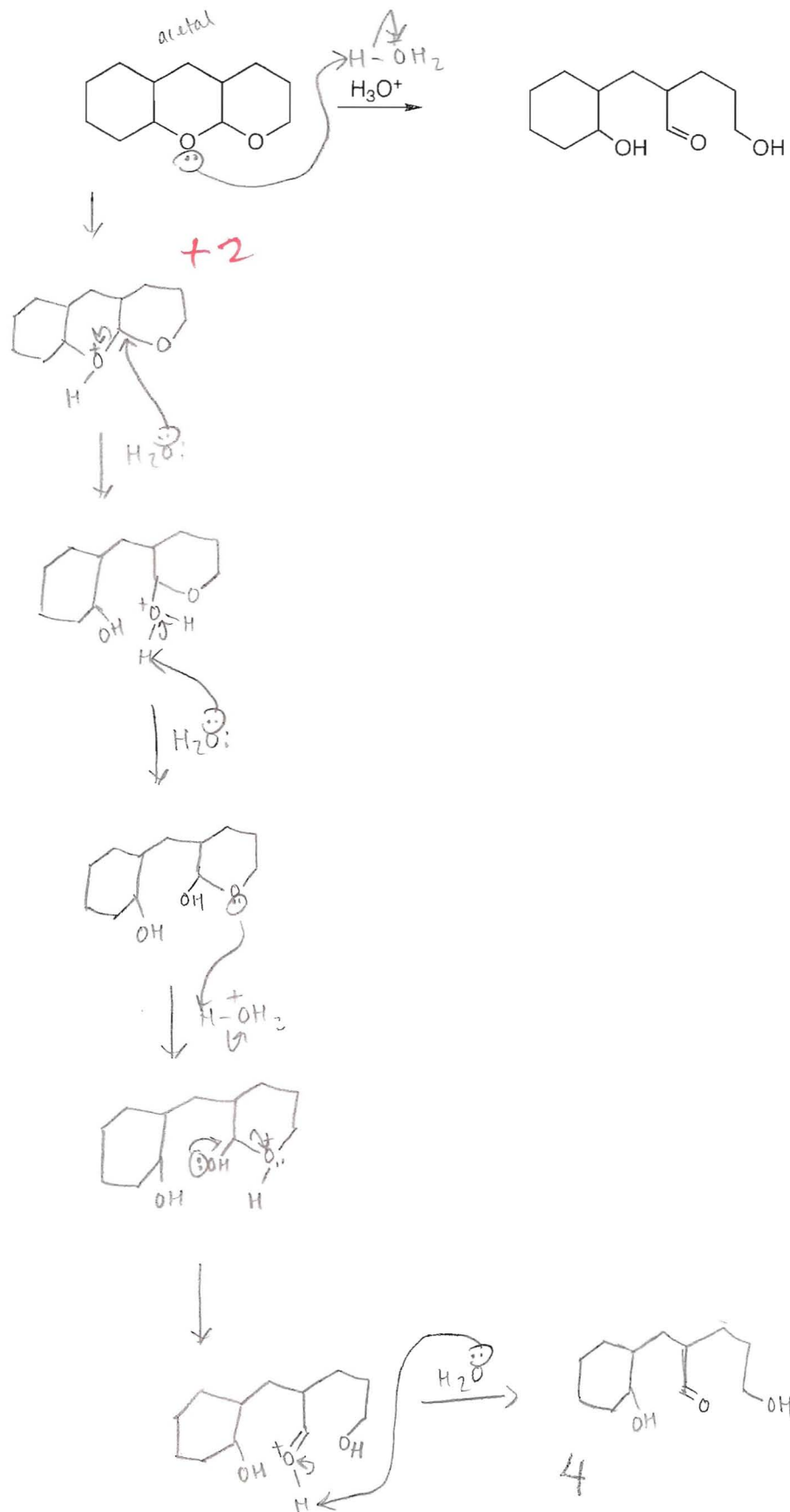


$R-\overset{\overset{O}{\parallel}}{C}-CH_2-C\equiv N$ β -keto nitrile



C. Mechanism: (15 points)

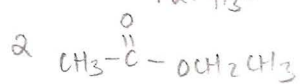
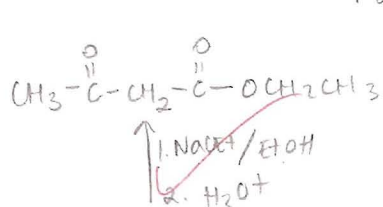
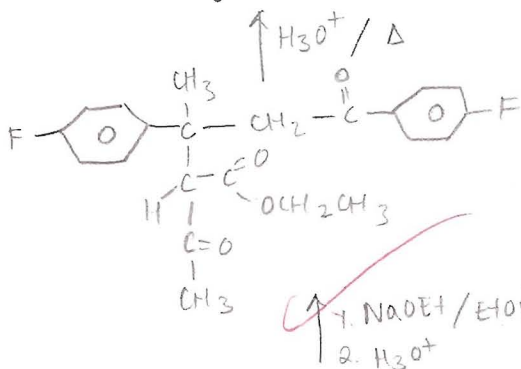
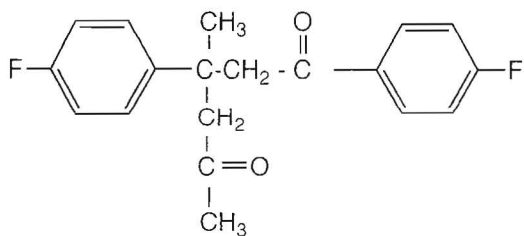
Provide a clear mechanism to explain the formation of the product. Use curved arrows to indicate "electron flow". Remember to show only one step at a time. **Show all intermediates and all formal charges.** When more than one resonance contributor may be drawn, be sure to draw the most stable contributor.



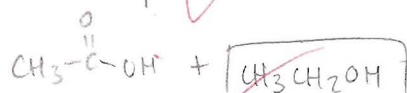
D. Synthesis: 15 Points

Synthesize the molecule below using any of the following reagents: benzene, aniline, any alkanes, alkenes, or alcohols of **three carbons** or less, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.

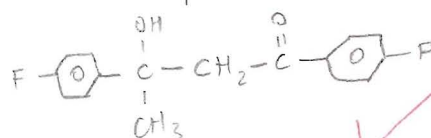
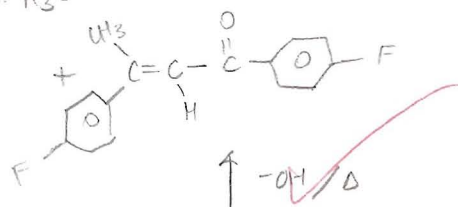
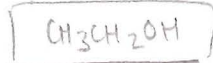
β-diketone



↑ H^+ (Fischer Esterification)



↑ Jones



↑ 1. NaOEt / EtOH
2. H_3O^+



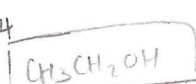
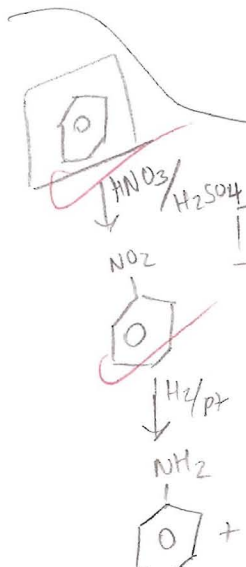
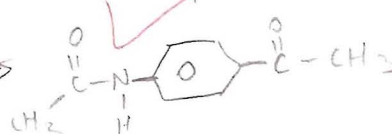
↑ 1. HBF_4
2. Δ



↑ $NaNO_2 / HCl$



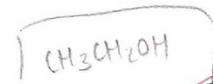
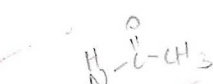
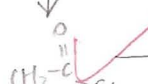
↑ $-OH / \Delta$



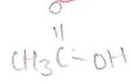
↓ Jones



↓ $SOCl_2$



↓ Jones



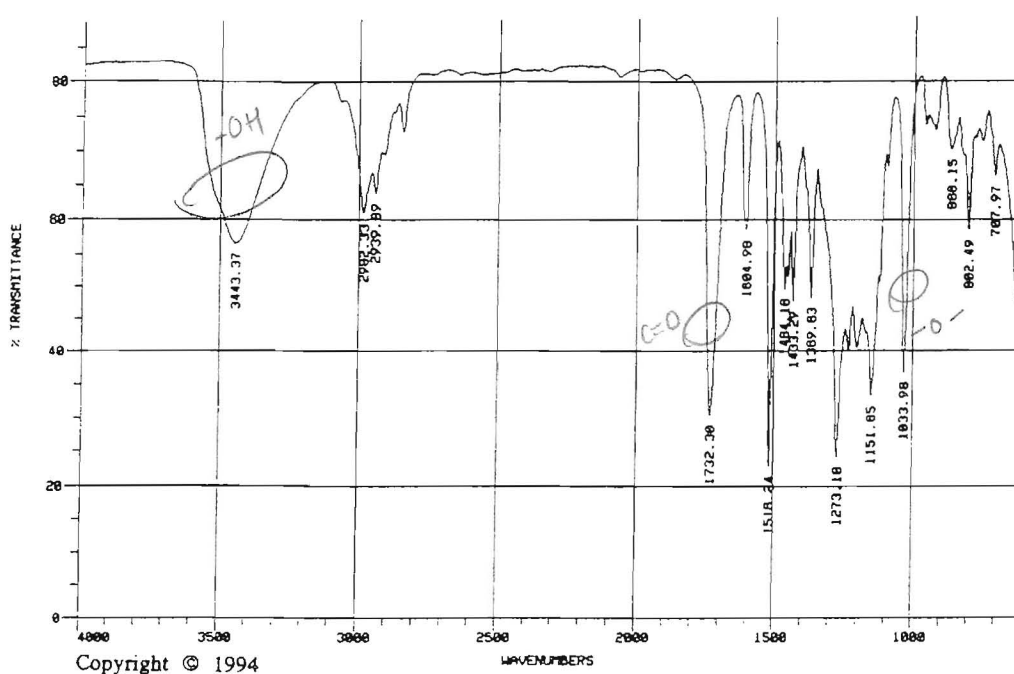
↓ $SOCl_2$



↓ $AlCl_3$

E. Spectroscopy: 15 Points

A compound with the formula $C_{11}H_{14}O_4$ exhibits the IR, 1H NMR and proton decoupled ^{13}C NMR spectra shown below. Please identify this compound and draw the structure in the box provided below. NOTE: The peak at 5.65ppm is D_2O exchangeable.



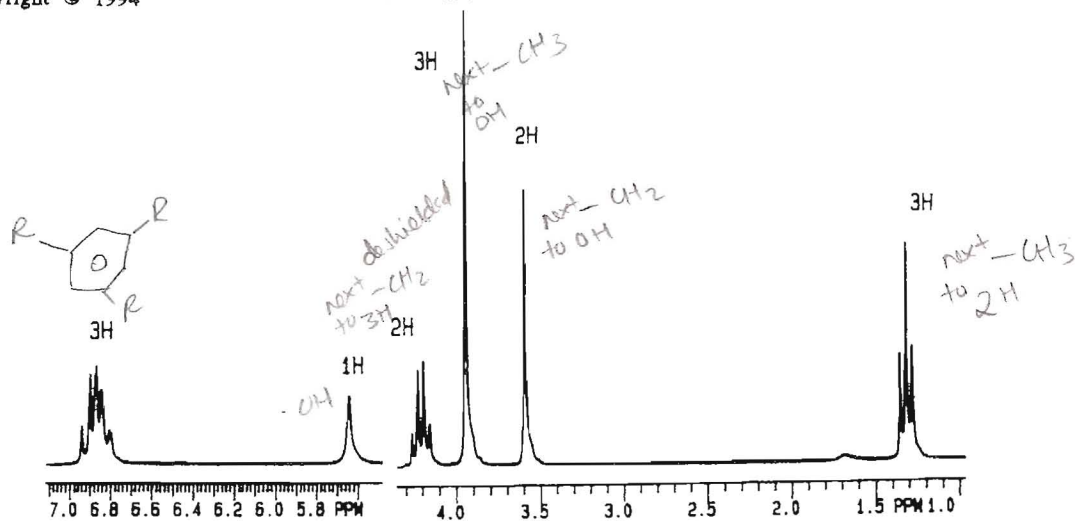
$$UN\#$$

$$11 - \frac{14}{2} + 1$$

$$= 11 - 7 + 1$$

$$= 12 - 7$$

$$= 5$$



Proton NMR

