

LEC (24)

CHEM 30A

①
JMBM

① SN vs E

FINAL (ROOM)

② SYNTHESIS

REVIEW SESSION

③ HALOALKANES

QUIZ/EVALS

④ PREPARATION

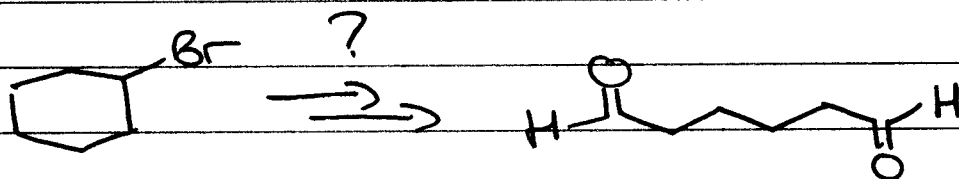
READ CH 7 Q 7.3-7.27

READ CH 8 Q 8.2-8.4, 8.9-8.28

① SN vs E pages LEC 23
6-8

② SYNTHESIS

- making molecules



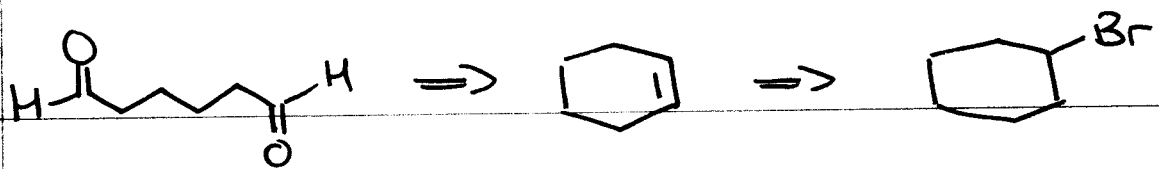
A \rightarrow B \rightarrow C \rightarrow D \rightarrow \rightarrow \rightarrow Z ?

RETROSYNTHESIS
(work backwards)

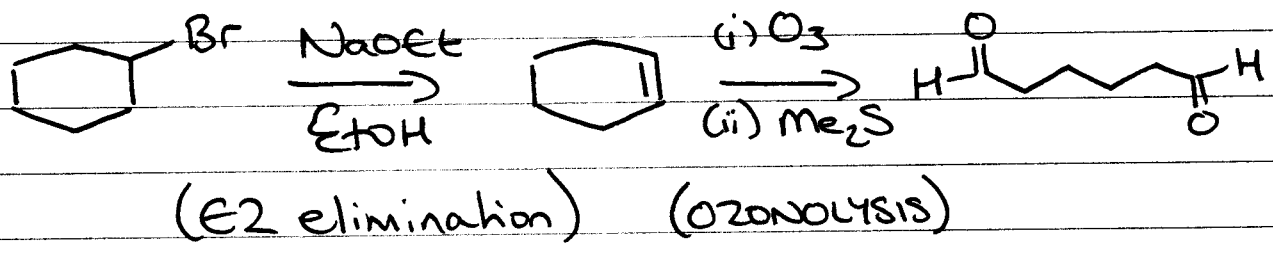
Z \rightarrow Y \rightarrow X \rightarrow W.....

So, what can we make O=CCCCC=O
from?

2



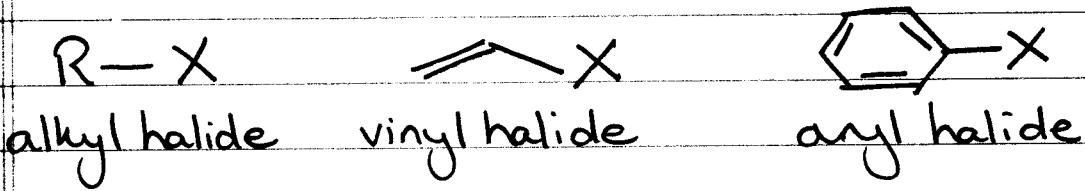
so, forward synthesis:



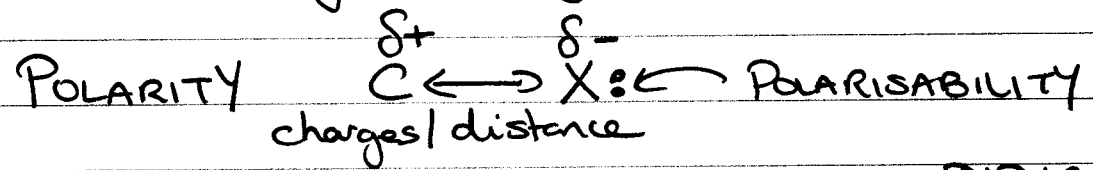
... and, how do we make BrC1CCCCC1

- we use chloro/bromoalkanes 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 ₃ F	4.0	139	1.85 D
CH ₃ Cl	3.0	178	1.87 D
CH ₃ Br	2.8	193	1.81 D
CH ₃ I	2.5	214	1.62 D

↑ N ↓ N
 (Note: The table shows an upward trend in electronegativity and a downward trend in bond length and dipole moment from F to I.)

Boiling Points

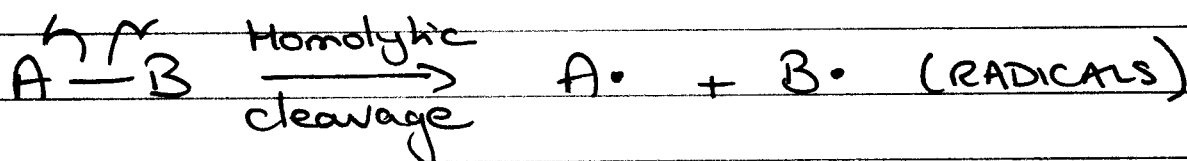
R-X	H	F	Cl	Br	I
eg CH ₃ CH ₂ -	-89	-37	13	38	72 °C

POLARISABILITY ↑ DISPERSION FORCES ↑

BOND LENGTHS/STRENGTHS

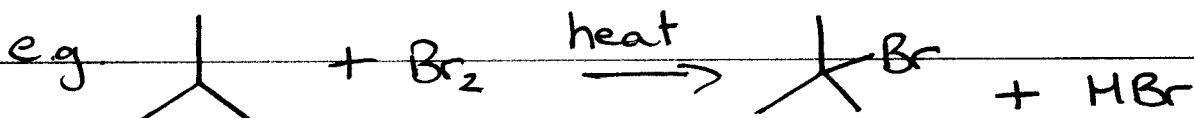
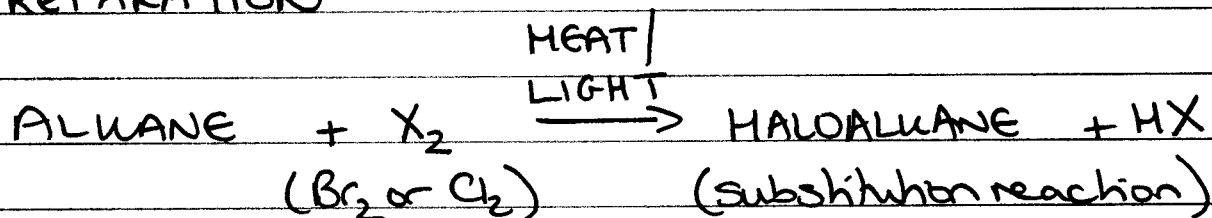
⇓

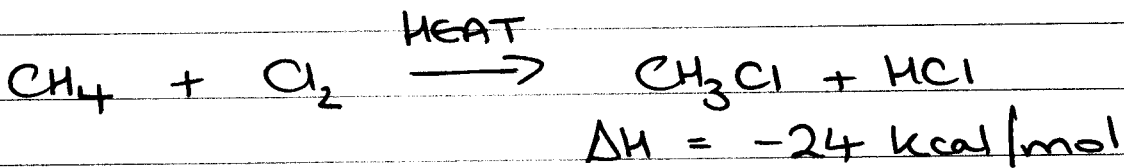
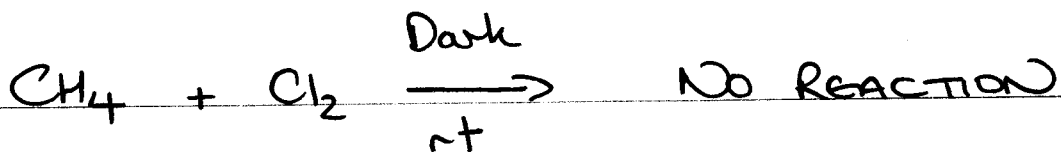
BOND DISSOCIATION ENERGY (BDE)



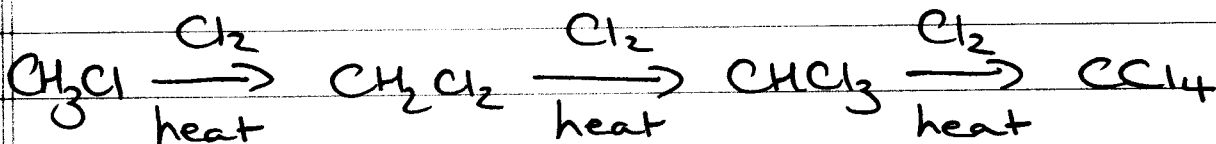
	LENGTH (pm)	BDE (kcal/mol)
C-H	109	90-100
C-F	142	105
C-Cl	178	80
C-Br	193	65
C-I	214	50

(4) PREPARATION

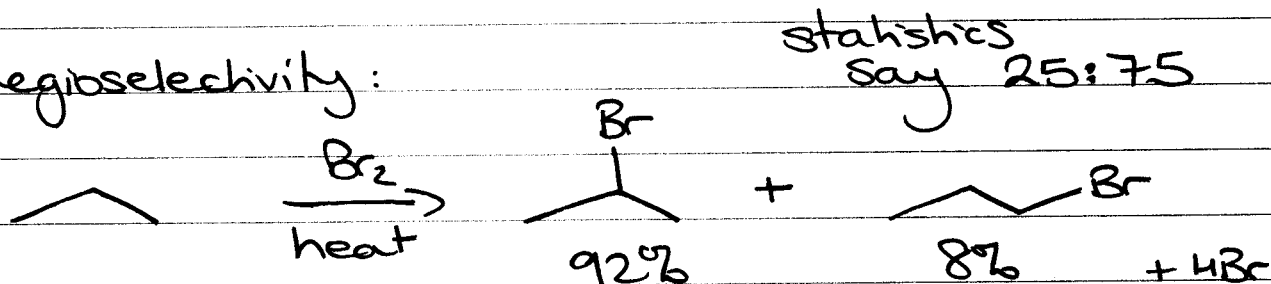




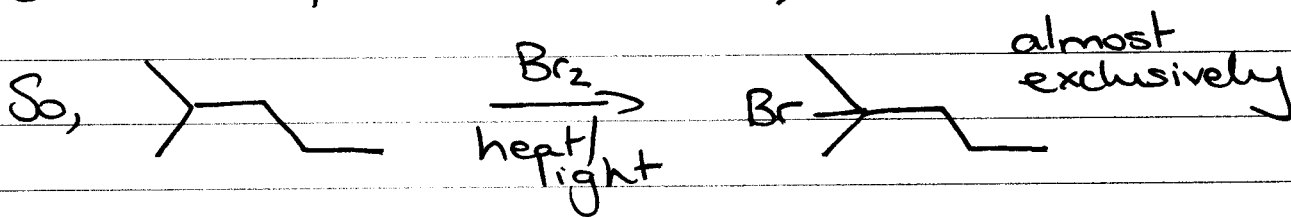
Reaction continues:



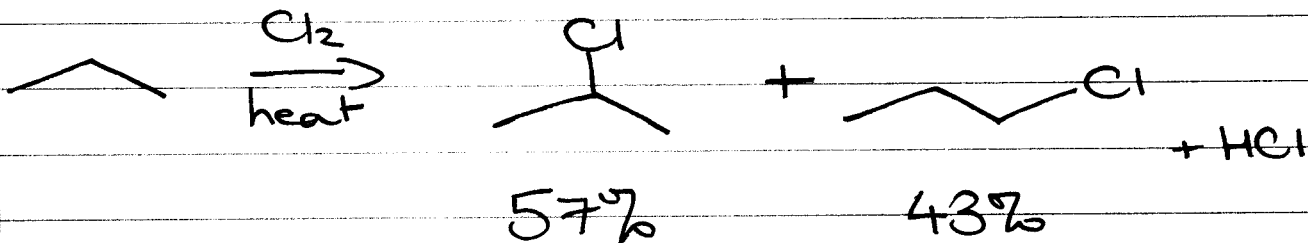
Regioselectivity:



sub of 2° favored over 1°
(also 3° favored over 2°)

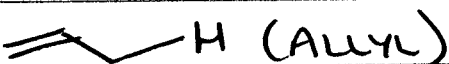
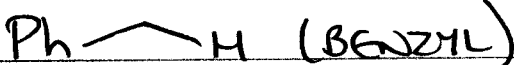
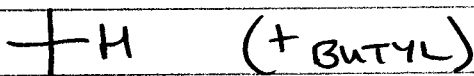
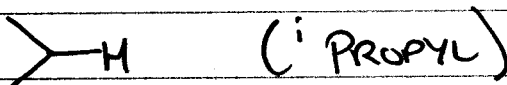

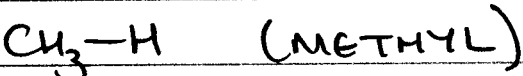



REGIOSELECTIVITY less pronounced for CHLORINATION



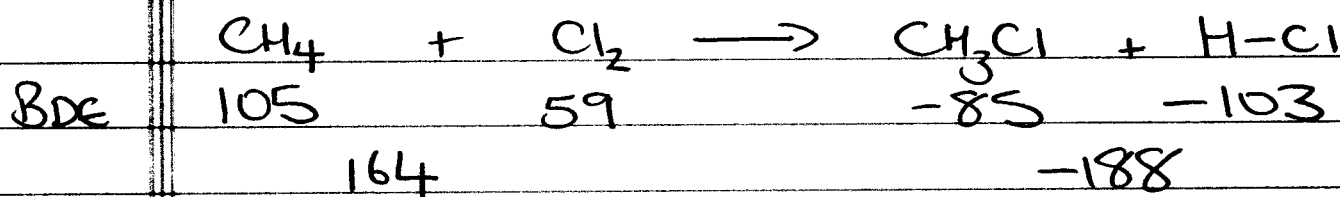
3°/2°/1° 1600 : 80 : 1 Br
 5 : 4 : 1 Cl

ENERGETICS OF RADICAL REACTIONS

C-H BOND	BDE (Kcal/mol)
 (ALLYL)	86
 (BENZYL)	88
 (t BUTYL)	93
 (i PROPYL)	96
 (ETHYL)	100
 (METHYL)	105
 (VINYL)	106

↑
RADICAL STABILITY INCREASES

So, for



$(\Delta H = -24 \text{ kcal/mol}) \Rightarrow$ EXOTHERMIC REACTION