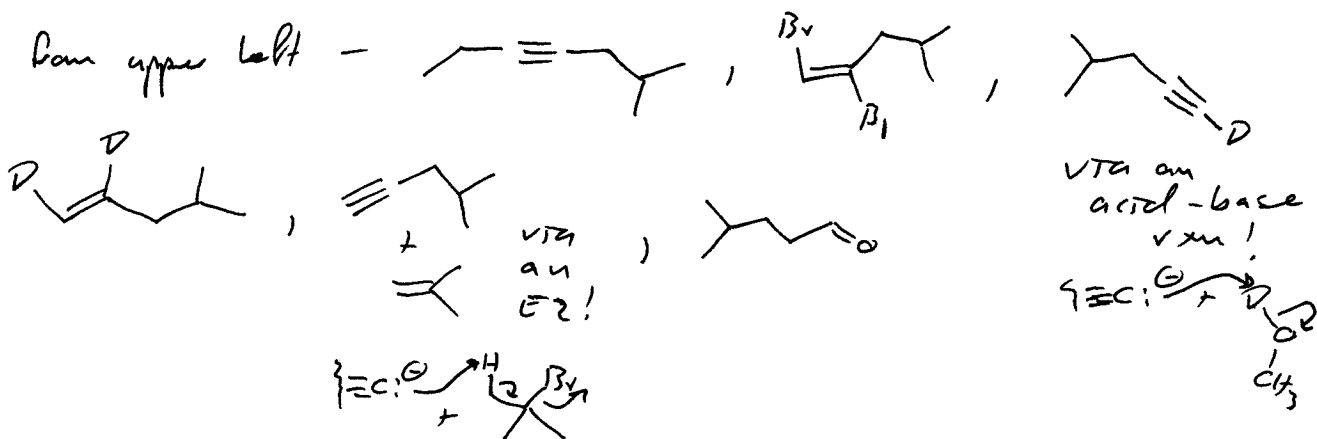
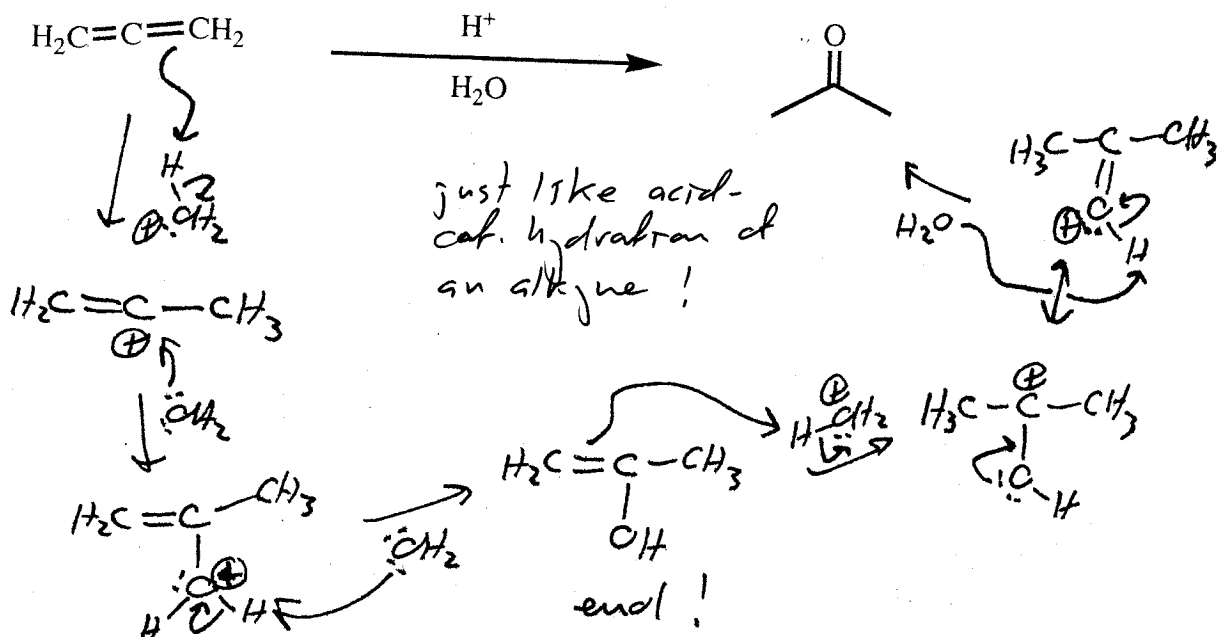


1. cw from upper left



2.



3. (1) reduce with H_2 + Lindlar's catalyst \rightarrow cis alkene, then OsO_4 followed by aq Na_2SO_3
- (2) " " $Na / liq NH_3 \rightarrow$ trans " , then epoxidize + treat epoxide with aq acid or base

4.

