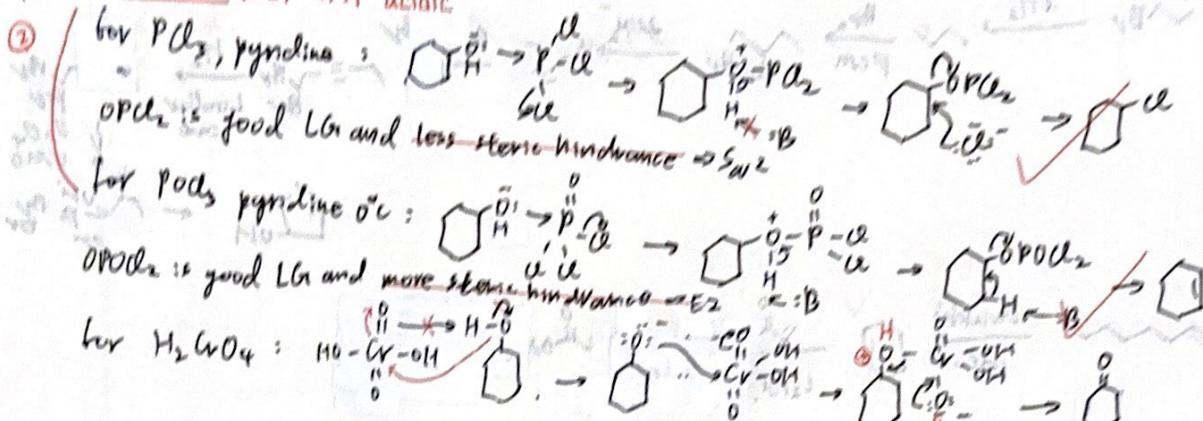
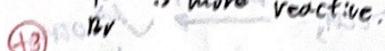


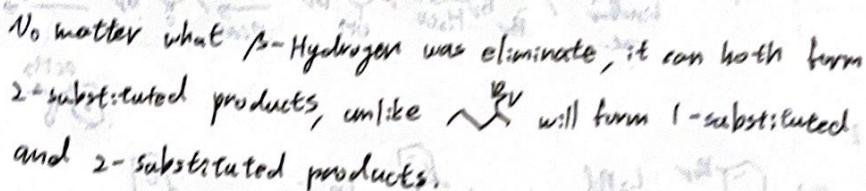
4. explain (-2):  $\beta\text{-H}$  acidic



5.

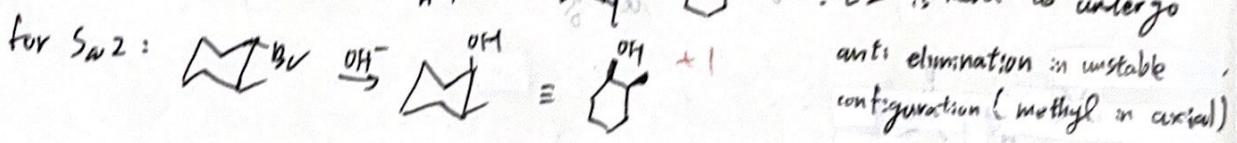
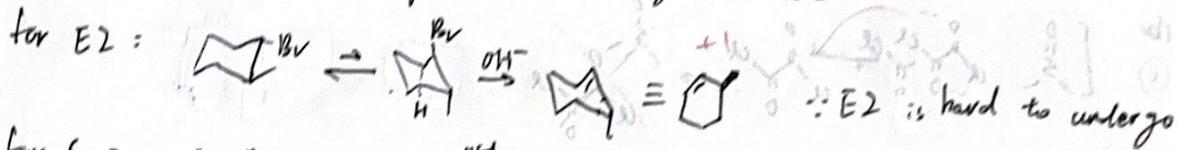
oxidation mechanism (-1). explain (-1).

(3) 

No matter what  $\beta\text{-Hydrogen}$  was eliminated, it can both form 2-substituted products, unlike 

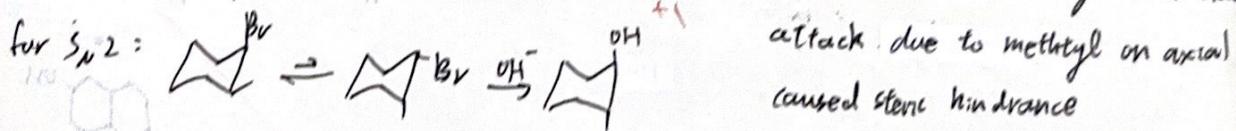
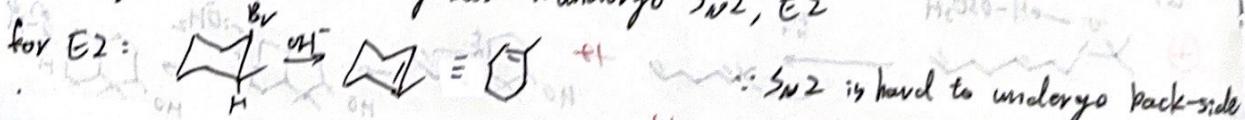
6.

(a) (4)  $\because 2^\circ$  alkyl halide and strong base  $\therefore$  undergo  $E2, S_{\text{N}}2$



(b)

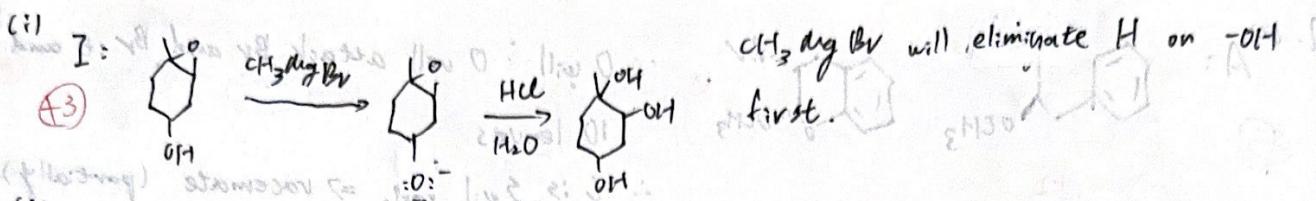
$\therefore 2^\circ$  alkyl halide and strong base  $\therefore$  undergo  $S_{\text{N}}2, E2$

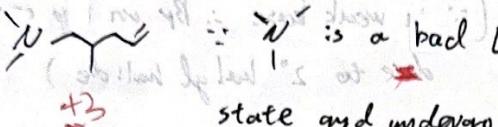


$\therefore$  rxn. rate =  $E2 > S_{\text{N}}2$

~~E2 > 2~~

7. (a) A: 
  
 (+3) 
  
 (-1) 
  
 ∴ it is  $S_N1$  rxn.  $\Rightarrow$  racemate (partially)
- (b) B: 
  
 (+3) 
  
 (-1)
- (c) C: 
  
 (+1) 
  
 (-1)
- (d) D: 
  
 (+3) 
  
 (-1)
- (e) E: 
  
 (+3)
- (f) F: 
  
 (+3) 
  
 (-1)
- (g) G: 
  
 (+3) 
  
 (-1)
- (h) H:



(ii) J: 

$\text{CH}_3\text{MgBr}$  is a bad LG  $\therefore$  it will make carbanion-like transition state and undergo E2 (strong base and high T)

d. (a)

K: 1) excess  $\text{CH}_3\text{I}$ ,  $\text{K}_2\text{CO}_3$  (good yields)  $\rightarrow$  2<sup>nd</sup> oxidation

2)  $\text{Ag}_2\text{O}$ ,  $\text{H}_2\text{O}$

3)  $\Delta$

4)  $\text{P}-\text{Bz}_2\text{N}$   $\rightarrow$  carbonyl more defined

5)  $\text{H}_2\text{O}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{OH}^-$

L: 1)  $\text{NH}_2^-$

2)  $\text{Bu}_2\text{NCl}$

3)  $3\text{NH}_2^-$

4)  $\text{Br} \sim$

5)  $\text{H}_2$ , Lindlar's cat.

6) mCPBA

M: 1)  $\text{CH}_3\text{MgBr}$  /  $\text{N} = \text{Me}_2\text{CuLi}$

2)  $\text{HCl}$

(d) O: 1)  $\text{TsCl}$ , pyridine / P:  $\text{POCl}_3$ , pyridine  $0^\circ\text{C}$  / Q: 1) mCPBA  
 2)  $-\text{OCH}_3$  / R:  $\text{NaBH}_4$ ,  $\text{H}_2\text{O}$  / S:  $\text{NaBH}_4$ ,  $\text{H}_2\text{O}$  / T:  $\text{NaBH}_4$ ,  $\text{H}_2\text{O}$  / U:  $\text{NaBH}_4$ ,  $\text{H}_2\text{O}$  / V:  $\text{NaBH}_4$ ,  $\text{H}_2\text{O}$  / W:  $\text{NaBH}_4$ ,  $\text{H}_2\text{O}$  / X:  $\text{NaBH}_4$ ,  $\text{H}_2\text{O}$  / Y:  $\text{NaBH}_4$ ,  $\text{H}_2\text{O}$  / Z:  $\text{NaBH}_4$ ,  $\text{H}_2\text{O}$

9.

$\text{S}^- > \text{O}^- > \text{H}_2\text{O}^-$   $\therefore$  The charge on S is more delocalized  $\therefore$  ion-dipole interaction less  
 $\Rightarrow \text{S}^-$  is the most reactive in protic polar solvent ( $\text{MeOH}$ )

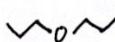
(+) aqueous pKa of  $\text{NO}_2 > \text{H}_2\text{O}^-$

$\therefore$  basicity:  $\text{NO}_2^- > \text{H}_2\text{O}^-$

$\Rightarrow$  nucleophilicity:  $\text{NO}_2^- > \text{H}_2\text{O}^-$

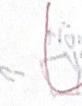
10.

$\therefore$  its R group is fixed, which won't cause as much as steric hindrance as dipropyl ether



dipropyl ether

$\text{H}_3\text{N}^+$



$\text{H}_3\text{N}^+ - \text{H}_2\text{O}$