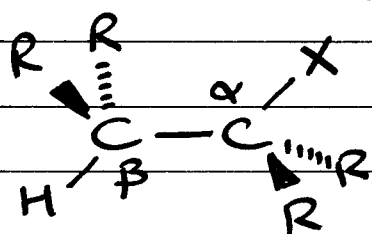


- ① SN2 vs E2      WEDS: QUIZ/EVALS
- ② SYNTHESIS      READ CH 8
- ③ HALOALKANES      QUESTIONS: 8.2-8.4, 8.9-8.28
- ④ PREPARATION

① SN2 vs E2

- structure of substrate



BRANCHING at  $\alpha/\beta$

slows SN2 (STERICS)

speeds up E2 (MORE STABLE ALKENE)

- nucleophile

as nucleophilicity  $\uparrow$       ratio SN2/E2  $\uparrow$

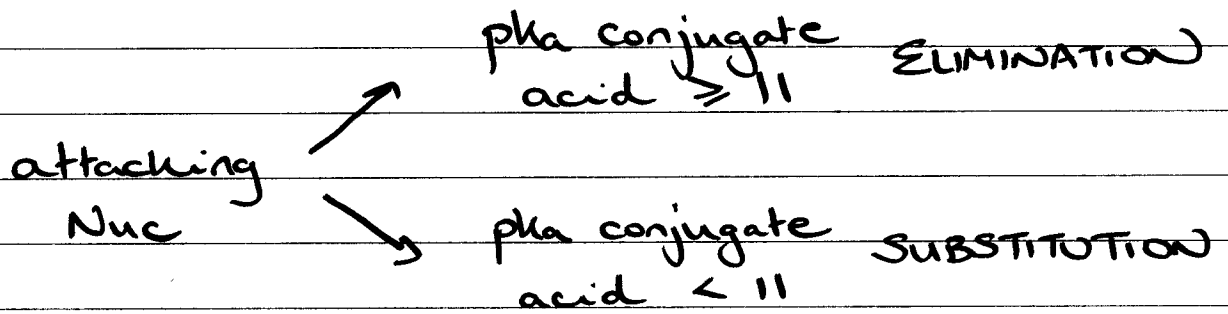
as basicity  $\uparrow$       ratio E2/SN2  $\uparrow$

SUMMARY

POOR NUC (H<sub>2</sub>O/ROH)      Weakly basic Nuc (I<sup>-</sup>, RS<sup>-</sup>, RCO<sub>2</sub><sup>-</sup>)      Strongly basic Nuc (RO<sup>-</sup>/HO<sup>-</sup>) (TO<sup>-</sup>)  
 unhindered      hindered

|                   |               |        |     |     |
|-------------------|---------------|--------|-----|-----|
| CH <sub>3</sub> X | NR            | SN2    | SN2 | SN2 |
|                   | NR            | SN2    | SN2 | E2  |
|                   | NR            | SN2    | E2  | E2  |
|                   | SN1/E1 (slow) | SN2    | E2  | E2  |
|                   | SN1/E1        | SN1/E1 | E2  | E2  |

## 2° SUBSTRATES



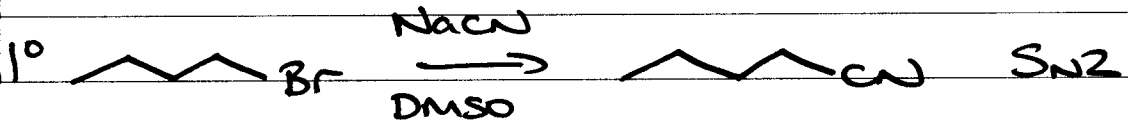
Also higher temp favors ELIMINATION

$$\Delta G = \Delta H - T\Delta S$$

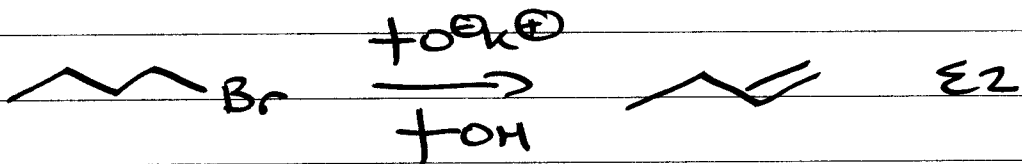
$S_N$  2 molecules  $\rightarrow$  2 molecules

$E$  2 molecules  $\rightarrow$  3 molecules  $\xrightarrow{+ \Delta S}$

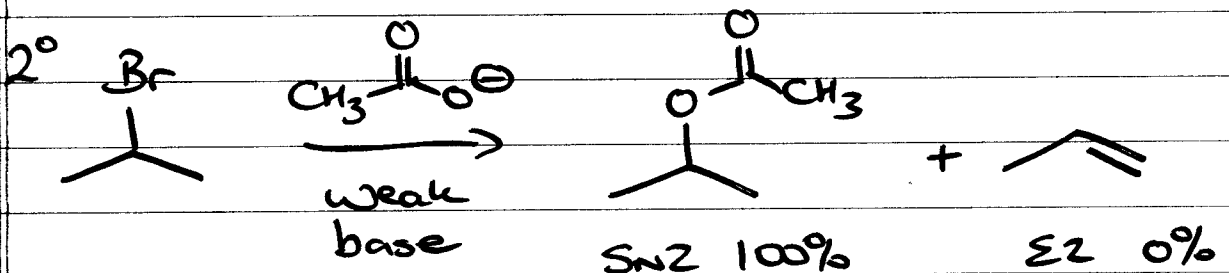
examples



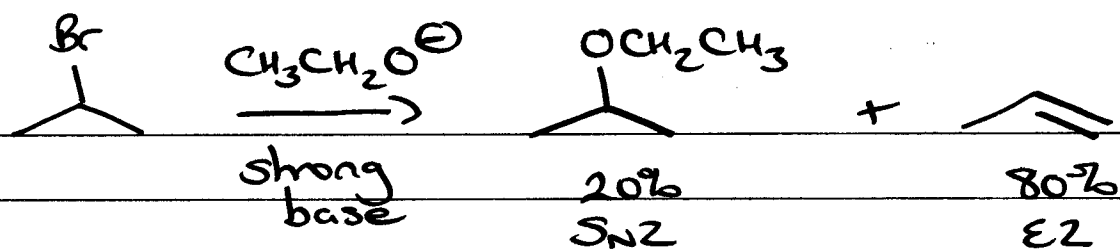
( $\text{CN}^\ominus, \text{RS}^\ominus, \text{N}_3^\ominus, \text{NH}_3, \text{Br}^\ominus, \text{I}^\ominus$ ) Good Nuc



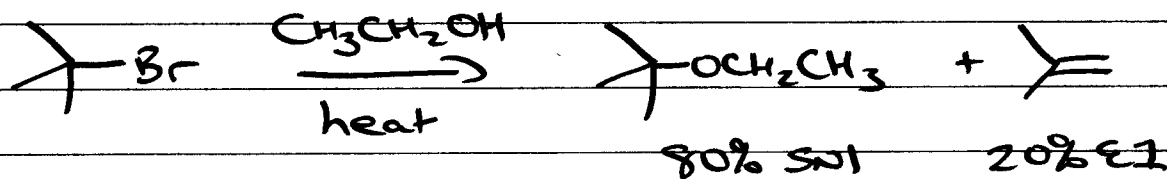
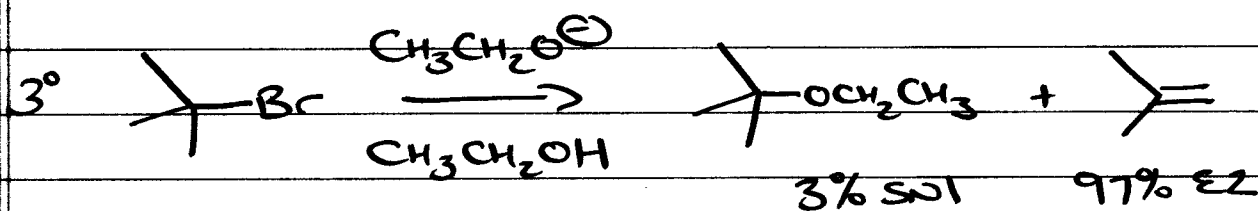
strongly hindered bases



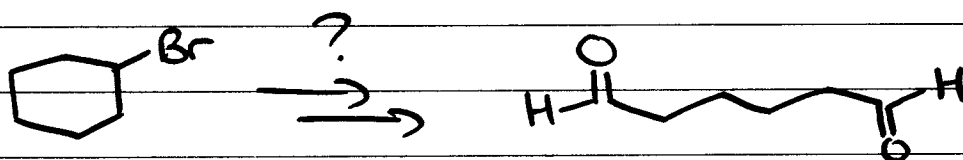
3



2° BENZYLIC / ALLYLIC substrates can do  $\text{E}1/\text{S}_\text{N}1$  with weakly basic NUC in polar protic solvents.



## ② SYNTHESIS - making molecules

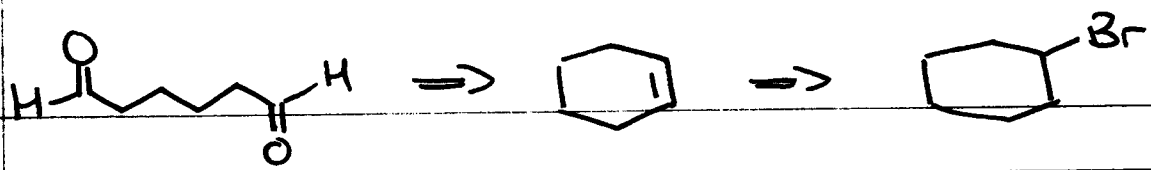


A  $\rightarrow$  B  $\rightarrow$  C  $\rightarrow$  D  $\rightarrow$   $\rightarrow$   $\rightarrow$  Z?

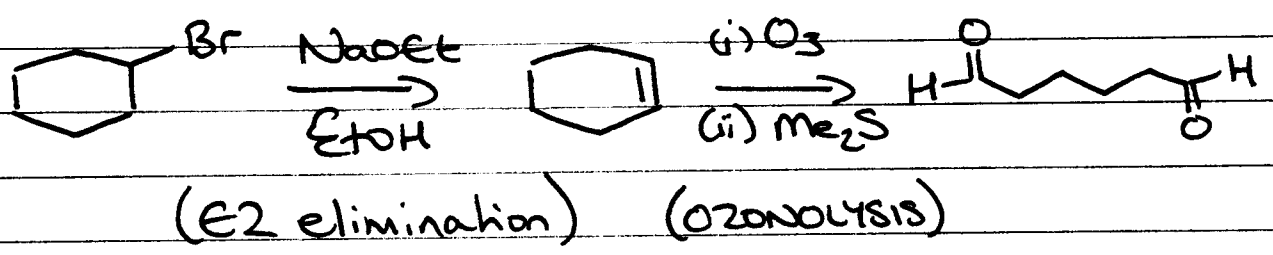
RETROSYNTHESIS (work backwards)

Z  $\rightarrow$  Y  $\rightarrow$  X  $\rightarrow$  W  $\rightarrow$   $\rightarrow$   $\rightarrow$  ...

So, what can we make O=C(C)CCCC=O from?



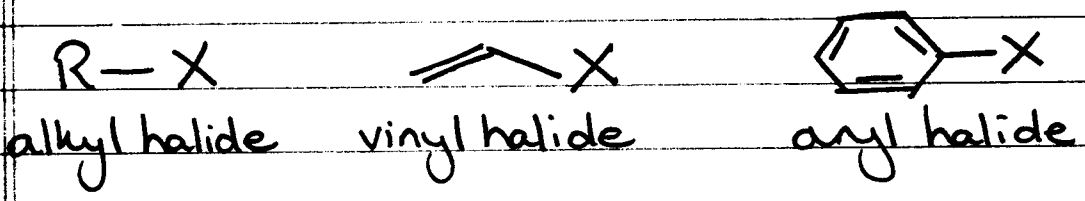
so, forward synthesis:



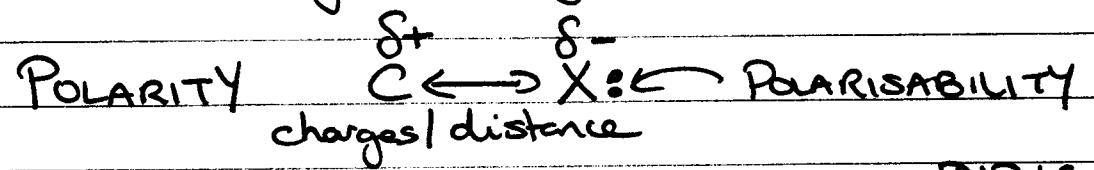
... and, how do we make BrC1CCCCC1

- we use chloro/bromoalkenes a lot.

③ HALOALKANES  
(halogens F, Cl, Br, I)



(read through naming rules - not so hard)



|                    | EN of X | C-X (pm) | DIPOLE MOMENT (D) |
|--------------------|---------|----------|-------------------|
| CH <sub>3</sub> F  | 4.0 ↑   | 139      | 1.85 D            |
| CH <sub>3</sub> Cl | 3.0     | 178      | 1.87 D            |
| CH <sub>3</sub> Br | 2.8 ↓   | 193      | 1.81 D            |
| CH <sub>3</sub> I  | 2.5 ↓   | 214 ↓    | 1.62 D            |

## BOILING POINTS

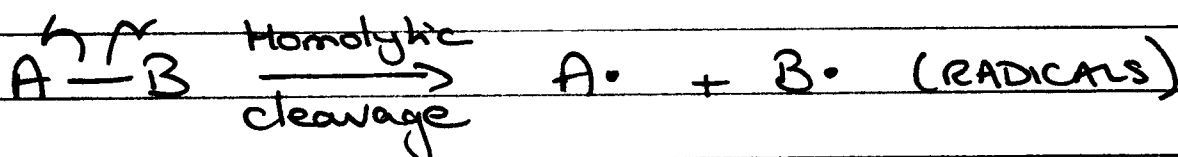
| R-X                          | H   | F   | Cl | Br | I     |
|------------------------------|-----|-----|----|----|-------|
| eg $\text{CH}_3\text{CH}_2-$ | -89 | -37 | 13 | 38 | 72 °C |

POLARISABILITY ↑ DISPERSION FORCES ↑

## BOND LENGTHS/STRENGTHS



## BOND DISSOCIATION ENERGY (BDE)



|      | LENGTH (pm) | BDE (Kcal/mol) |
|------|-------------|----------------|
| C-H  | 109         | 90-100         |
| C-F  | 142         | 105            |
| C-Cl | 178         | 80             |
| C-Br | 193         | 65             |
| C-I  | 214         | 50             |

## (4) PREPARATION

