(20) **Today**

Chap 6 Acid-Base and Donor-Acceptor Chemistry

Next Class (21)

Chap 6 Acid-Base and Donor-Acceptor Chemistry

(22) **Second Class from Today**

Chap 9.1 Introduction to Coordination Chemistry

Third Class from Today (23)

Chap 9.1 Introduction to Coordination Chemistry

lone-pair e^- attract H^+

Gas phase basicity

$$NMe_3 < NHEt_2 < NHBu_2 < NEt_3 < NBu_3$$

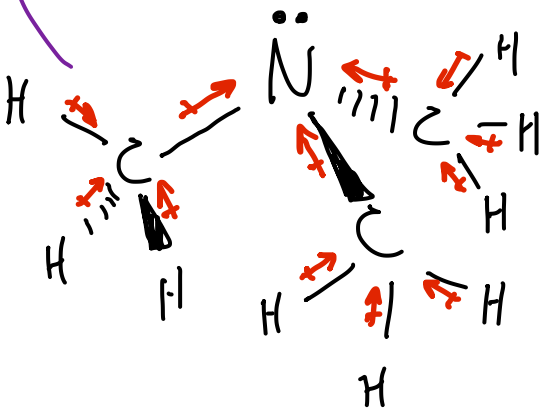
the inductive effect

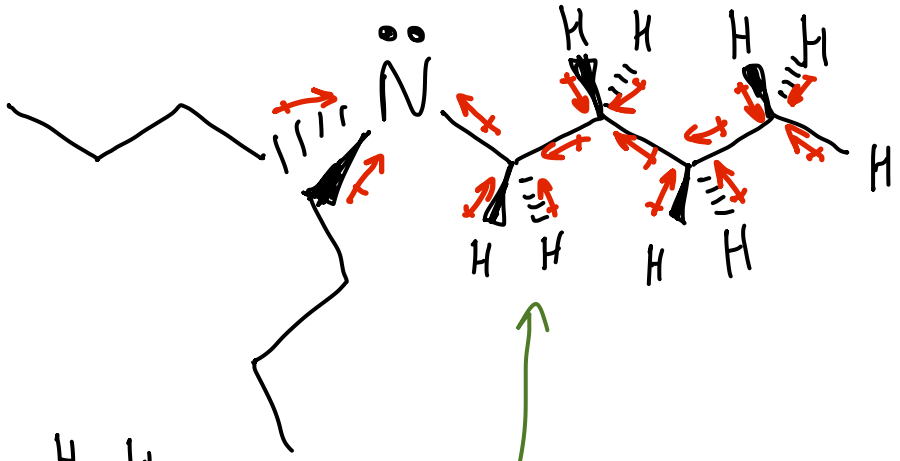
e^- rich things attract H^+

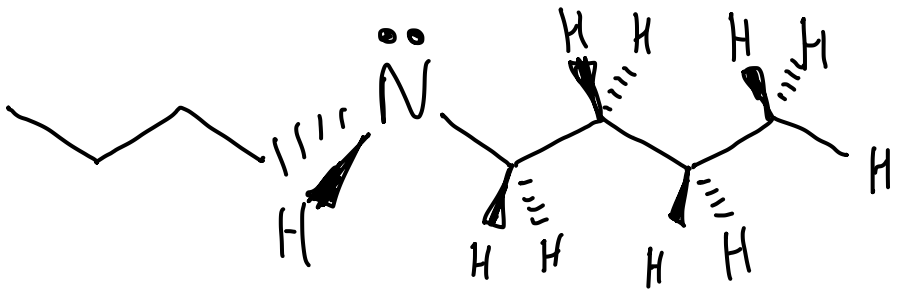
tiny dipoles push e^- density onto C which push e^- density onto N

less e^- rich

more e^- rich







alkyl groups act as e^- donors, more e^- donors means more e^- rich N means more basic

Increasing base strength in water

$NH_3 < Me_3N < MeNH_2 < Me_2NH$

$NH_3 < EtNH_2 < Et_3N < Et_2NH$

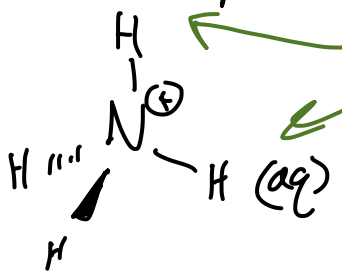
as compared to

Gas phase basicity

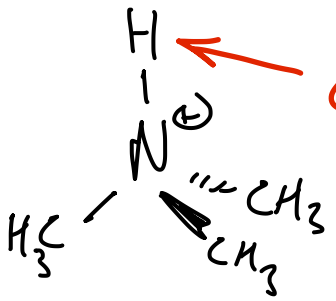
$NH_3 < NMe_3 < NHEt_2 < NHBu_2 < NEt_3 < NBu_3$

Solvation of the protonated species

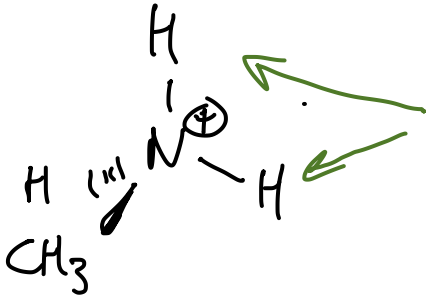
$NH_3(aq) + H^+(aq) \rightarrow$



can interact well with H_2O through H bonding to for H-bond donor



only 1 H-bond donor



not as e⁻ rich, but can form 3 H-bonds with water

Super acids

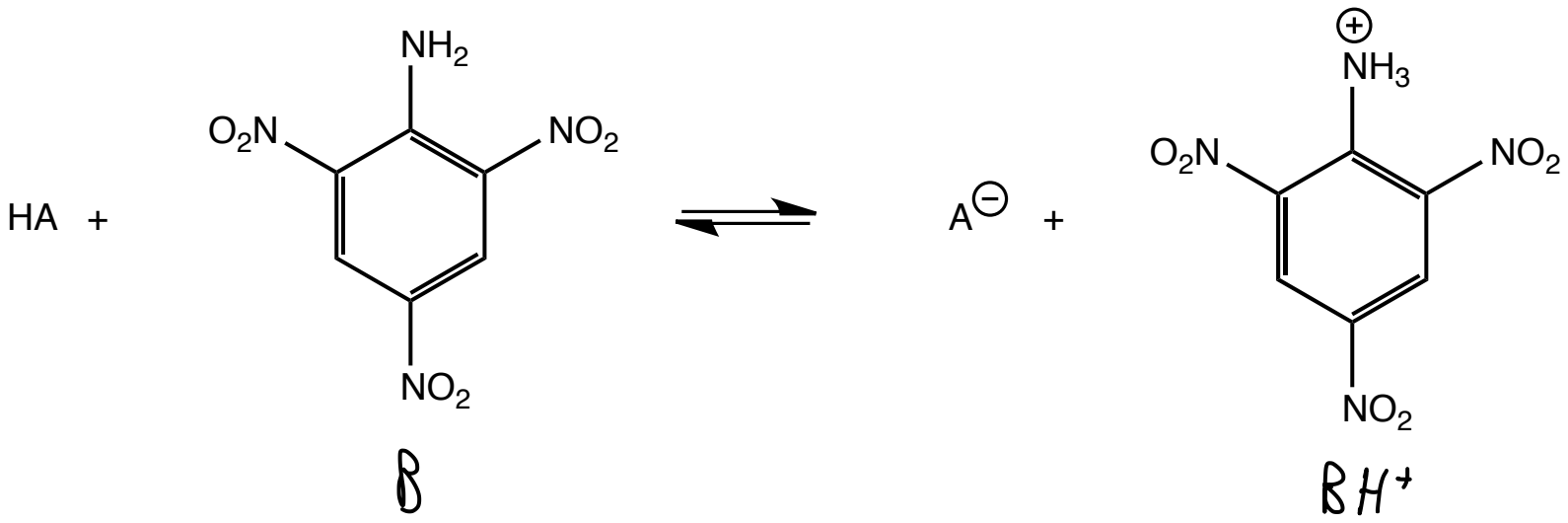
Hammett

Section 6.1, 6.2, 6.3, 6.4

$H_0 = pK_{BH+} - \log([BH^+]/[B])$ where $H_0 = -\log(A_{H+})$

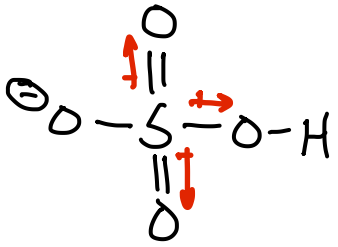
H_2SO_4	-11.9	acid
$HClO_4$	-13.0	super acid
HSO_3CF_3	-14.6	
HSO_3F	-15.6	
$HSO_3F–SbF_5$	-21– -25	
$HF + SbF_5 <=> H^+ + SbF_6^-$	-21 – - 28	

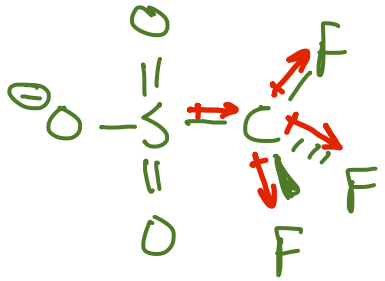
10^{13} $[H^+]$

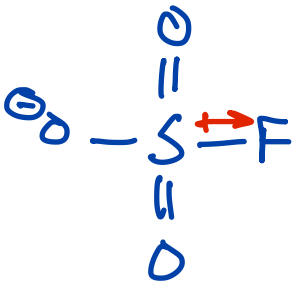


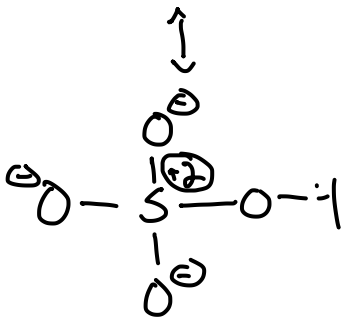
Super acids H_2SO_4 -11.9

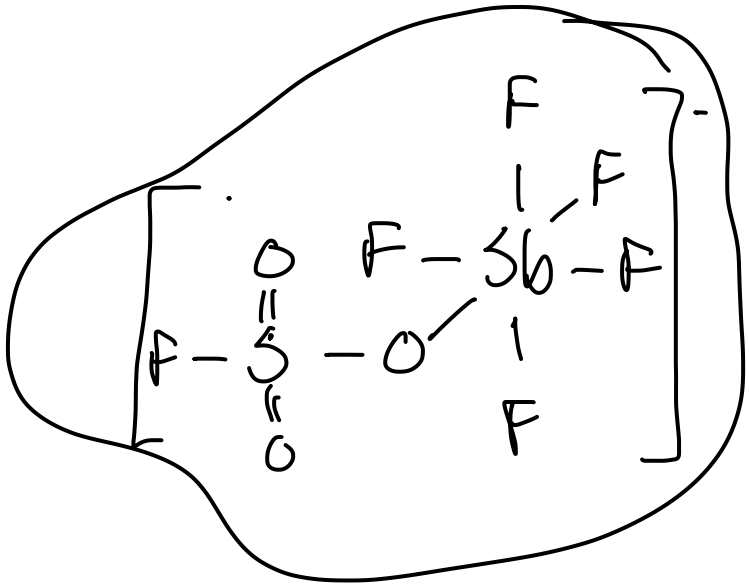
HSO_3CF_3	triflic acid	-14.6
HSO_3F		-15.6
$HSO_3F–SbF_5$	magic acid	-21– -25

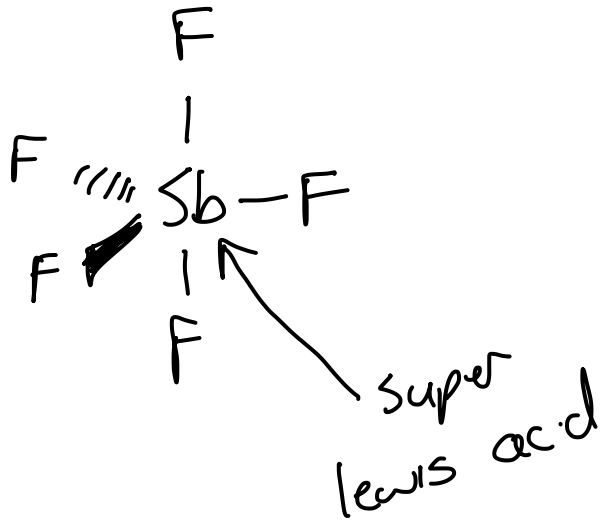


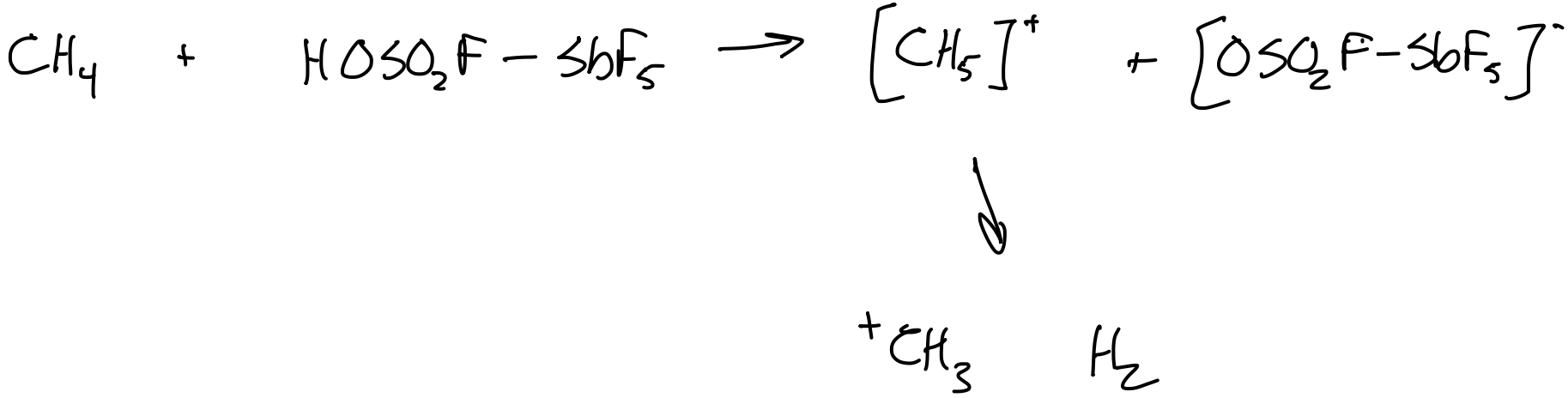











$CH_4 + HOSO_2F - SbF_5 \rightarrow [CH_5]^+ + [OSO_2F - SbF_5]^-$
$^+CH_3$
H_2