ORGANIC CHEMISTRY 1 LECTURE GUIDE 2019

BY RHETT C. SMITH

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Organic Chemistry 1
Lecture Guide 2019

By Rhett C. Smith, Ph.D.

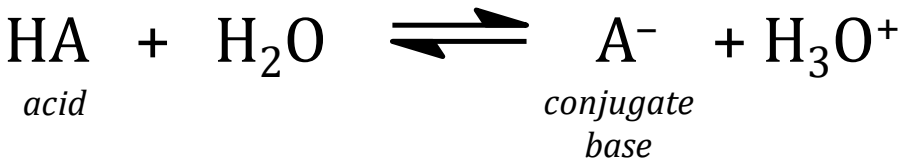
Companion Books from the Proton Guru:

Organic Chemistry 1 Reactions and Practice Problems 2019

by Rhett C. Smith

Organic Chemistry 1 Primer 2019,

by Rhett C. Smith, Andrew G. Tennyson, and Tania Houjeiry



Any factors that favor dissociation of HA into H^+ (to form H_3O^+ in water) and A^- will enhance acidity.

Most important factor influencing dissociation:

***1. _____**

Notes

Within a group (column), the size of the anion has a strong effect on acidity, because:

		$pK_a \sim$
_____	**HF**	_____
	HCl	_____
	HBr	_____
_____	**HI**	_____

- ORBITAL OVERLAP
- **ANION STABILITY**

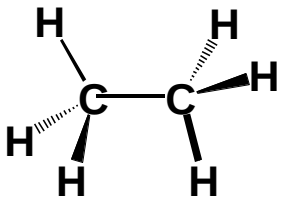
Notes

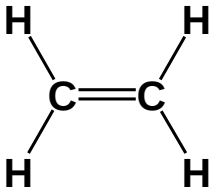
The electronegativity plays a strong role because:

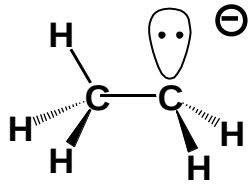
	CH_4	NH_3	H_2O	HF
$pK_a \sim$	_____	_____	_____	_____

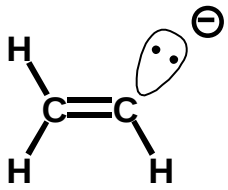
Notes

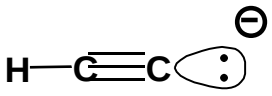
If the atom to be deprotonated is the same and only hybridization changes, we need to know that the hybridization influences electronegativity:











Acetylide anion

Note: the electronegativity of an *sp*-hybridized C is similar to that of an sp^3-hybridized N

Notes

If the anion produced by deprotonation has more than one (good) resonance form, then:

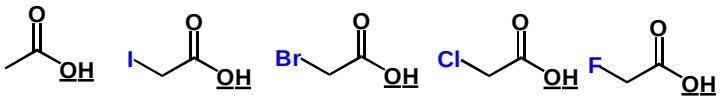
HF
pK_a = 3.1

CH_3CO_2H
pK_a = 4.7

CH_3OH
pK_a = 15.5

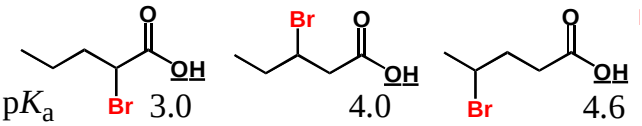
Notes

Inductive effects can make a species more OR less acidic. If an atom to be deprotonated has a partial positive charge INDUCED on it by nearby atoms, it is easier to deprotonate because:



pK_a	4.8	3.2	2.9	2.8	2.7

This series illustrates:

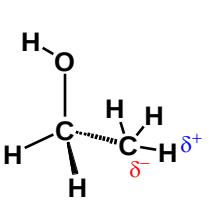
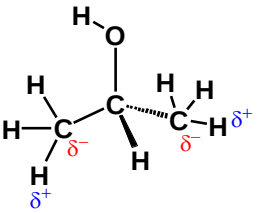
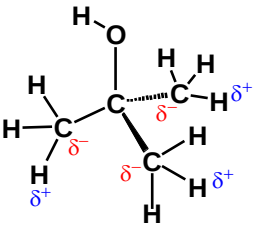


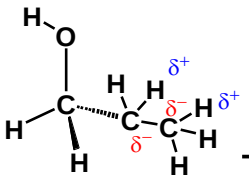
pK_a	3.0	4.0	4.6

This series illustrates:

Notes

sterics:

pK_a ~   



Notes

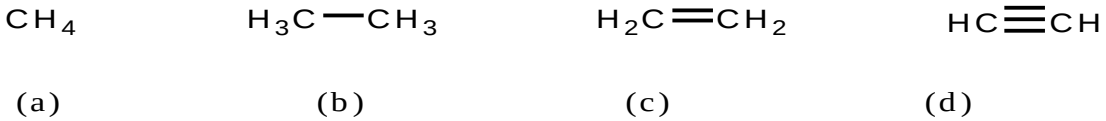
Which is the strongest acid:

a) SiH_4 b) PH_3 c) SH_2 d) HCl

Which is the strongest base:

a) H_3C^- b) H_2N^- c) HO^- d) F^-

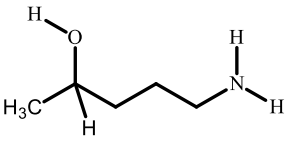
Which has the lowest pK_a:

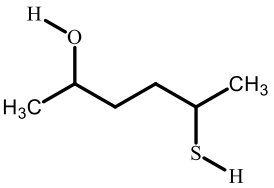


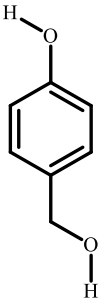
(a) (b) (c) (d)

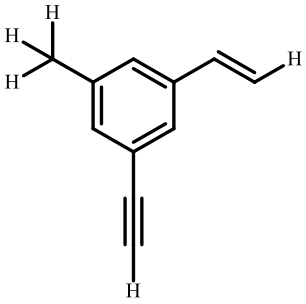
Notes

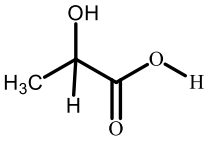
Which proton shown in each molecule is most acidic?

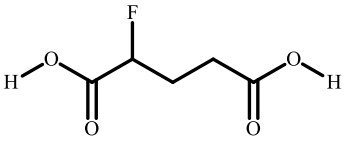












Notes