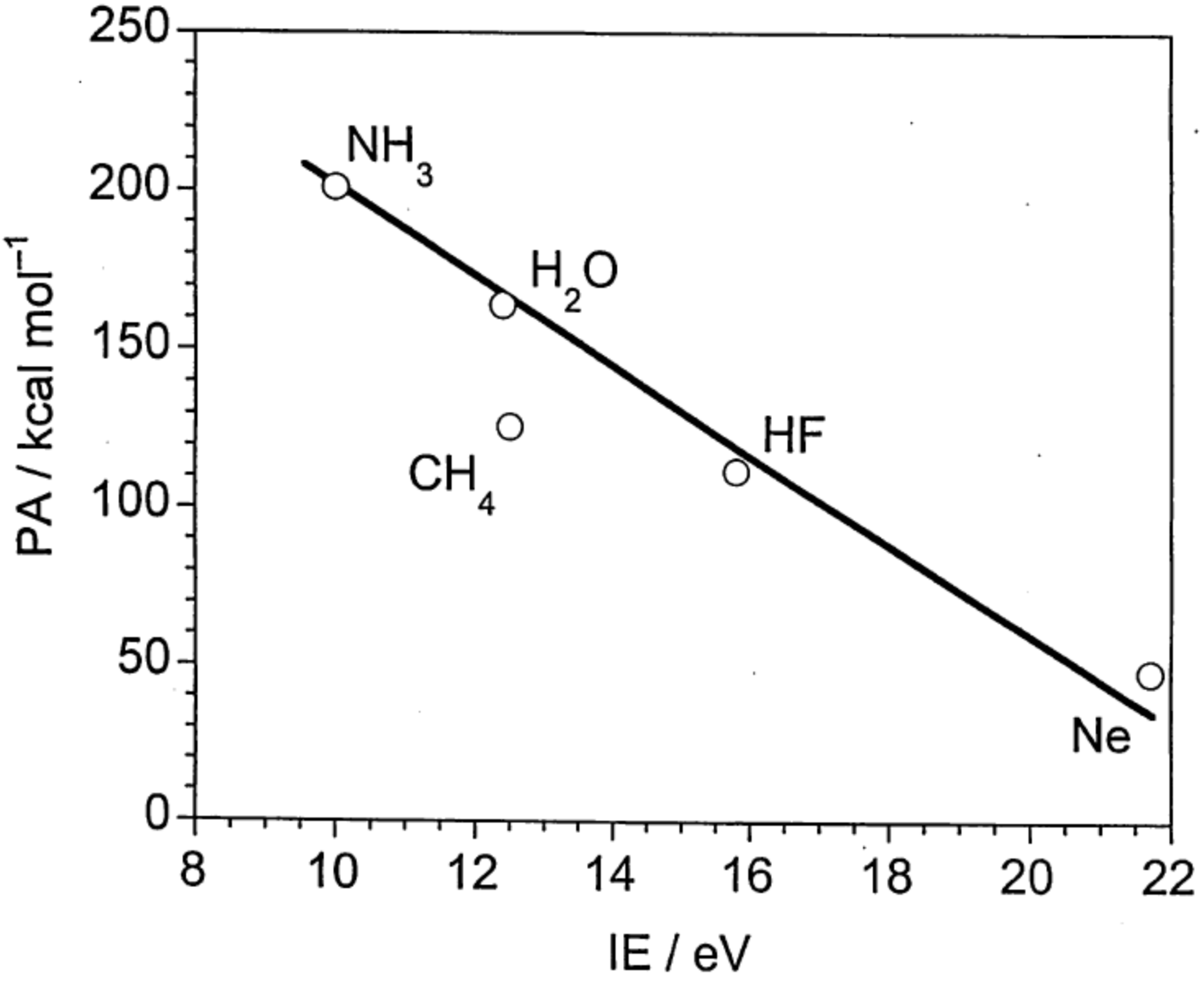
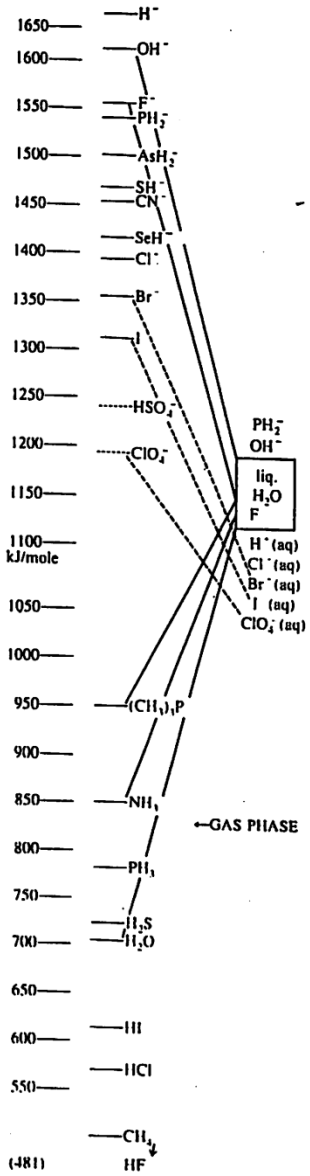

250
200
150
100
50
0
PA / kcal mol^{-1}
NH$_3$
H$_2$O
CH$_4$
HF
Ne
8
10
12
14
16
18
20
22
IE / eV



PA's in the gas phase and aqueous solution.

Note: in gas phase Cl^- has a higher PA than H_2O, so....

$$HCl(g) + H_2O(g) \rightarrow NR$$

But in solution, Cl^- ion is stabilized by solvation... PA of the ion is reduced considerably... below 270 kcal mol^{-1}; thus following reaction is favorable

$$HCl(aq) + H_2O(aq) \rightarrow Cl^-(aq) + H_3O^+(aq)$$

	Definitions		*Examples*	
	Acid	*Base*	*Acid*	*Base*
Lavoisier	Oxide of N, P, S	Reacts with acid	SO_3	NaOH
Liebig	Replaceable H	Reacts with acid	HNO_3	NaOH
Arrhenius	Hydronium ion	Hydroxide ion	H^+	OH^-
Brønsted-Lowry	Hydrogen ion donor	Hydrogen ion acceptor	H_3O^+	H_2O
			H_2O	OH^-
			NH_4^+	NH_3
Solvent system	Solvent cation	Solvent anion	BrF_2^+	BrF_4^-
Lewis	Electron-pair acceptor	Electron-pair donor	Ag^+	NH_3
Ingold-Robinson	Electrophile (electron-pair acceptor)	Nucleophile (electron-pair donor)	BF_3	NH_3
Lux-Flood	Oxide ion acceptor	Oxide ion donor	SiO_2	CaO
Usanovich	Electron acceptor	Electron donor	Cl_2	Na

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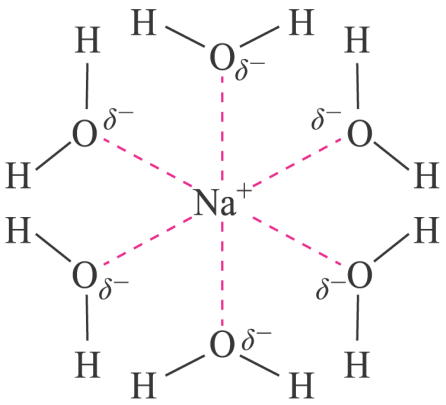
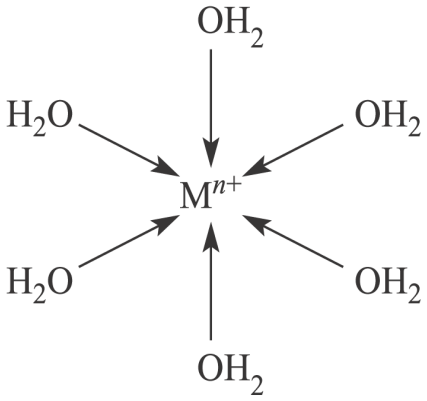
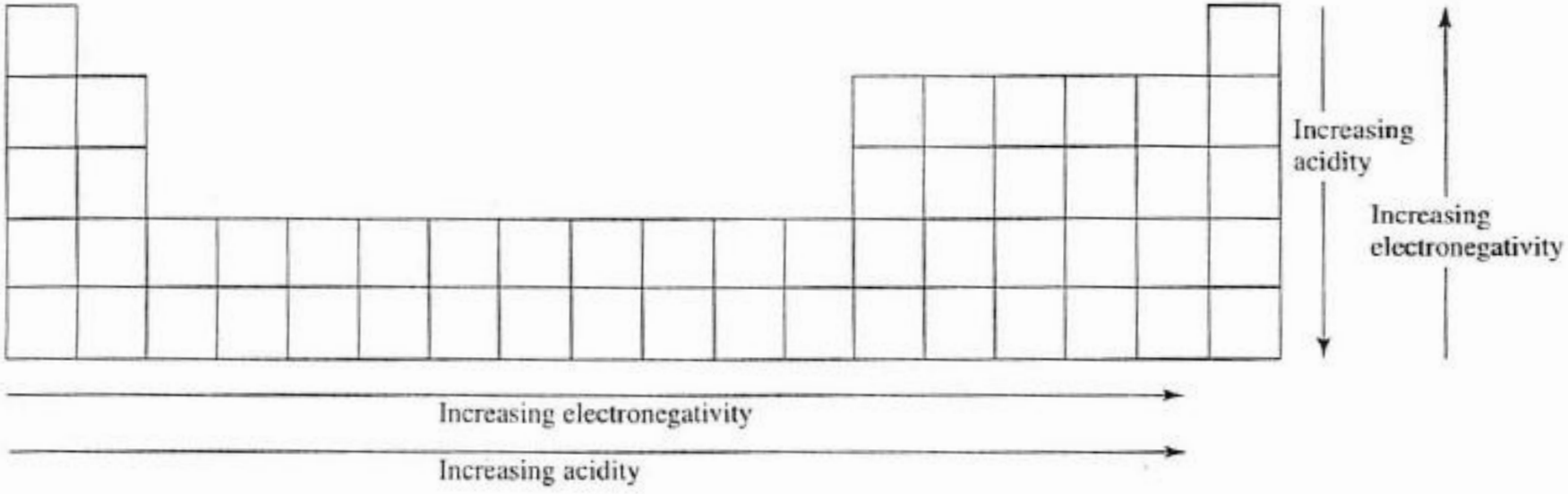
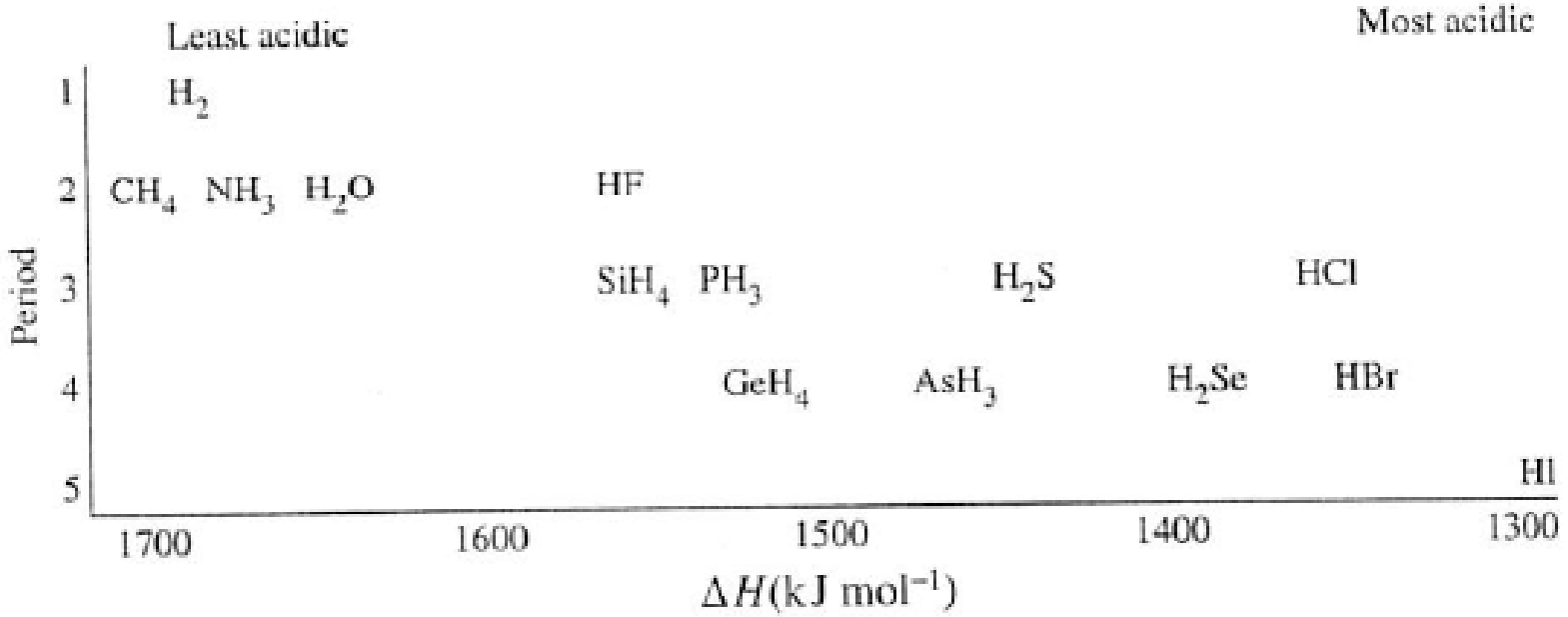
"There have been those who have wondered, often to themselves, and occasionally out loud, just where these various attempts to be precise and quantitative about the nature of acidity and basicity become to quixotic to be valuable. It is not impossible that the venerable sport of jousting at windmills is now being practiced by the more zealous defenders of the various acid and base "religions".

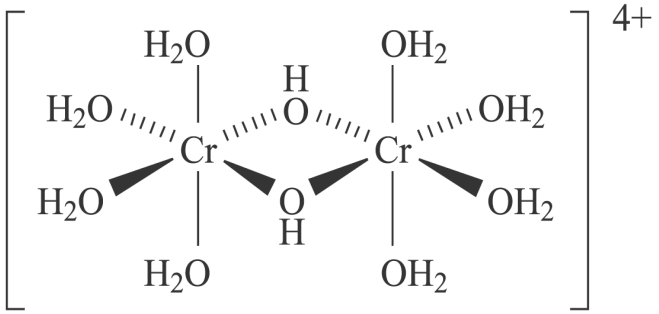
FA Cotton


H
H
O δ−
H
H
O δ−
H
δ− O
H
H
Na+
H
H
O δ−
H
δ− O
H
H
O δ−
H
H
H

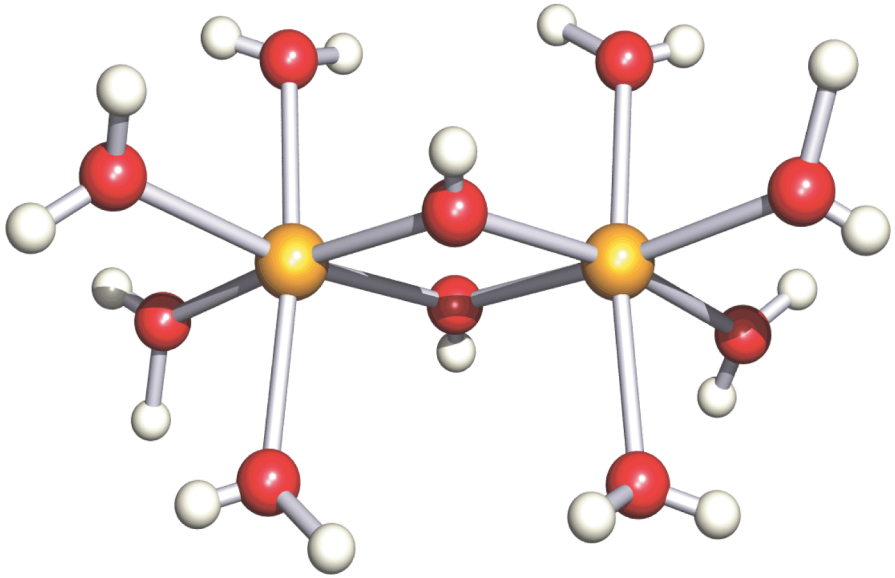

OH2
H2O
OH2
Mn+
H2O
OH2
OH2


Increasing acidity
Increasing electronegativity
Increasing electronegativity
Increasing acidity


Least acidic
Most acidic
Period
1
2
3
4
5
H_2
CH_4 NH_3 H_2O
HF
SiH_4 PH_3 H_2S HCl
GeH_4 AsH_3 H_2Se HBr
HI
1700
1600
1500
1400
1300
ΔH(kJ mol^{-1})



(a)



(b)