

HETEROAROMÁS VEGYÜLETEK

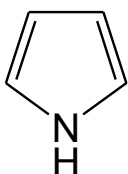
Konstitúció és elnevezés

racionális elnevezés (nem használatos)

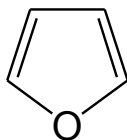
heteroatom: N $\longrightarrow$ az(a)
O $\longrightarrow$ ox(a)
S $\longrightarrow$ ti(a)

gyűrűtagszám: öttagú $\longrightarrow$ -ol
hattagú $\longrightarrow$ -in

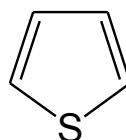
egy heteroatom, öttagú gyűrű



pirrol
(azol)

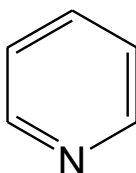


furán
(oxol)



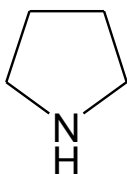
tiofén
(tiol)

egy heteroatom, hattagú gyűrű

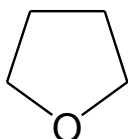


piridin
(azin)

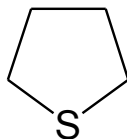
telített (nem aromás) származékok



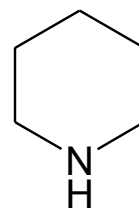
pirrolidin



tetrahidrofurán

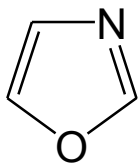


tetrahidrotiofén

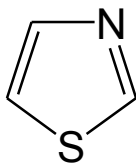


piperidin

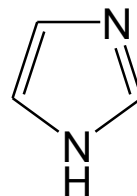
több heteroatomos gyűrűk



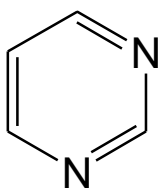
oxazol
(1,3-oxazol)



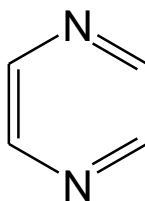
tiazol
1,3-tiazol



imidazol
(1,3-diazol)

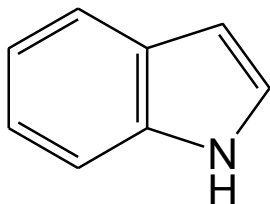


pirimidin
(1,3-diazin)

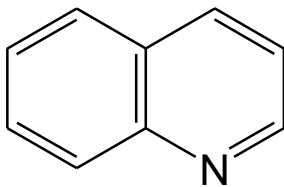


pirazin
(1,4-diazin)

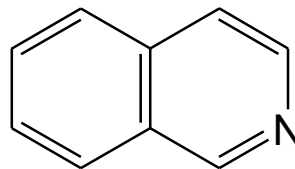
kondenzált gyűrűs származékok



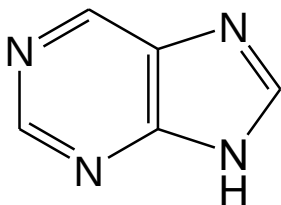
indol



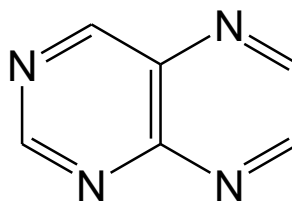
kinolin



izokinolin



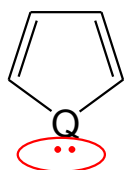
purin



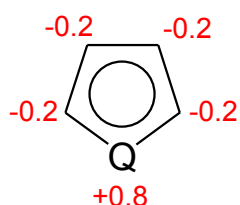
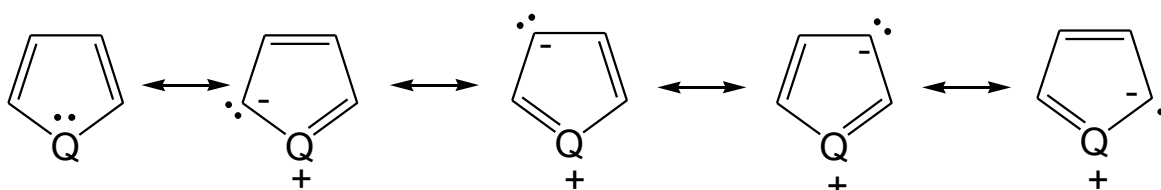
pteridin

Elektronszerkezet

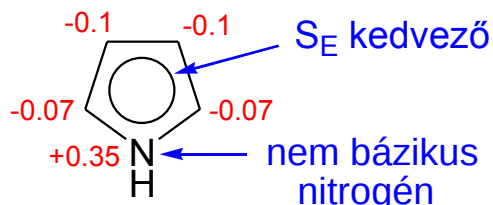
pirrol, furán, tiofén (öttagú gyűrű)



szükséges az aromás szerkezethez
(6 π -elektron; Hückel-szabály)

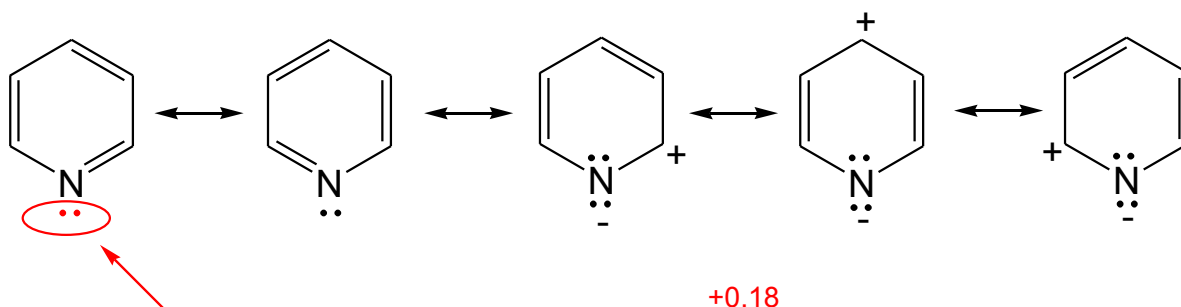


"egyenletes" elektroneloszlás
(nem valóságos)

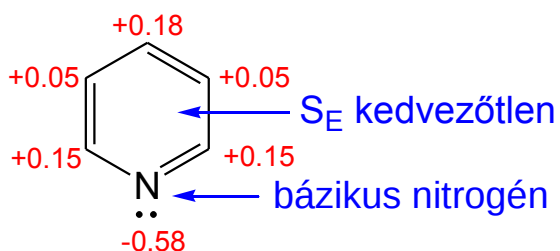


valóságos elektroneloszlás

piridin (hattagú gyűrű)

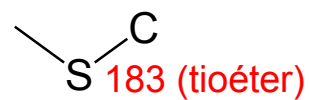
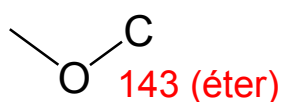
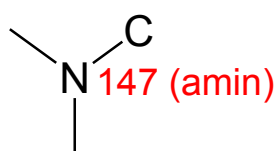
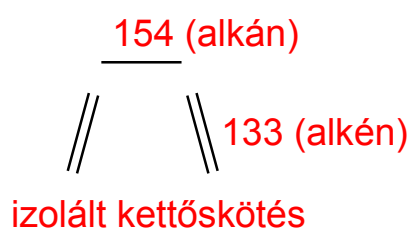


nem szükséges az aromás
szerkezethez; (6 π -elektron
a gyűrűben)

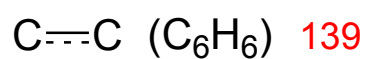
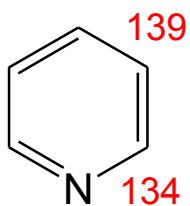
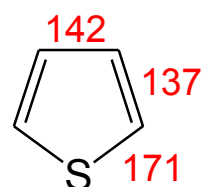
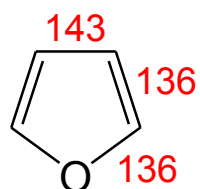
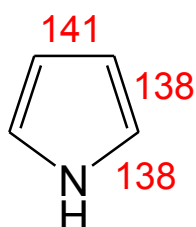


Térszerkezet

kötéshosszak (pm)



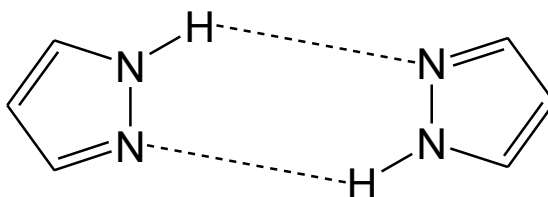
heteroaromás vegyületek



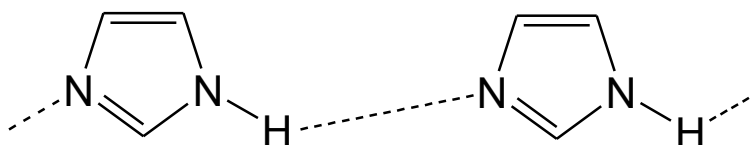
Fizikai tulajdonságok

	fp. (°C)	H-kötés
benzol	80	-
tiofén	84	-
piridin	115	-
pirrol	131	+
pirazol	187	+ (dimer)
imidazol	256 (op. 90 °C)	+ (polimer)

pirazol

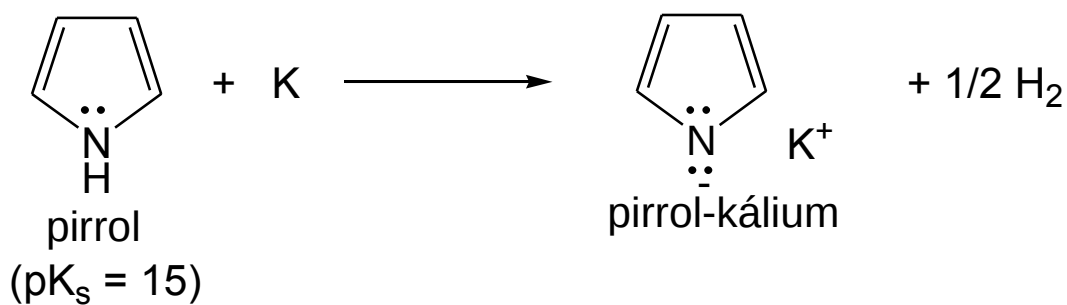


imidazol



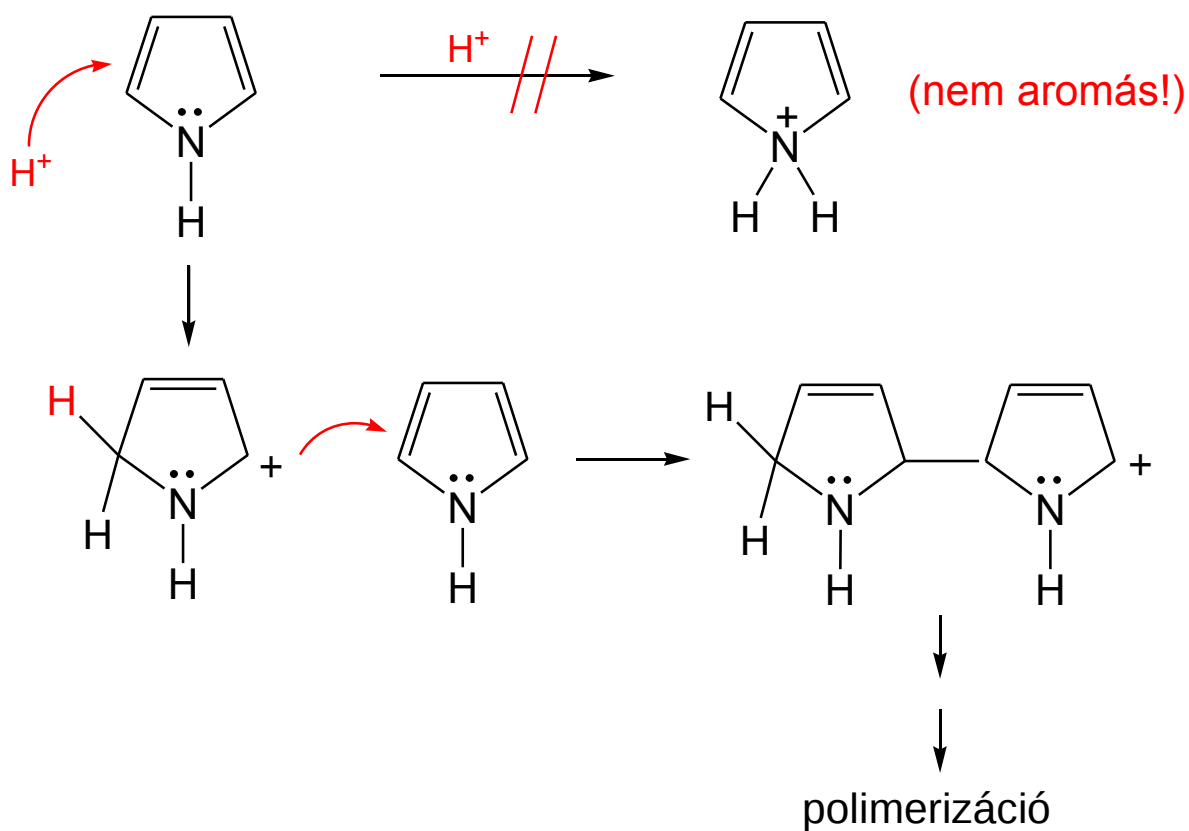
A pirrol sav-bázis tulajdonságai

savi jelleg



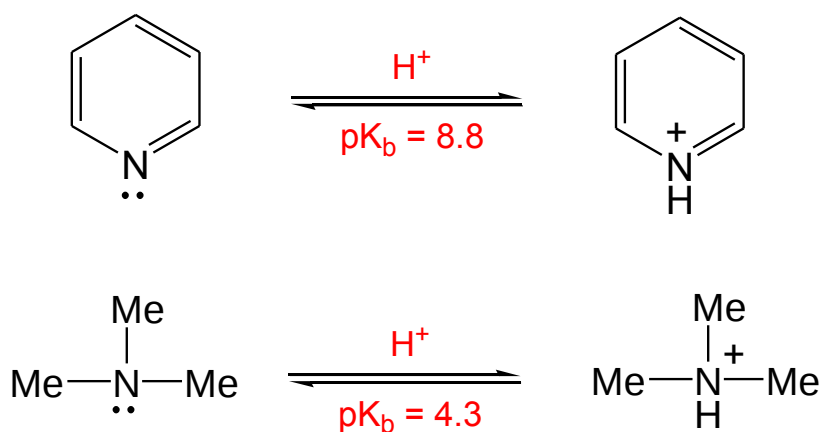
→ a pirrol gyenge N-H sav

bázicitás

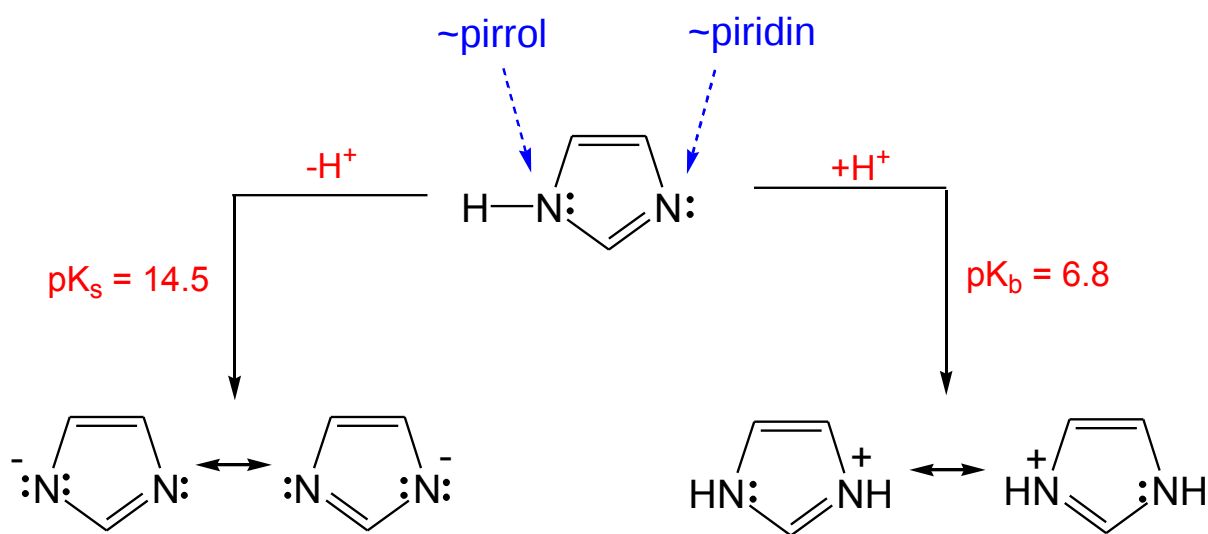


→ a pirrol nem N-bázis

A piridin bázicitása



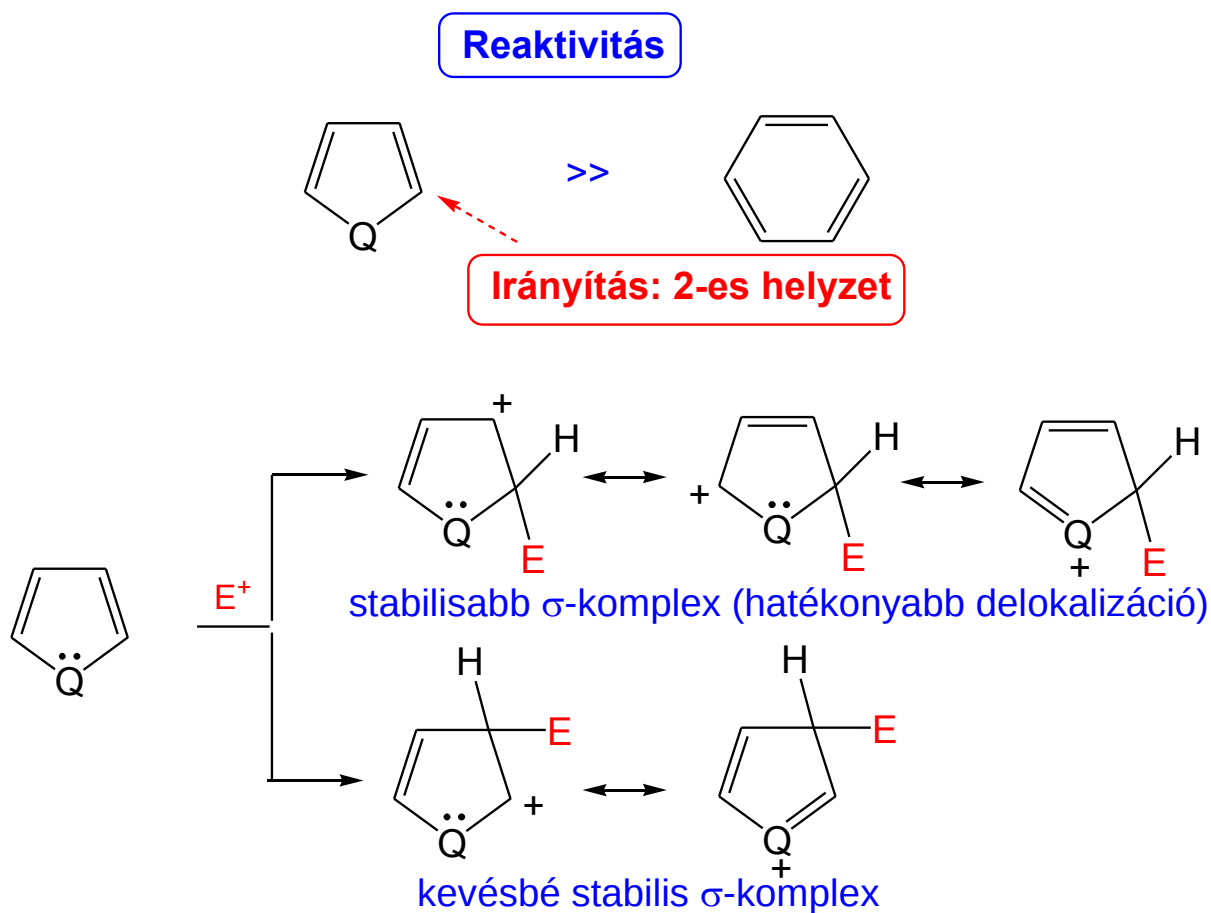
—————> a piridin gyenge bázis



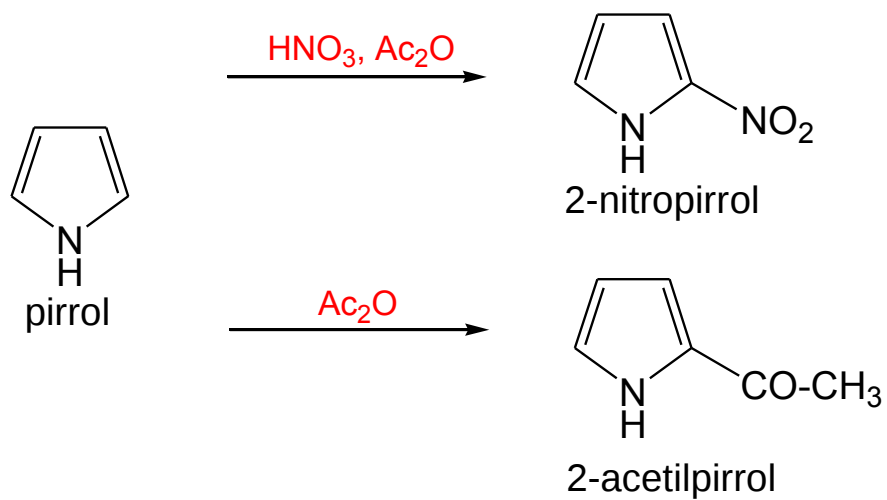
—————> az imidazol amfoter

Kémiai tulajdonságok

A pirrol, furán és tiofén elektrofil szubsztitúciós reakciója

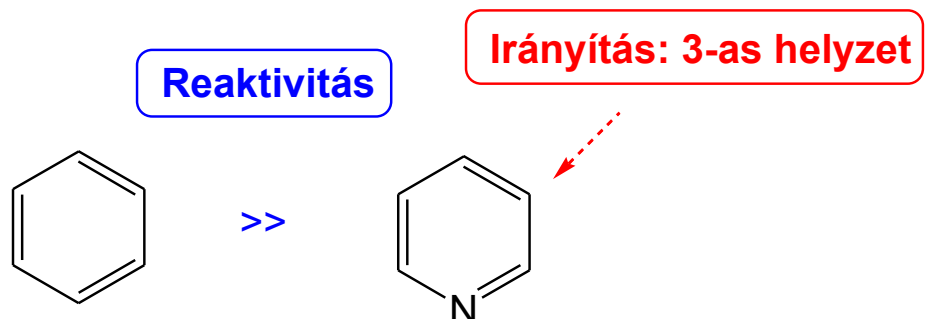


Példa

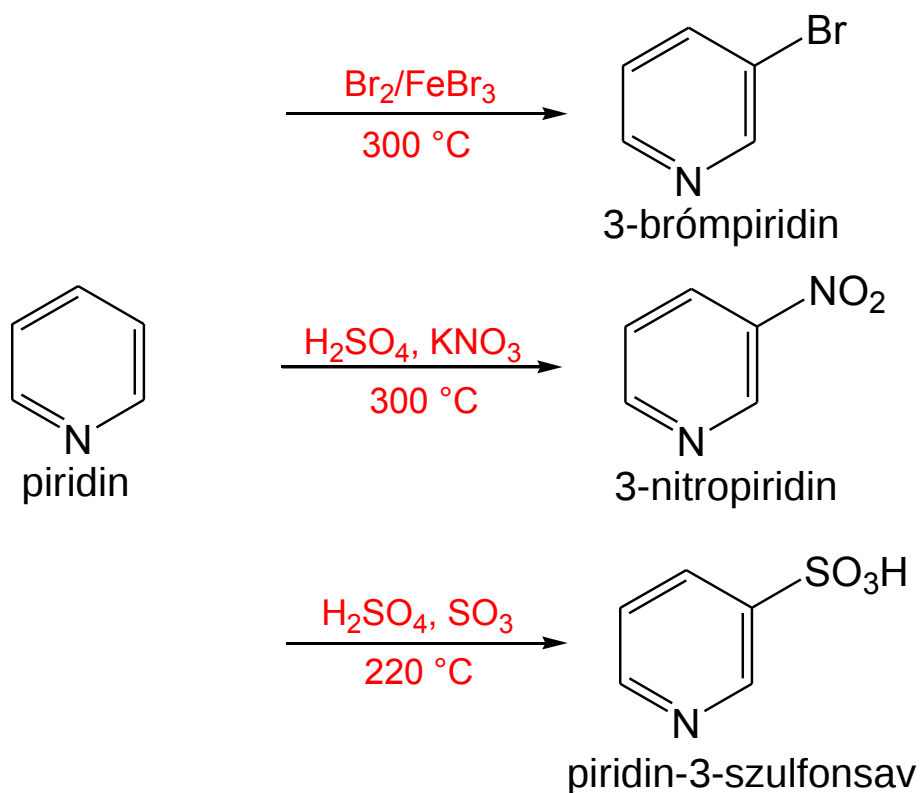


A piridin reaktivitása

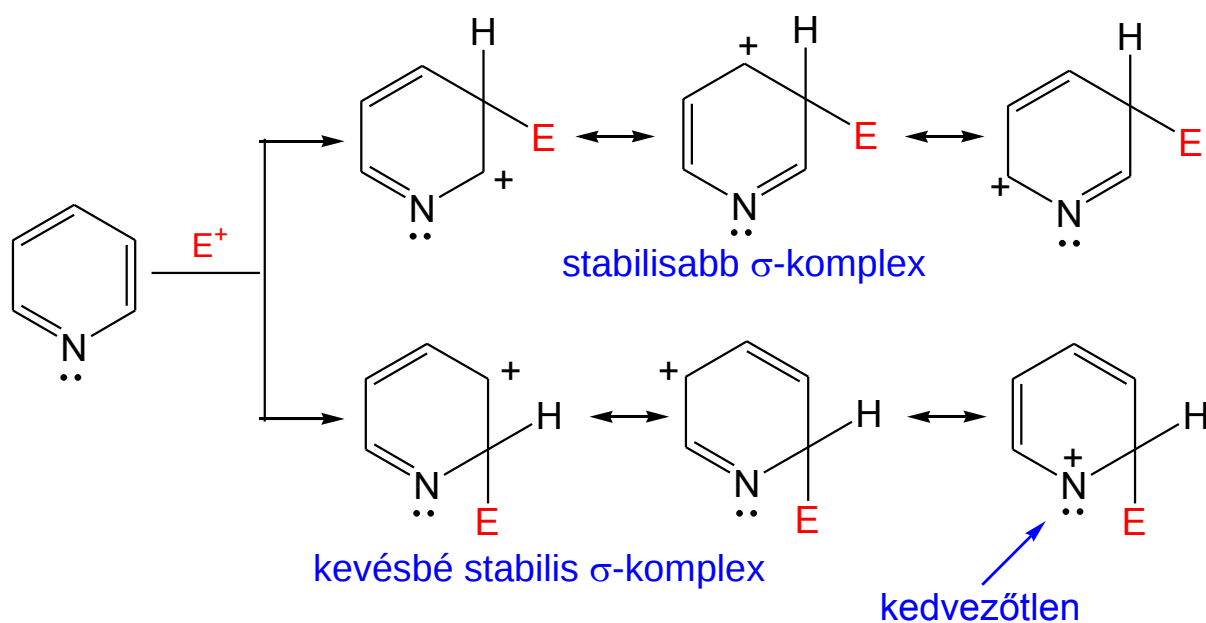
Elektrofil szubsztitúció



Példák

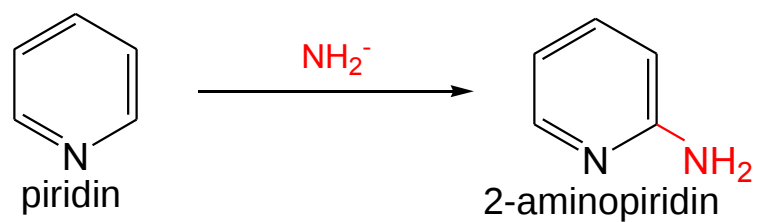
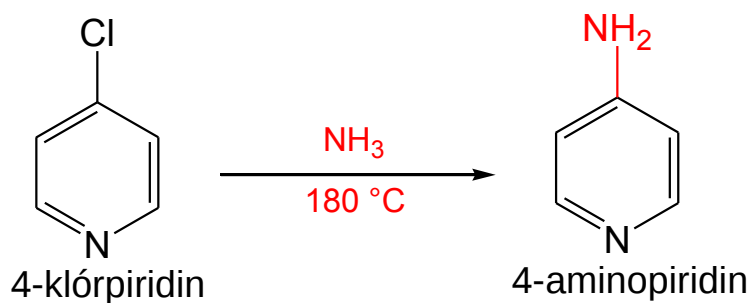
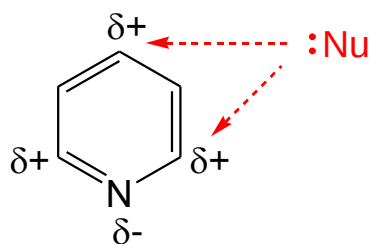


Az irányítás indoklása



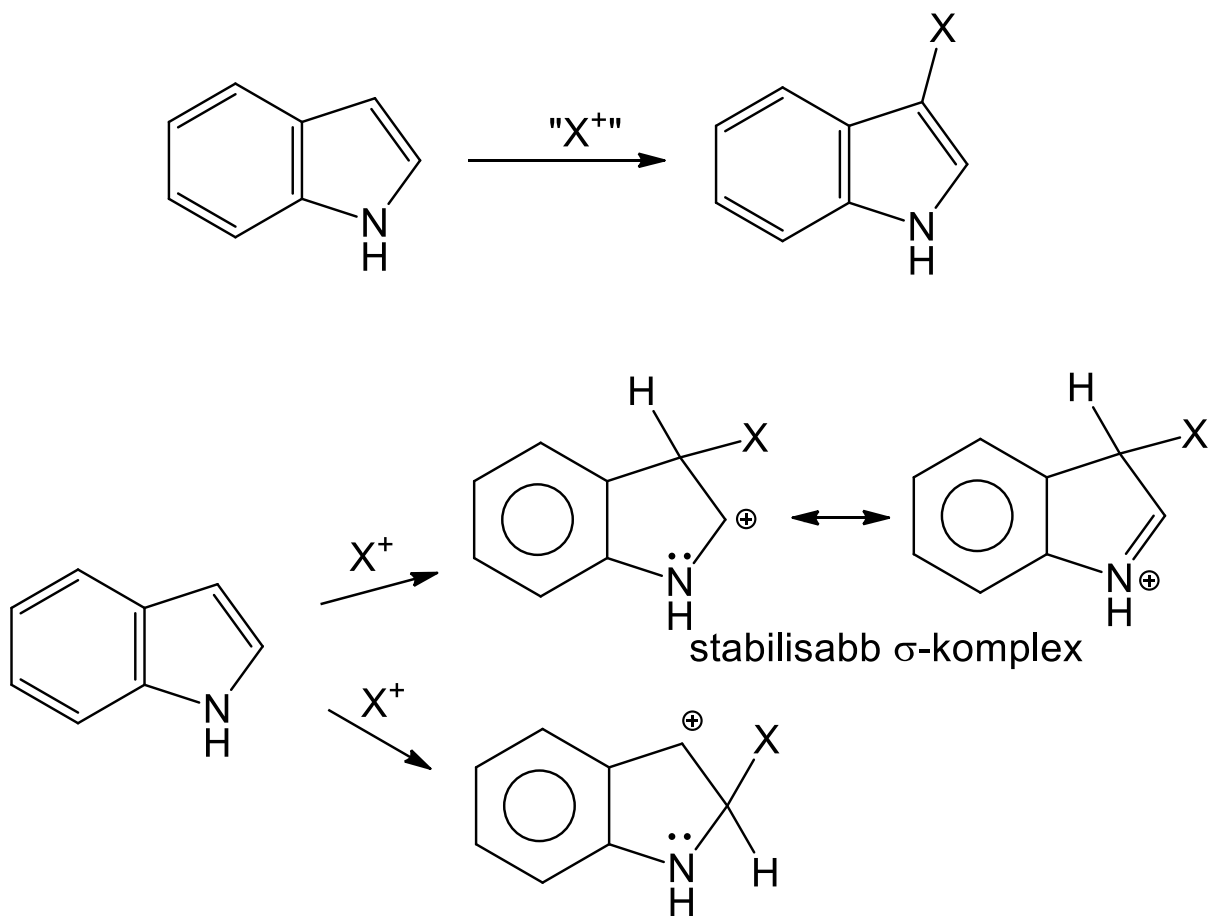
Nukleofil szubsztitúció piridinszármazékokon

a piridin szerkezete

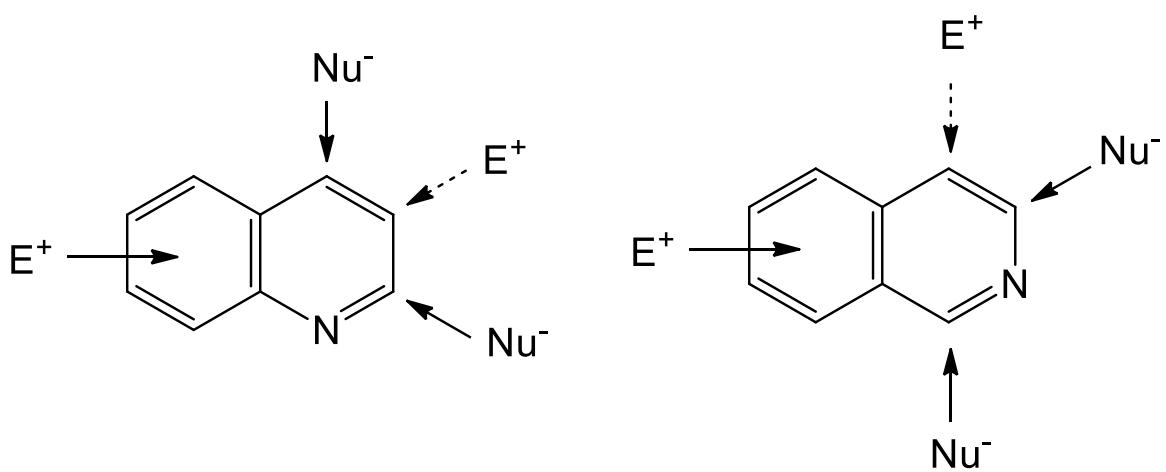


Az indol reaktivitása

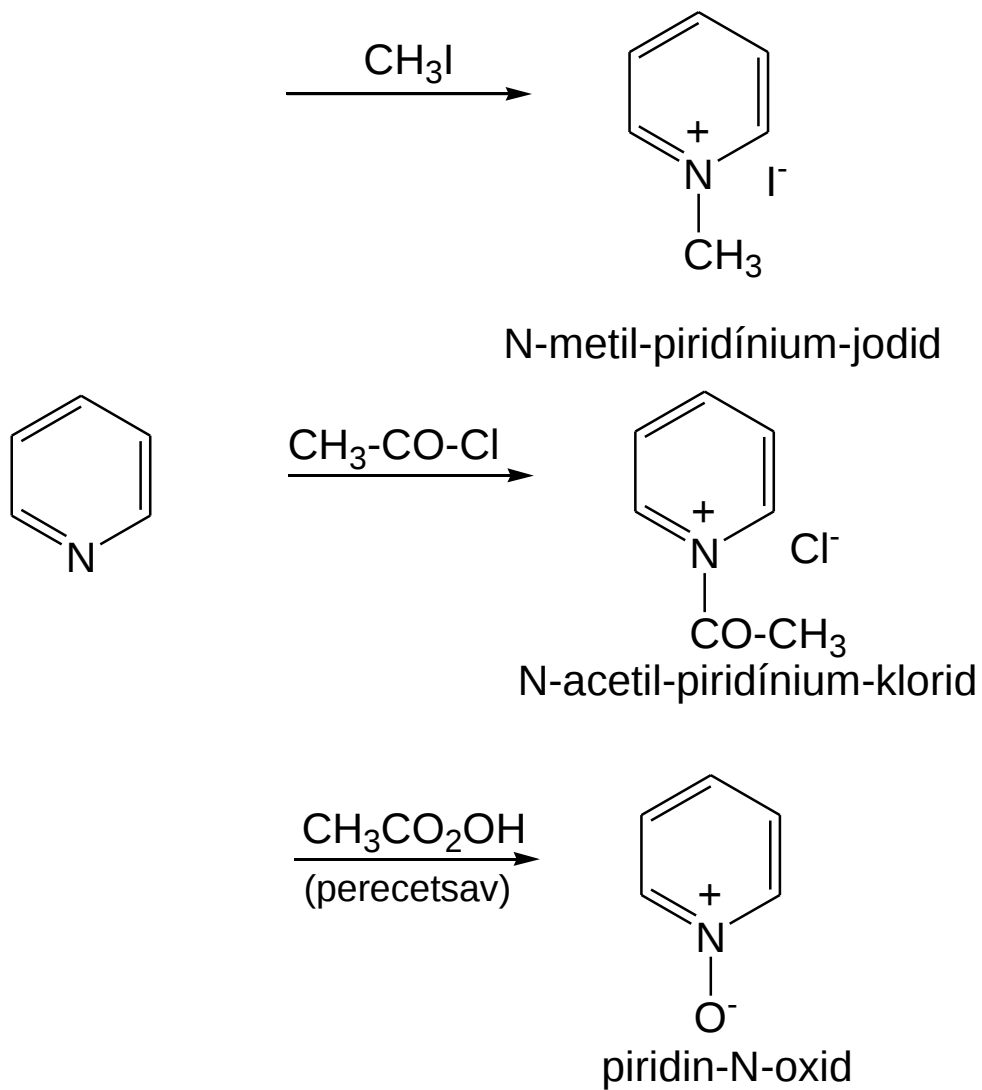
irányítás a 3-as helyzetbe



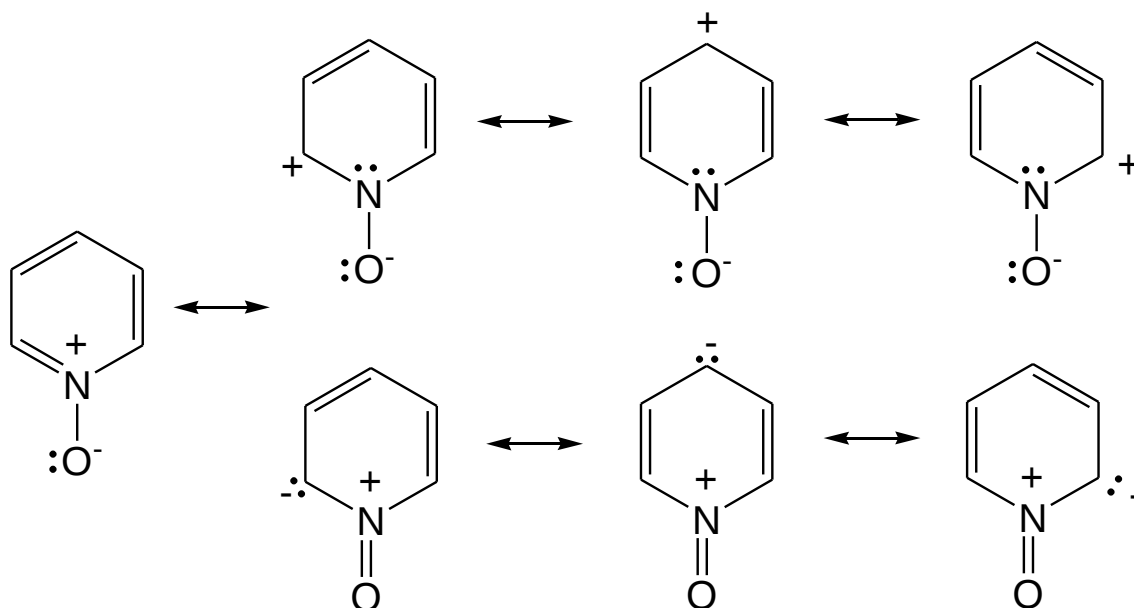
Kinolin, izokinolin



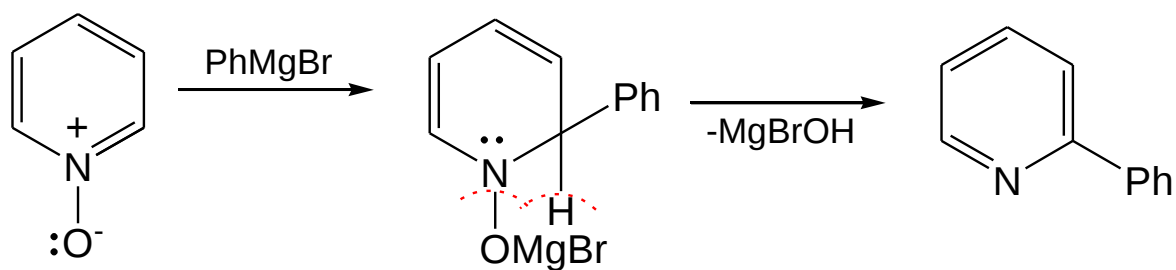
A piridin N-atomján végbemenő reakciók



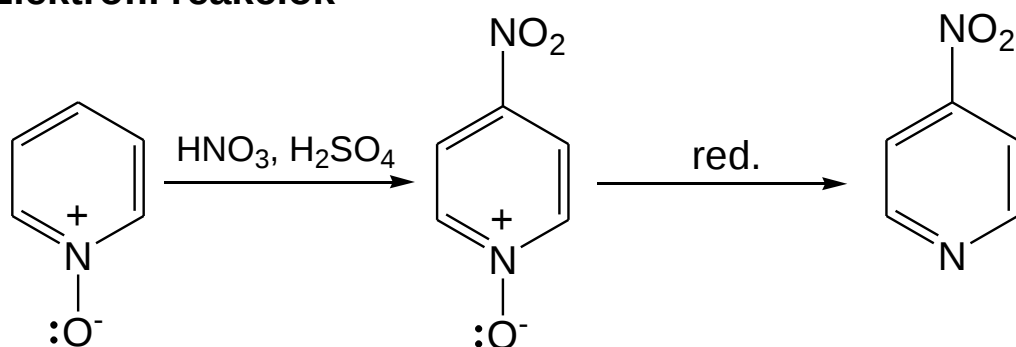
A piridin-N-oxid szerkezete



Nukleofil reakciók

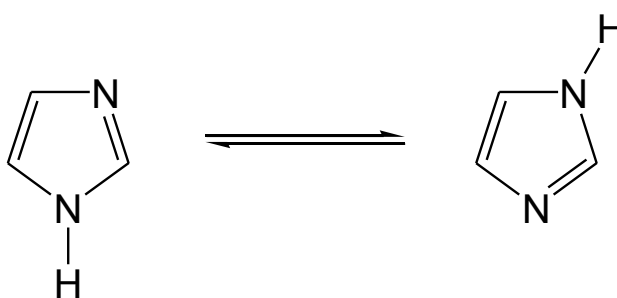


Elektrofil reakciók

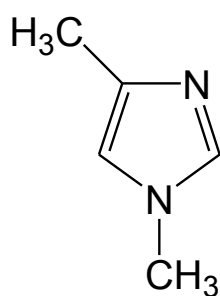
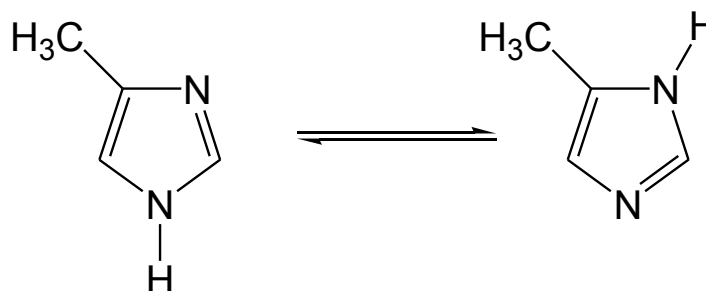


Tautoméria

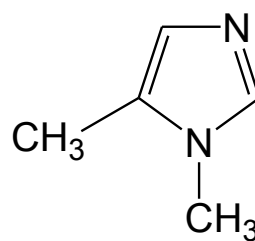
imidazol



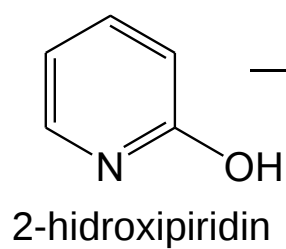
(4,5)-metilimidazol



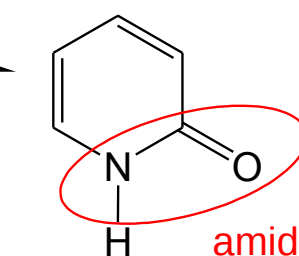
1,4-dimetilimidazol



1,5-dimetilimidazol

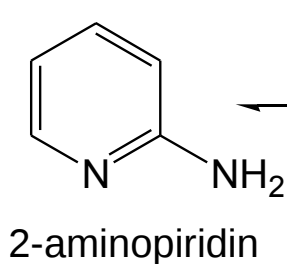


2-hidroxipiridin

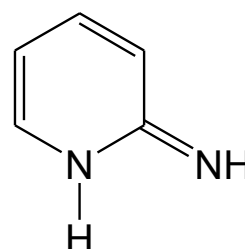


2-piridon

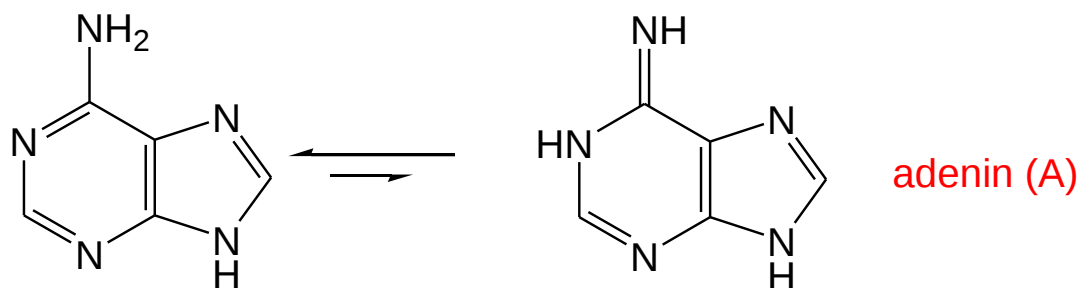
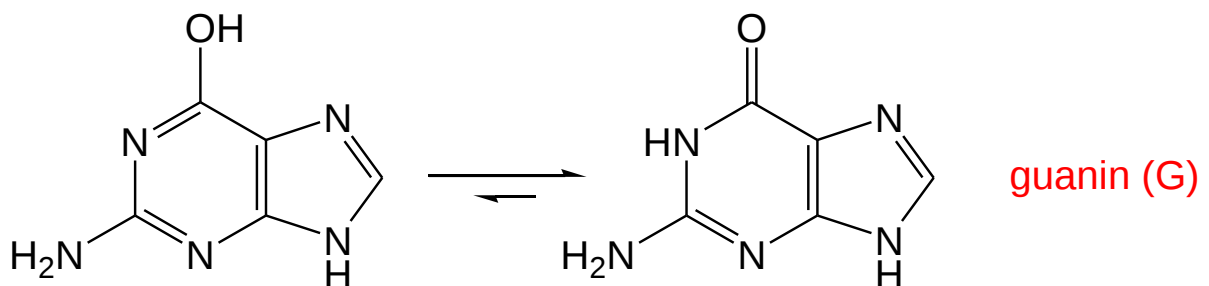
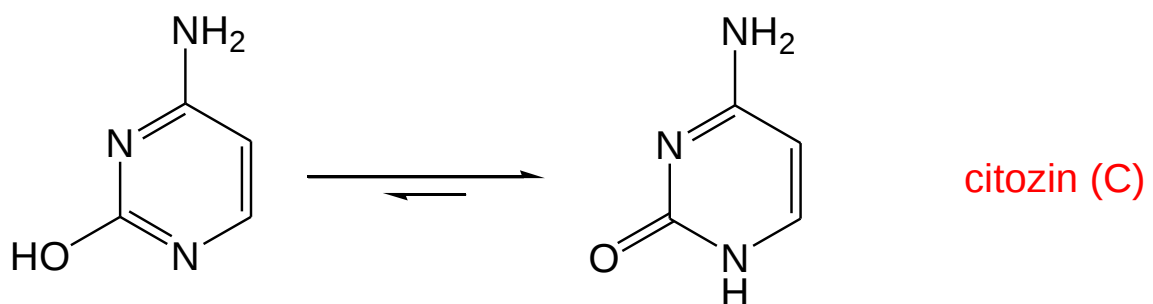
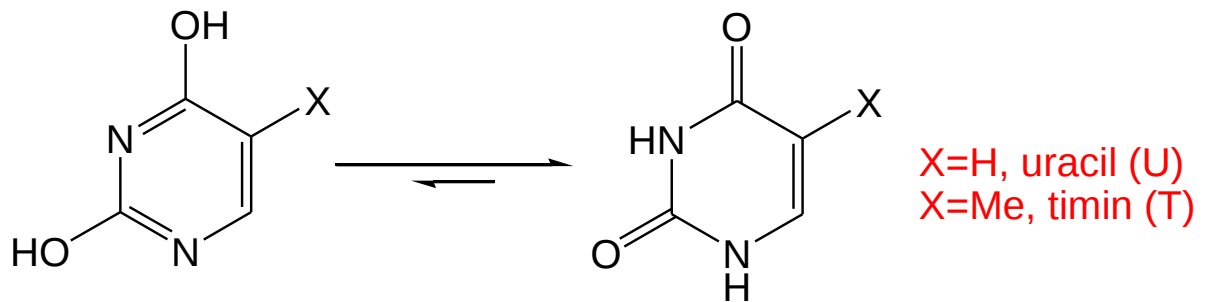
amid szerkezet



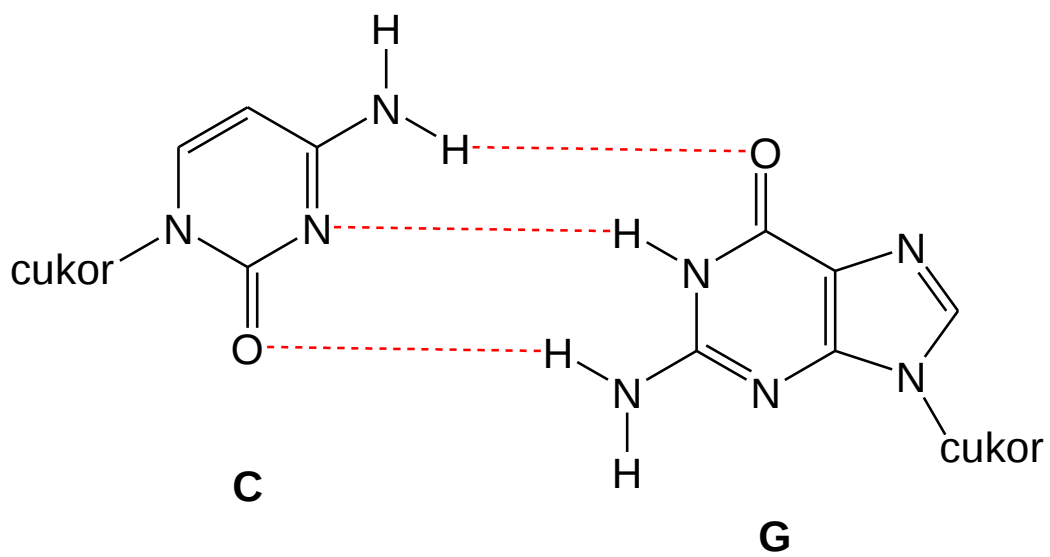
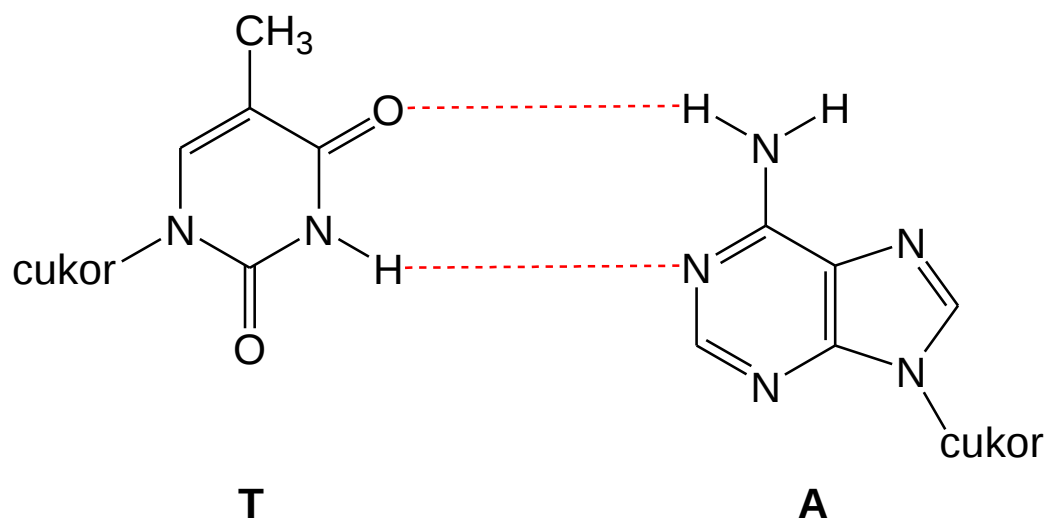
2-aminopiridin



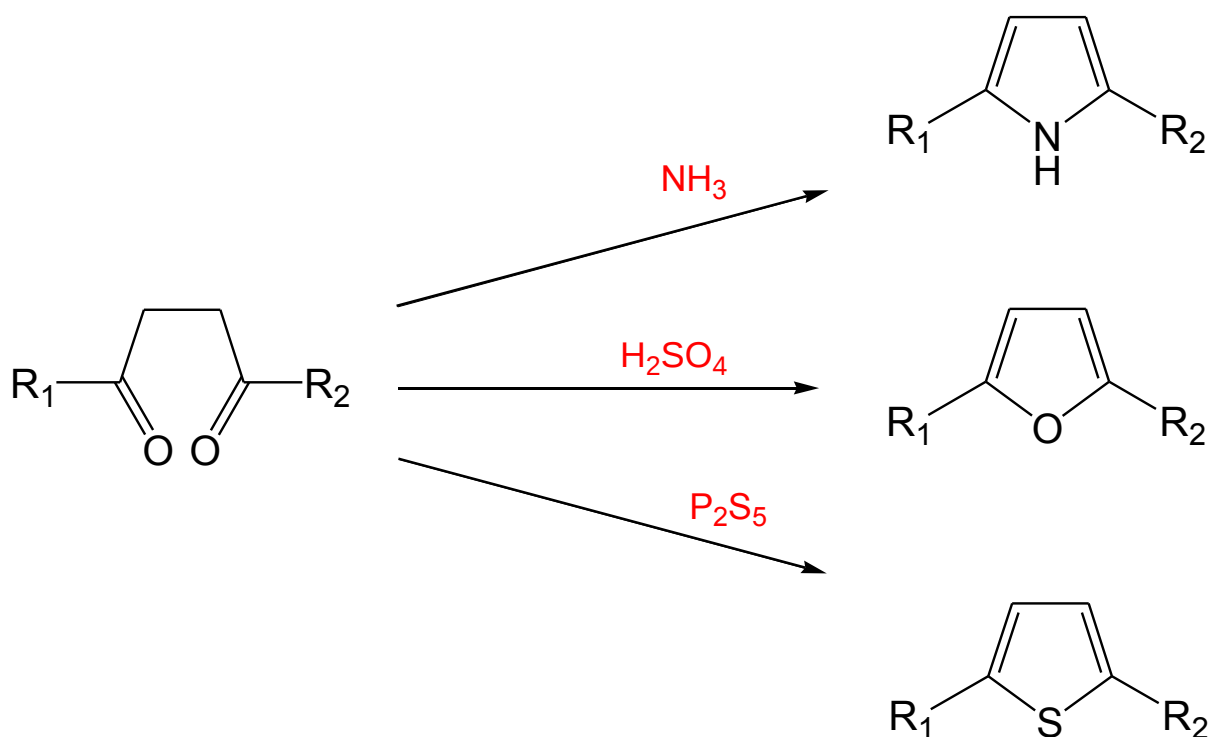
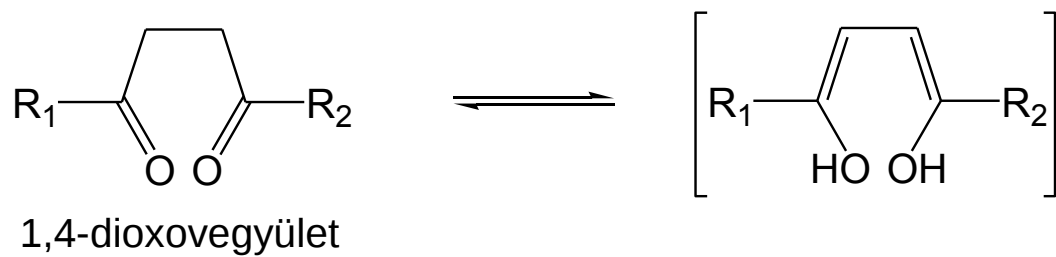
Nukleinsavbázisok



Nukleinsavbázis-párok



Heterociklusos vegyületek előállítása



Példák

