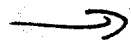
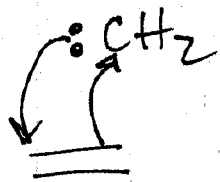


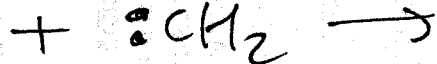
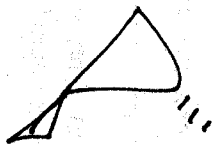
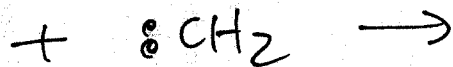
Carbenes - neutral, divalent carbon



highly reactive - only has 6 e's instead of 8.



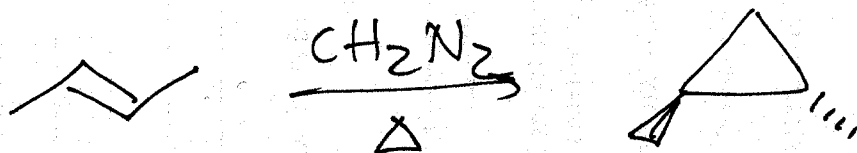
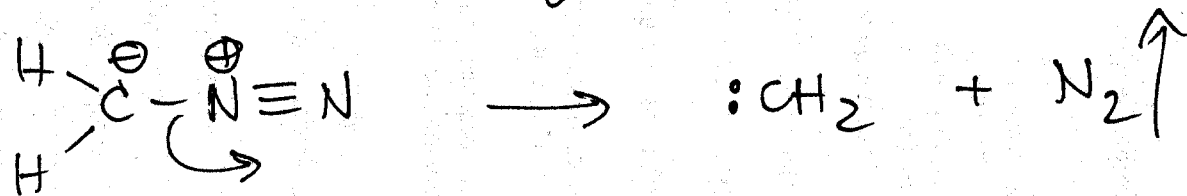
syn addition



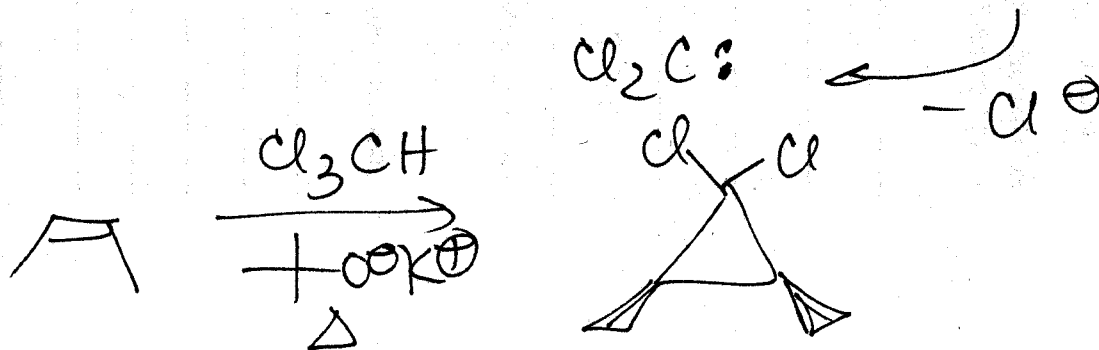
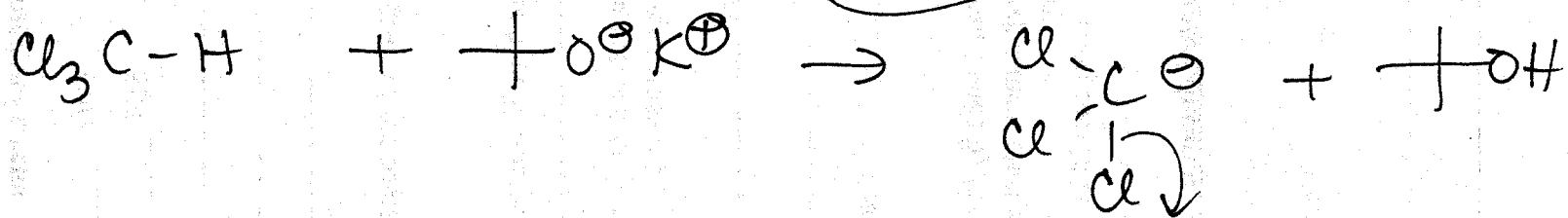
stereochem  
of alkene  
is retained

Three ways to make carbene / carbenoids.

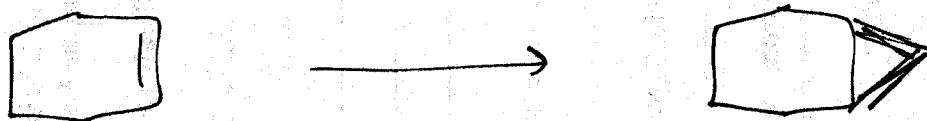
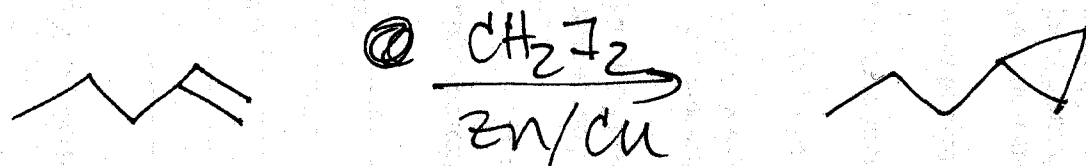
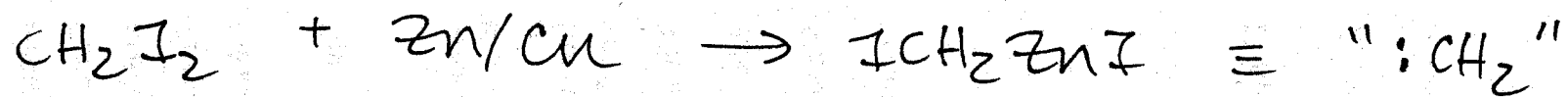
1. Decomposition of diazomethane  $\text{CH}_2\text{N}_2$



2.  $\alpha$ -elim of HCl from  $\text{CHCl}_3$   $\text{pK}_a \sim 24$



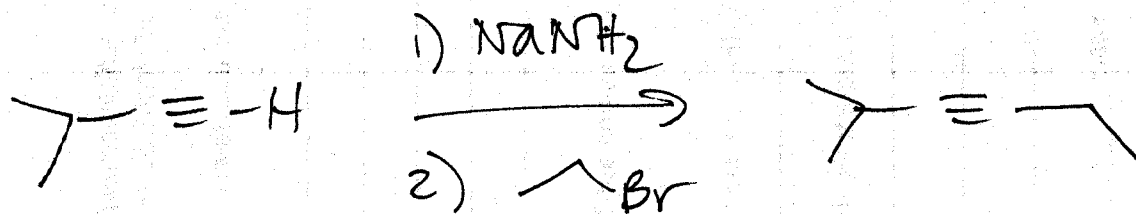
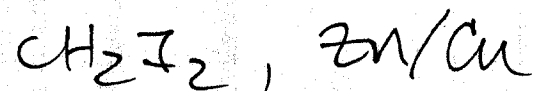
### 3. Simmons-Smith cyclopropanation



Two answers:



or

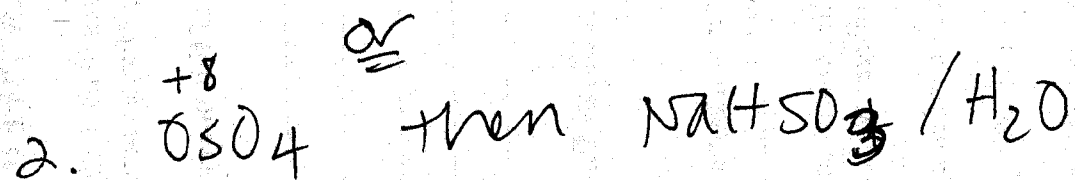
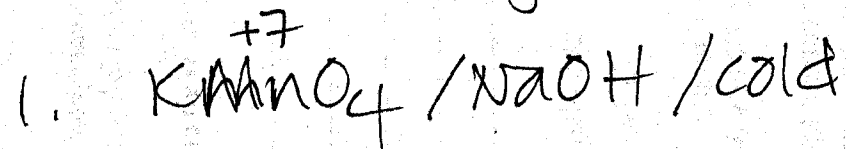


↑  
indicate clearly steps #1 and #2

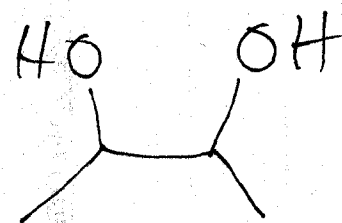
# Oxidation of Alkenes

syn hydroxylation  $\rightarrow$  vicinal diols

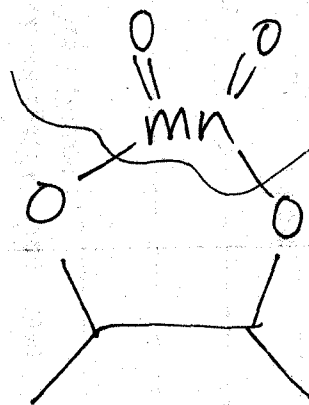
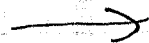
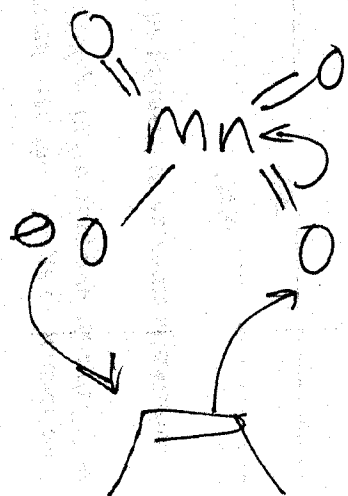
Two sets of reagents:



syn addition

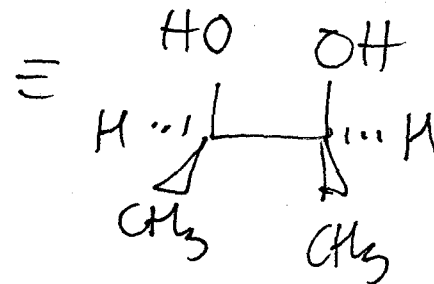
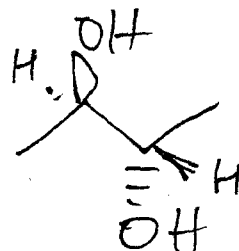
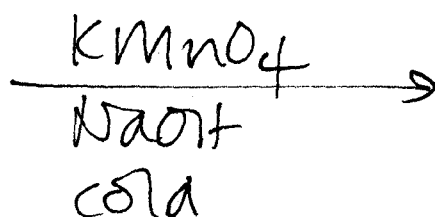
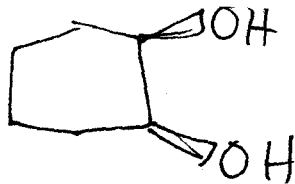
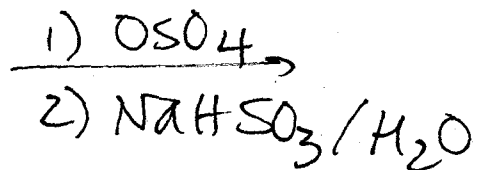


+  $\text{MnO}_2$



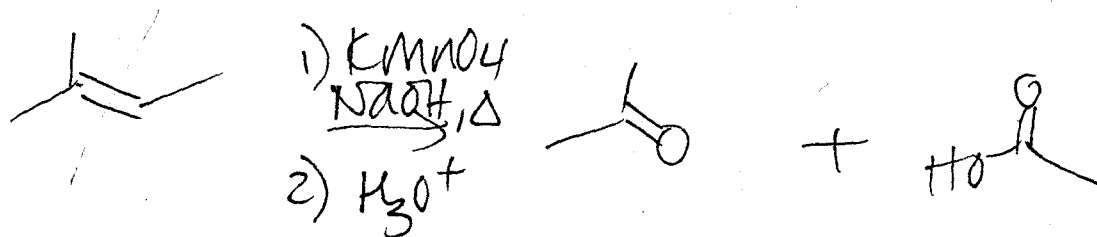
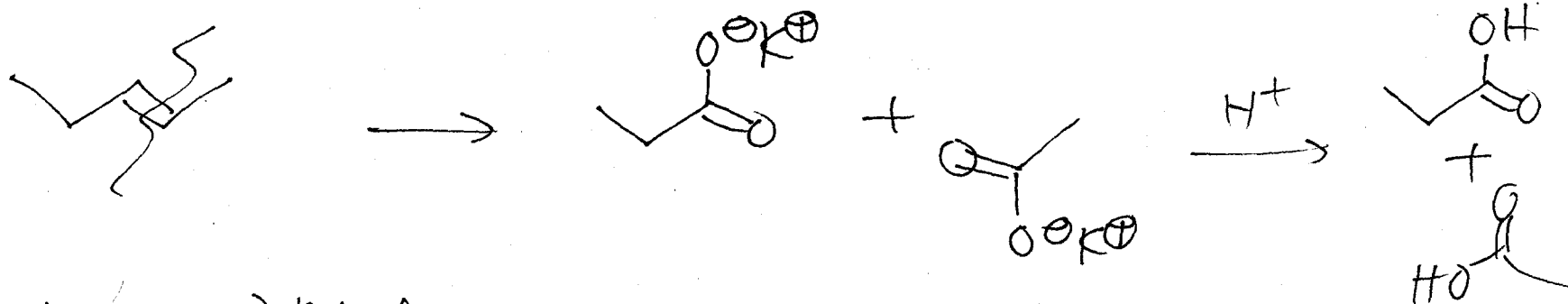
a manganate ester

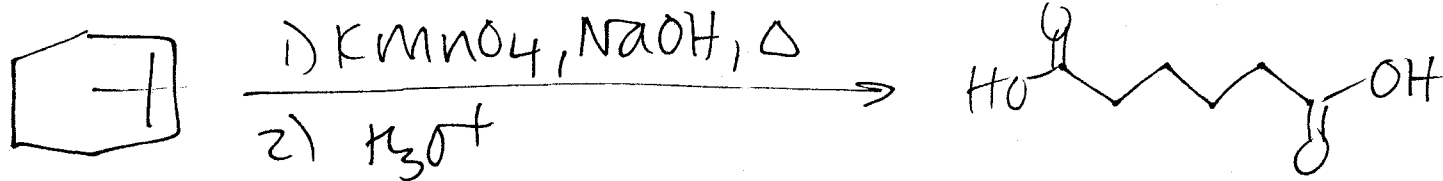
(osmate ester if using  $\text{OsO}_4$ )



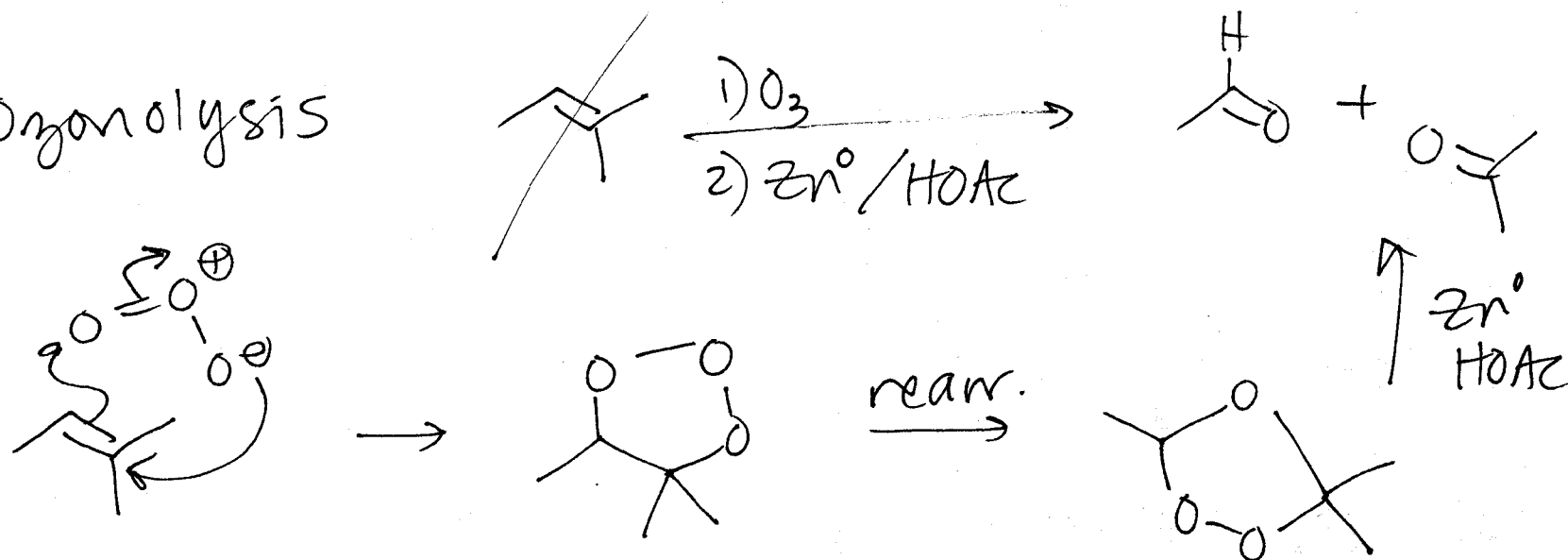
oxidative cleavage of Alkenes — two methods

1.  $\text{KMnO}_4, \text{NaOH}, \Delta$





2. Ozonolysis



$\text{KMnO}_4$  method  $\rightarrow$  acids  
 ketones

Ozonolysis  $\rightarrow$  aldehydes  
 ketones

