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

Nucleophilicity is a measure of how rapidly a compound (a nucleophile) will attack an electron-deficient atom

Nucleophilicity is measured by a rate constant (*k*).

A

Basicity is a measure of how favorable it is for a compound (a base) to shares its lone pair, often with a proton.

Basicity is measured by the acid dissociation constant (K_a).

B

Notes

Nucleophilicity Trends

(A)

$O^{2-} > HO^- > H_2O$

$RO^- > ROH$

$HS^- > H_2S$

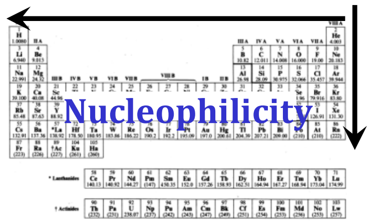
(B)

$H_2N^- > HO^- > F^-$

$H_3N > H_2O$

$RO^- > RCO_2^-$

(C)



$I^- > Br^- > Cl^- > F^-$

$HS^- > HO^-$

$PH_3 > NH_3$

Notes

Lecture Topic II.2: Nucleophilicity versus Basicity

Solvent Influences Nucleophilicity/Basicity

A

B

It is easier to break the ion-dipole interactions between a weak base and the solvent than between a strong base and the solvent

C

Notes

Solvents can be classified into several types on the basis of the type of intermolecular forces they can exhibit with other molecules:

A	hexane, other hydrocarbons
B	diethylether, acetone
polar protic:	C
D	$(CH_3)_2SO$ (dimethylsulfoxide, DMSO) $(CH_3)_2NC(O)H$ (N,N-dimethylformamide, DMF)

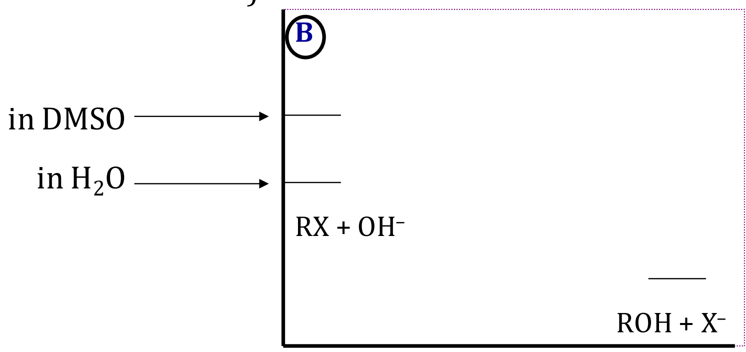
Notes

Lecture Topic II.2: Nucleophilicity versus Basicity
Solvent Influences Nucleophilicity/Basicity

A

OH^- in H_2O: strong ion-dipole interaction with water diminishes its nucleophilicity (less reactive; higher E_a)

in DMSO: weaker solvation and thus more nucleophilic (faster reaction) versus the same reaction in water



Notes