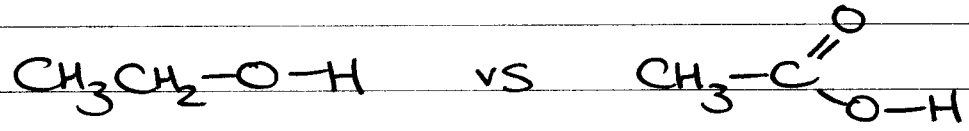
LEC (13) CHEM 30A Halloween

(1) STRUCTURE & ACIDITY	Finish Ch4 problems
(2) LEWIS ACIDS & BASES	Read Ch5 + problems
(3) ALKENES INTRO	Acid/base WEB
organic reactions	
(4) TYPES	Read 6.1-6.3
(6) MECHANISMS	

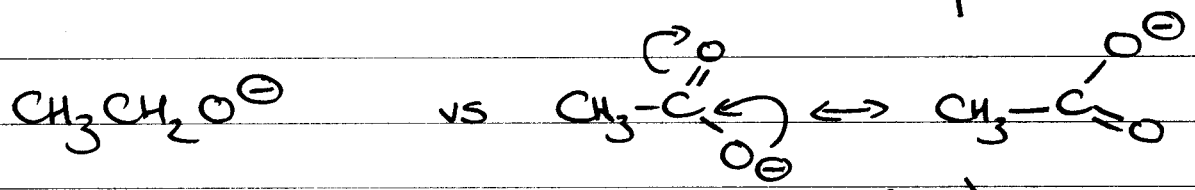
(1) STRUCTURE & ACIDITY cont...

c) RESONANCE

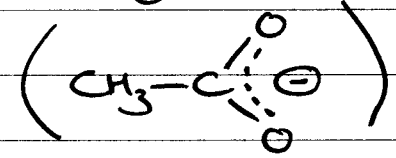
consider:



16 5 pka



charge localized on one atom



charge delocalized

DELOCALIZATION ≡ STABILITY (HOT POTATO)

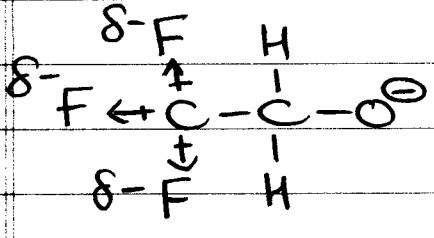
d) INDUCTIVE EFFECT

Consider

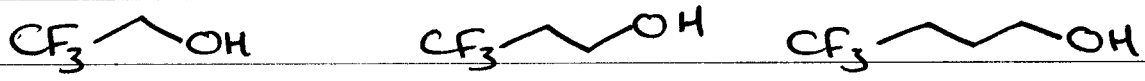
CH_3CH_2-O-H vs CF_3CH_2O-H

15.9 12.4 pKa

$CF_3CH_2O^{\ominus}$ is more stable than $CH_3CH_2O^{\ominus}$

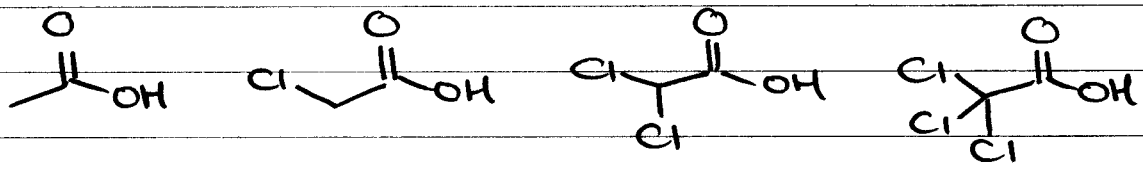


THROUGH BOND EFFECT, falls off rapidly with distance



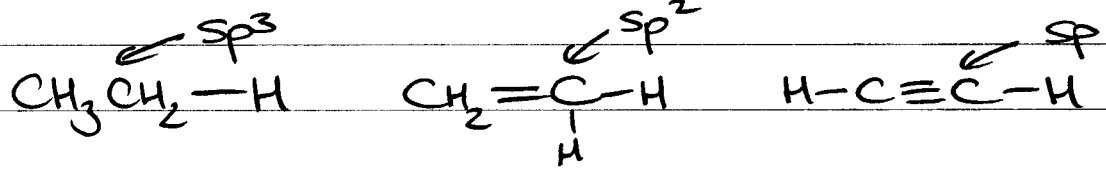
pKa 12.4 14.6 15.4

same effect w/ CARBOXYLIC ACIDS



4.75 2.85 1.48 0.64

e) HYBRIDISATION



51 44 25 pKa

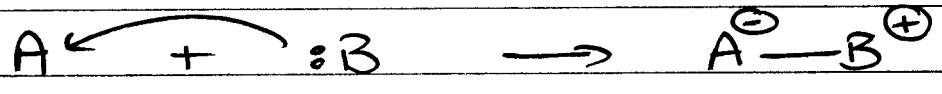
⟶ ACIDITY INCREASES as S character of orbital increases 25% → 33% → 50%

e^- closer to nucleus, A^- more stable, HA more acidic

② LEWIS ACIDS/BASES

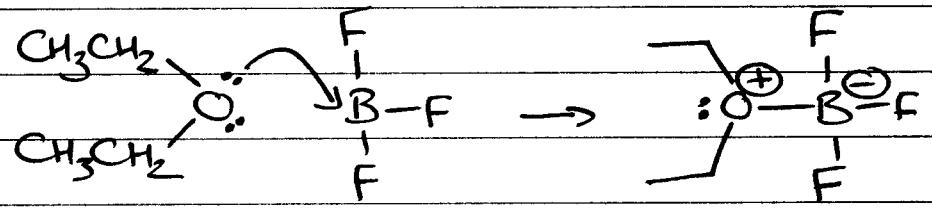
about e^- pairs, not H^+

LEWIS ACID accepts an e^- pair
LEWIS BASE donates an e^- pair



LEWIS ACID — LEWIS BASE

e.g.



LEWIS BASE — LEWIS ACID

③ Chapter 5 – Intro to Alkenes

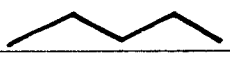
Structure / Cis/trans E/Z / Naming / Natural C=C

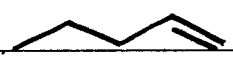
- Index of Hydrogen Deficiency (degrees of unsaturation)
1 per ring / π BOND

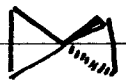
- max Hs in a structure C_nH_{2n+2}

$$\text{Deg Unsat} = \frac{\text{max H} - \text{actual H}}{2}$$

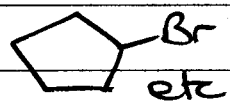
(i) C & H ONLY

C_5H_{12} $(12-12)/2 = 0$  no rings or π BONDS

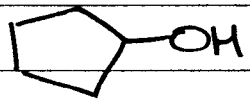
C_5H_{10} $(12-10)/2 = 1$  or 

C_5H_8 $(12-8)/2 = 2$   

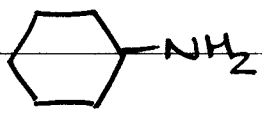
(ii) F, Cl, Br, I → replace for H

$C_5H_9Br \Rightarrow C_5H_{10}$ $(12-10)/2 = 1$ 

(iii) O, S → IGNORE

$C_5H_{10}O \Rightarrow C_5H_{10}$ 

(iv) N, P add a C & a H

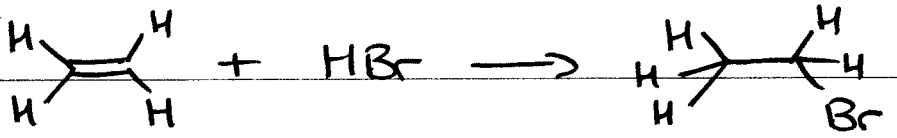


$C_6H_{13}N \Rightarrow C_7H_{14}$ $(16-14)/2 = 1$

ORGANIC REACTIONS

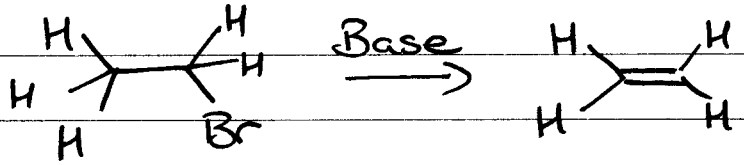
(4) TYPES

a) ADDITION (A + B → C)

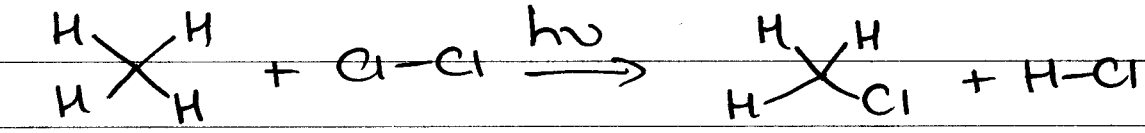
e.g.  + HBr ⟶

alkene alkyl bromide

b) ELIMINATION (A ⟶ B + C)

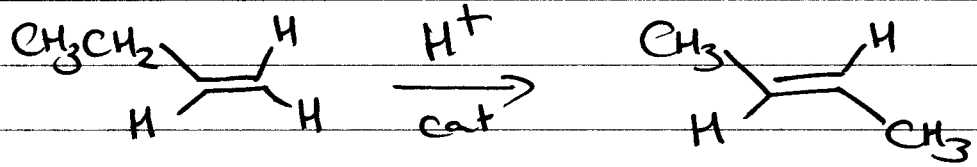
e.g. 

c) SUBSTITUTION (A-B + C-D ⟶ A-C + B-D)

e.g. 

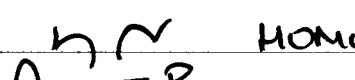
alkane alkyl halide

d) REARRANGEMENT



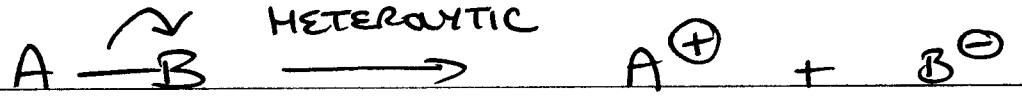
(5) MECHANISMS
(Bond making / bond breaking)

- BREAKING

 HOMOLYTIC ⟶ A• + B•

(↷ 1e⁻ arrow)

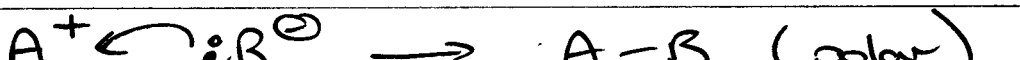
radical rxns (radicals → species containing unpaired e⁻)



POLAR REACTIONS

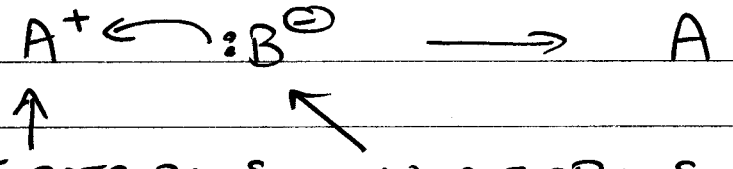
(↷ 2e⁻ arrow)

- MAKING



- POLAR RXNS (radicals in WK 9/10)

e⁻ RICH sites in one molecule react with e⁻ POOR sites in another molecule

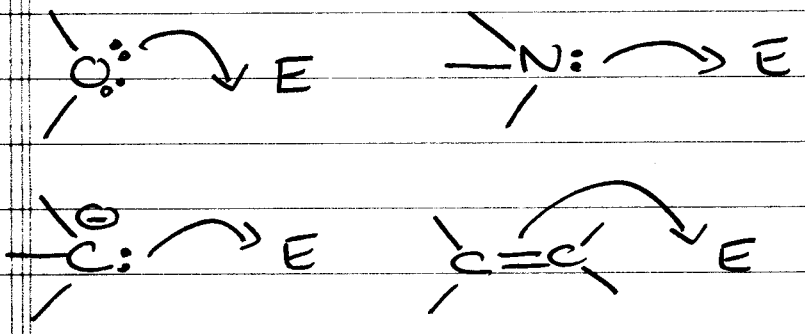


- NUCLEOPHILES
have an e⁻ RICH atom and are neutral or -vely charged

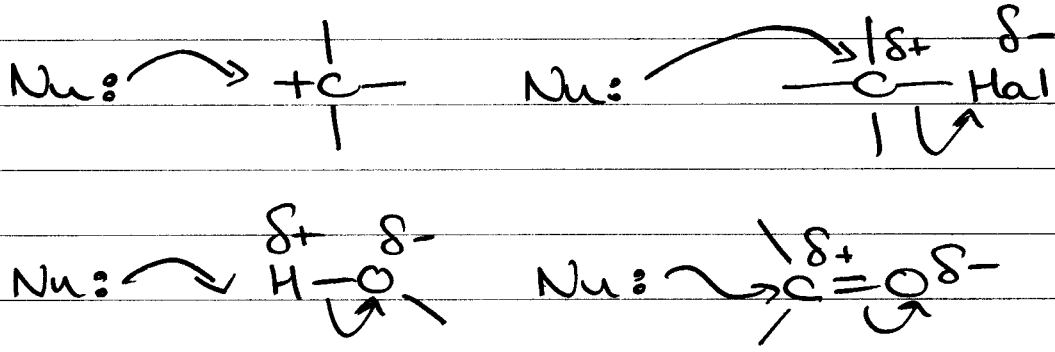
- ELECTROPHILES
have an e⁻ POOR atom and are neutral or +vely charged

PATTERNS

Electrons flow <u>from</u> nucleophiles

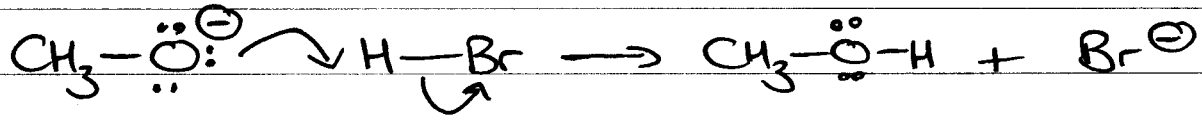


Electrons flow <u>to</u> electrophiles



RULES

(i) CONSERVE CHARGE



(ii) OCTET RULE OBEYED