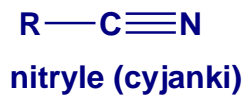
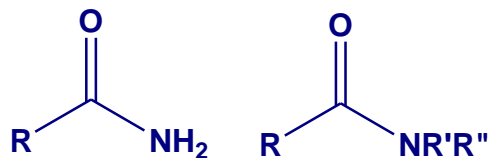
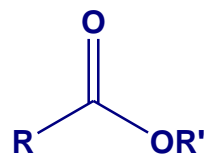
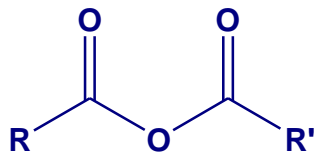
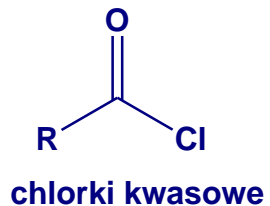
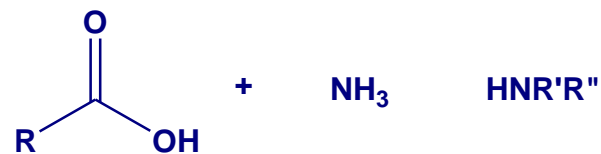
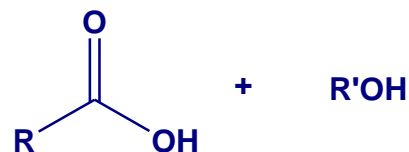
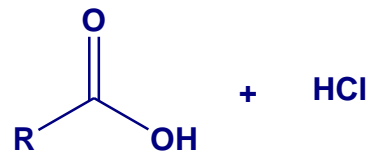


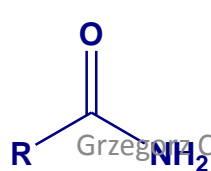
Pochodne kwasów karboksylowych



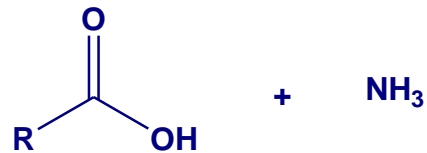
hydroliza
 $\xrightarrow{\text{S}_{\text{N}}\text{Acył}}$

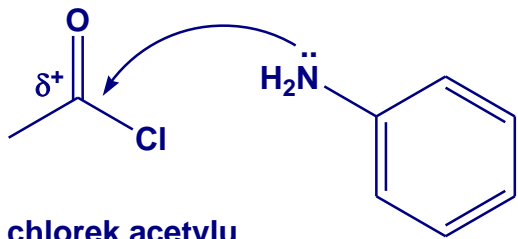


hydroliza
 $\xrightarrow{\text{S}_{\text{N}}\text{Acył}}$



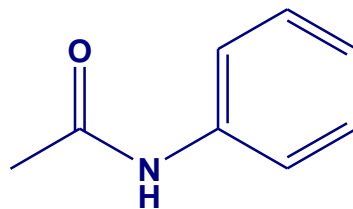
hydroliza
 $\xrightarrow{\text{S}_{\text{N}}\text{Acył}}$





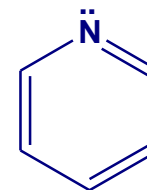
chlorek acetylu
chlorek kwasu
octowego

anilina

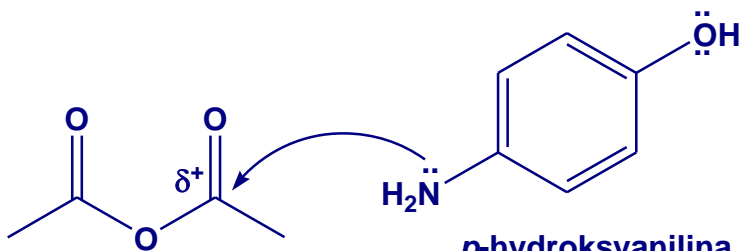


N-fenyloacetamid
N-fenyloamid kwasu octowego

:B $\ddot{\text{N}}\text{Et}_3$
trietyloamina

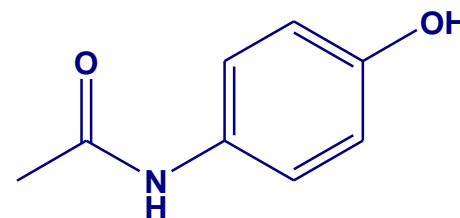
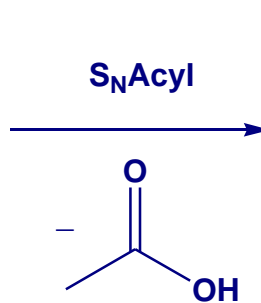


pirydyna
Py (pyridine)



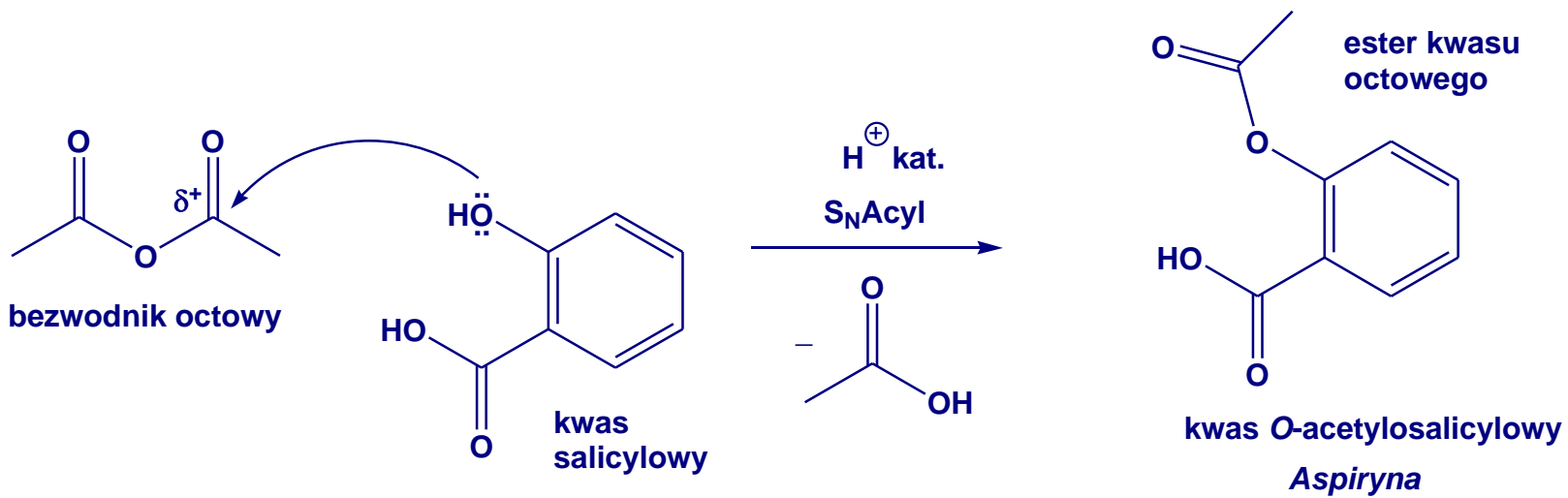
bezwodnik octowy

p-hydroksyanilina

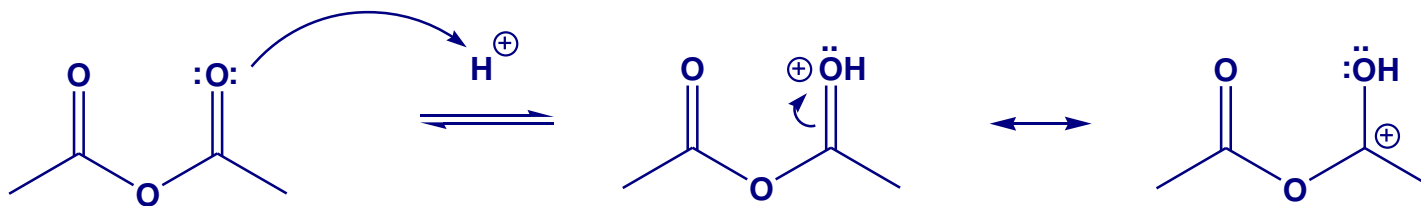


N-(*p*-hydroksyfenylo)acetamid
N-(*p*-hydroksyfenylo)amid kwasu octowego

Paracetamol



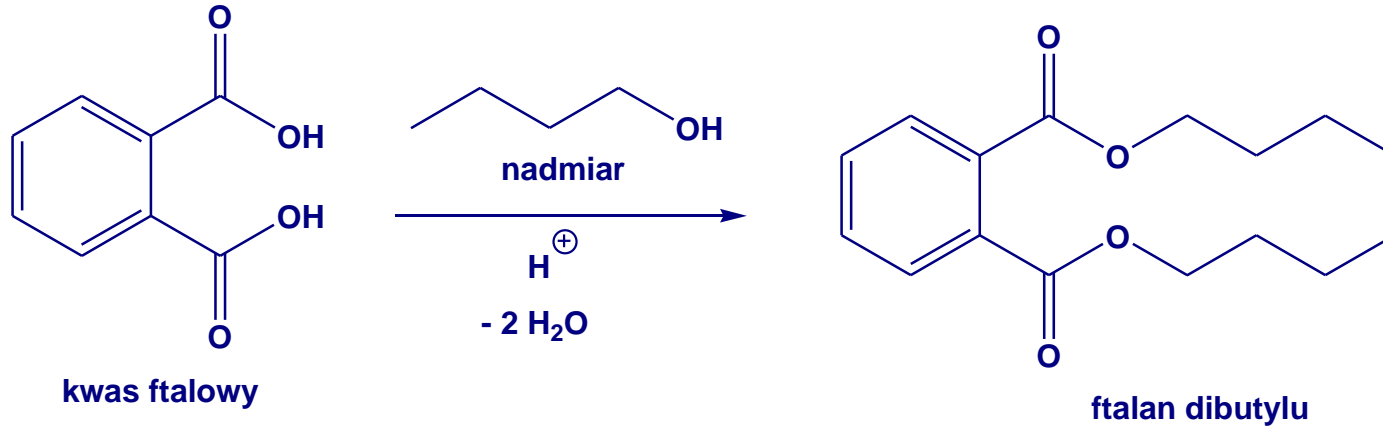
Aktywacja bezwodnika w reakcji S_NAcyl przy zastosowaniu kwasu jako katalizatora, np. H_2SO_4



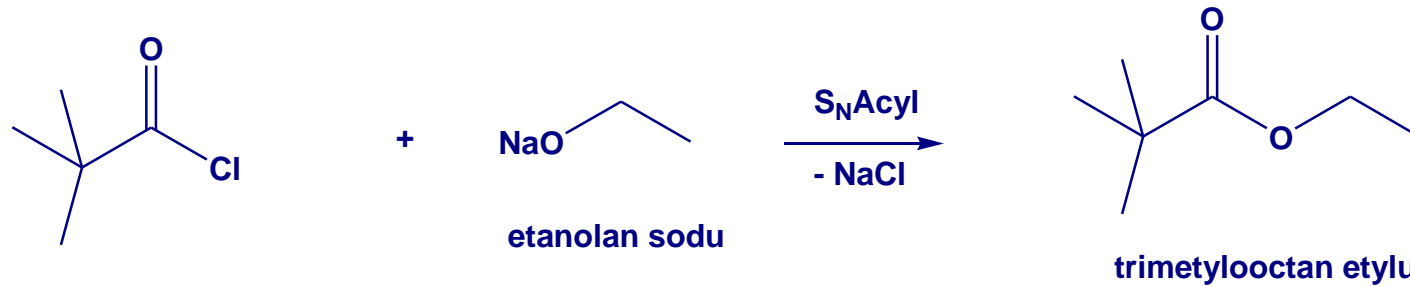
Następuje dodatkowe obniżenie gęstości elektronowej na acylowym atomie węgla, innymi słowy staje się on jeszcze lepszym elektrofilem.

Otrzymywanie estrów

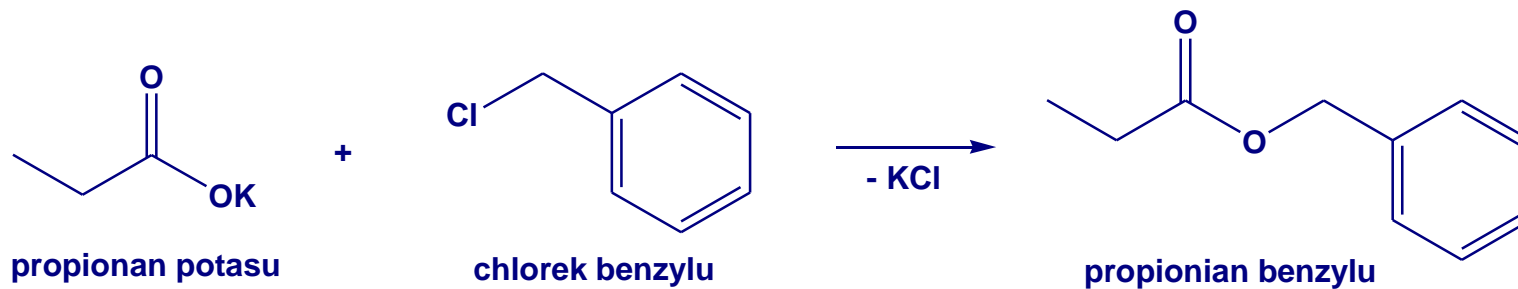
Estryfikacja Fishera



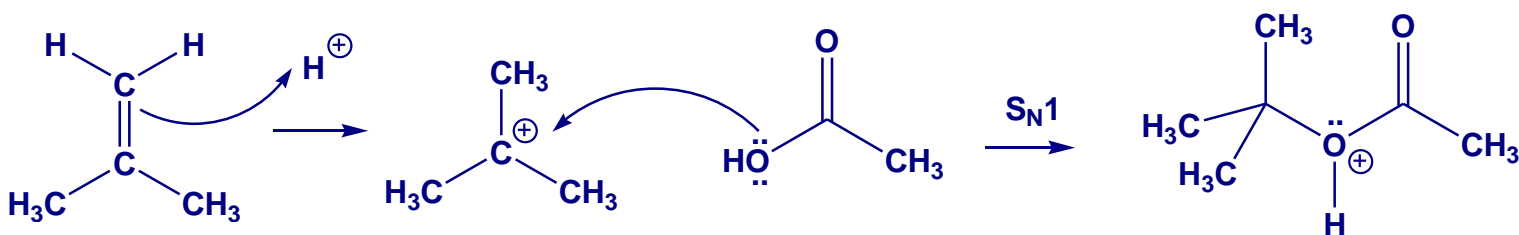
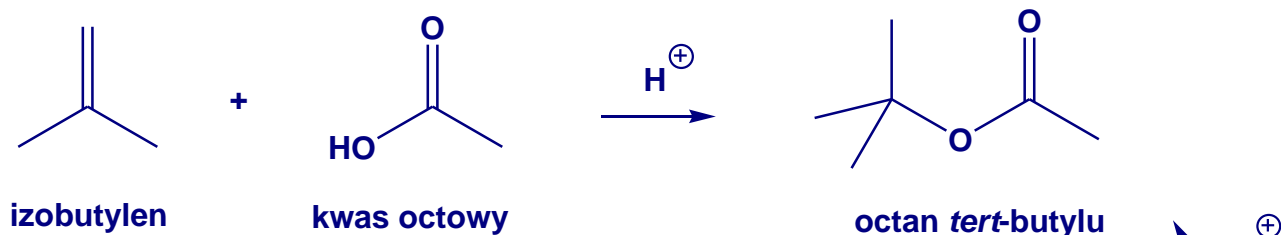
Wykorzystanie chlorków kwasowych

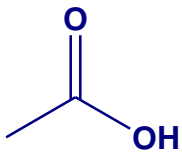


Podstawienie nukleofilowe z udziałem soli kwasów karboksylowych

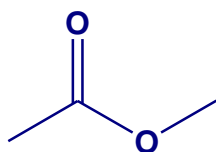


Addycja kwasu karboksylowego do alkenu

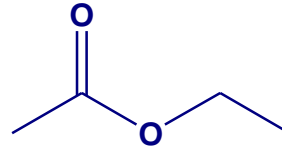




kwasy octowy



octan metylu



octan etylu

**masa molowa
g / mol**

60,1

74,1

88,1

T_{top} [°C]

17

- 98

- 84

T_{wrz} [°C]

119

58

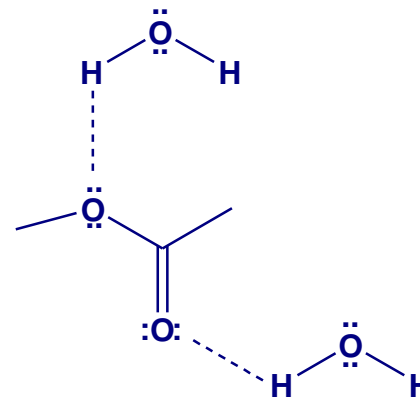
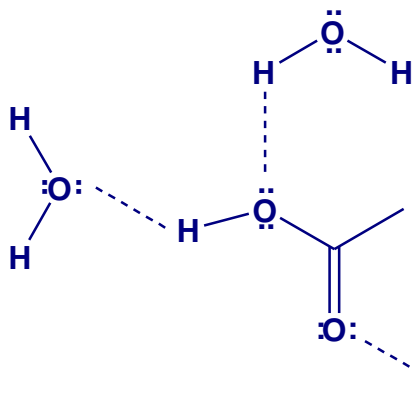
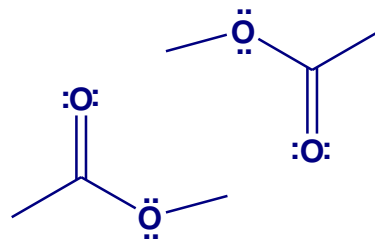
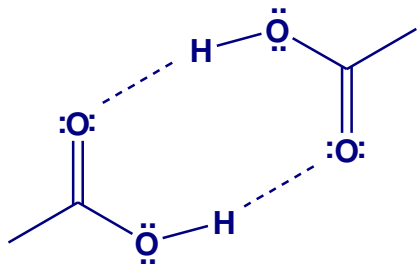
77

**rozp. w wodzie
g / l, 20 °C**

bardzo dobra

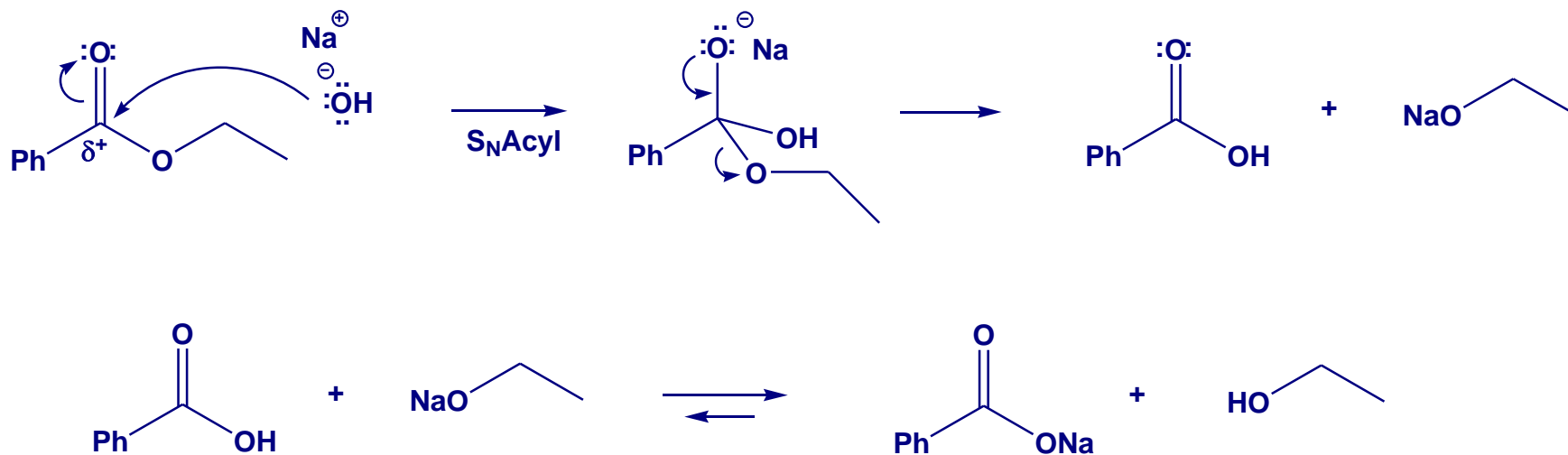
319

83

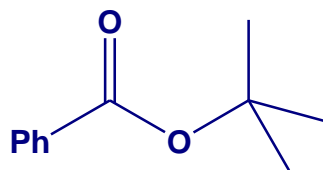


Hydroliza estrów

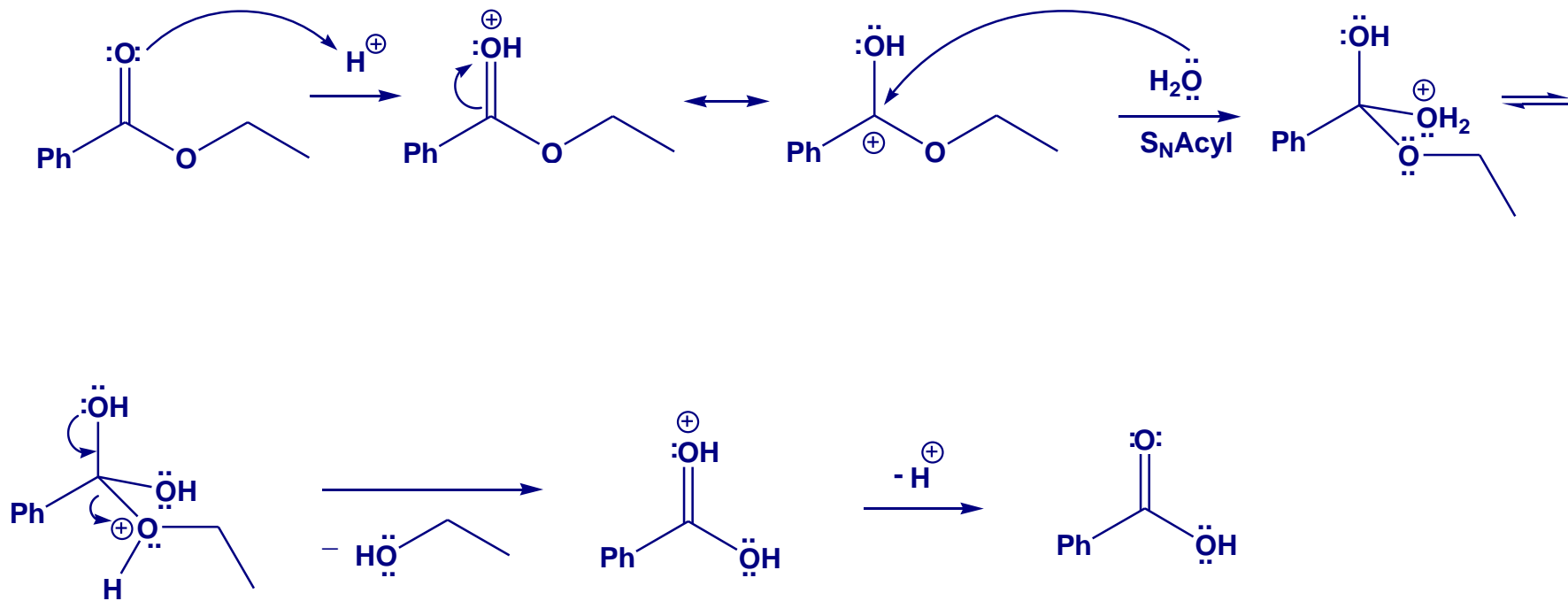
Hydroliza zasadowa



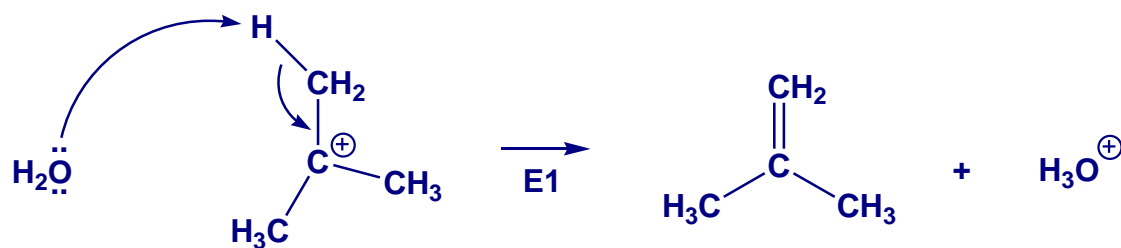
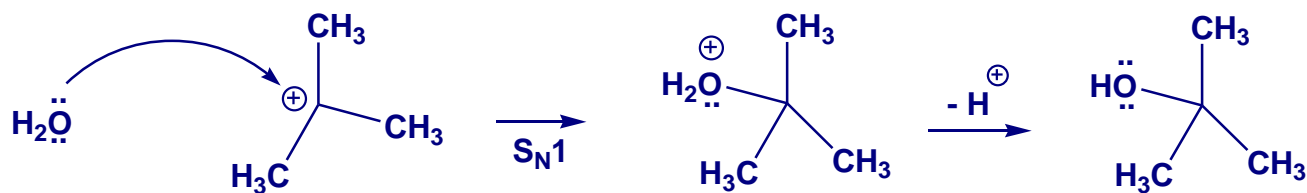
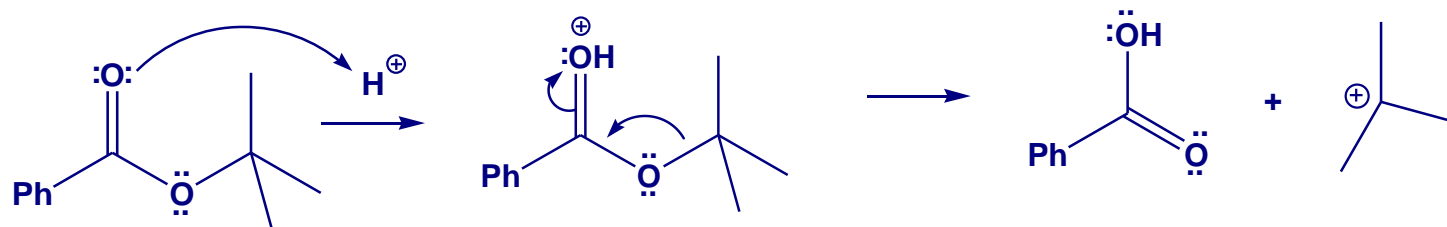
Estry zatłoczone sterycznie są mniej podatne na ten typ hydrolizy, np. benzoesan *tert*-butylu będzie ulegał jej znacznie wolniej aniżeli benzeosan etylu.



Hydroliza kwasowa estrów z pierwszo – i drugorzędową resztą alkoholową

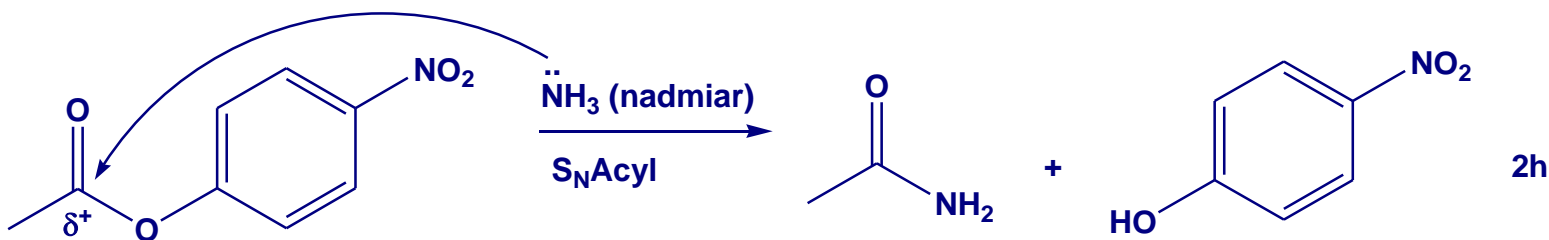
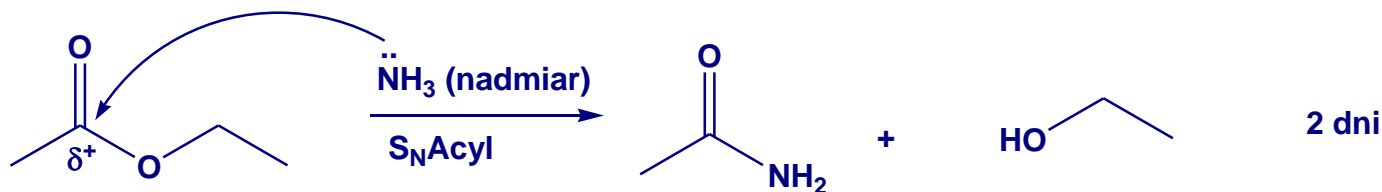
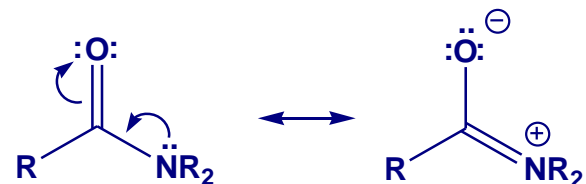


Hydroliza kwasowa estrów z trzeciorzędową resztą alkoholową

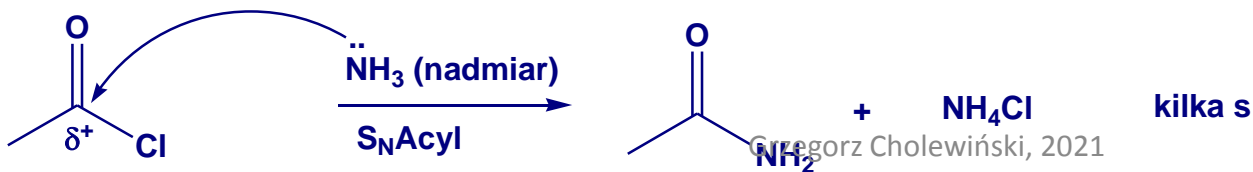


Aminoliza

Podobnie do hydrolizy zasadowej estrów, reakcja ta biegnie mechanizmem $S_N\text{Acy}$. Przybiega ona tym szybciej im mniejsza zawada steryczna na acylowym atomie węgla oraz posiada on podstawniki o efekcie elektronoakceptorowym. Ponadto bezwodniki z reguły są bardziej podatne na $S_N\text{Acy}$ od estrów ze względu na lepszą grupę opuszczającą (anion kwasu karboksylowego), a najbardziej reaktywne są halogenki kwasowe. Z kolei amidy ulegają najwolniej $S_N\text{Acy}$ z powodu pogorszenia elektrofilowości węgla acylowego poprzez delokalizację wolnej pary elektronowej atomu azotu, która jest dalej posunięta niż w przypadku bardziej elektroujemnego tlenu.

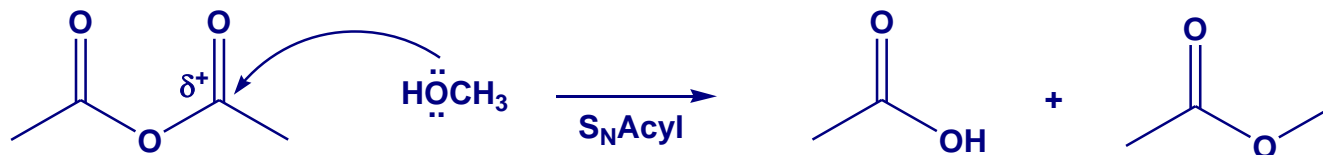


octan *p*-nitrofenylu, tzw. aktywny ester

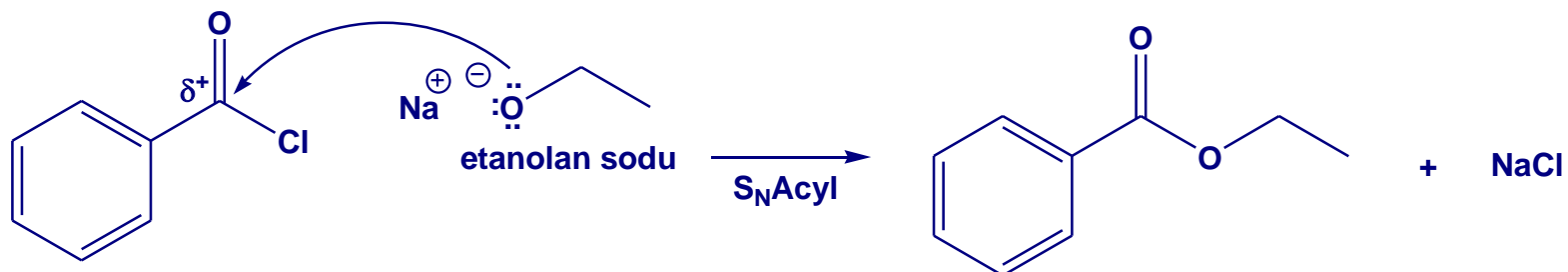


Alkoholiza pochodnych kwasów karboksylowych

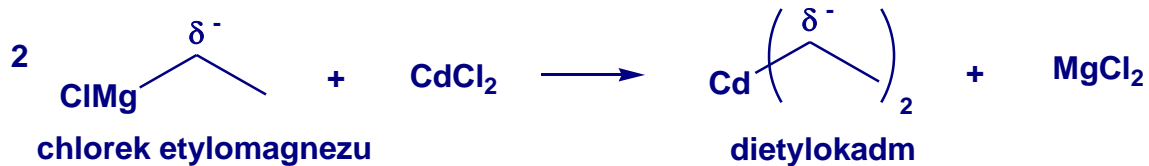
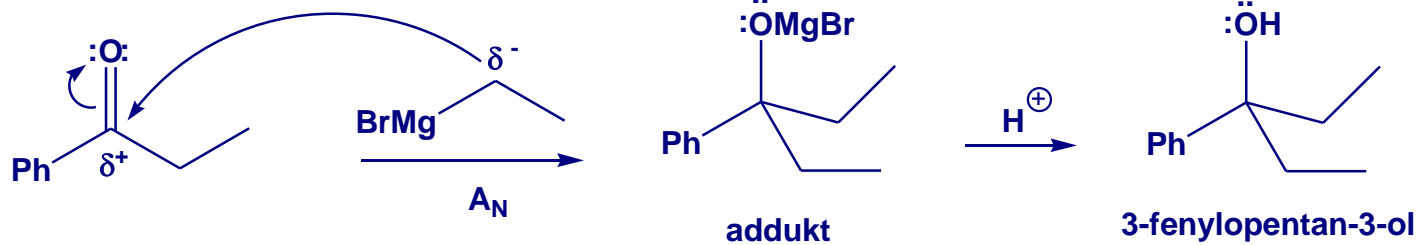
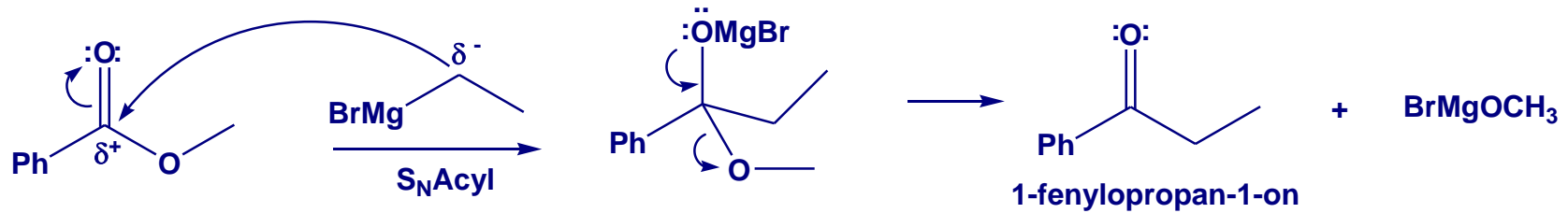
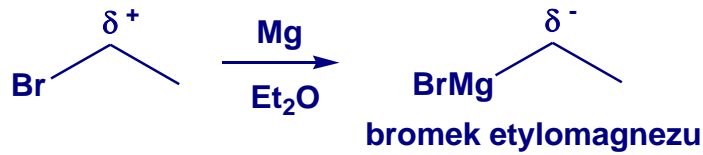
Przebiega podobnie do hydrolizy czy aminolizy, odczynnikiem nukleofilowym jest alkohol / alkoholan



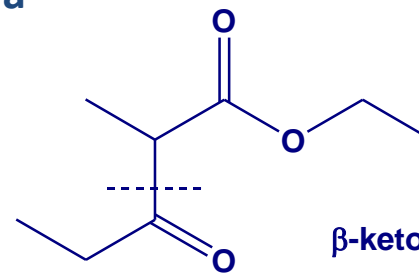
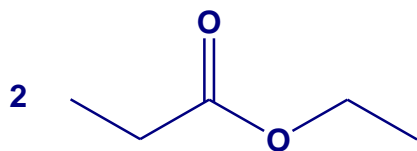
Podobna reakcja acylowania kwasu salicylowego: slajd nr 3



Reakcja z odczynnikami metaloorganicznymi



Kondensacja Claisena

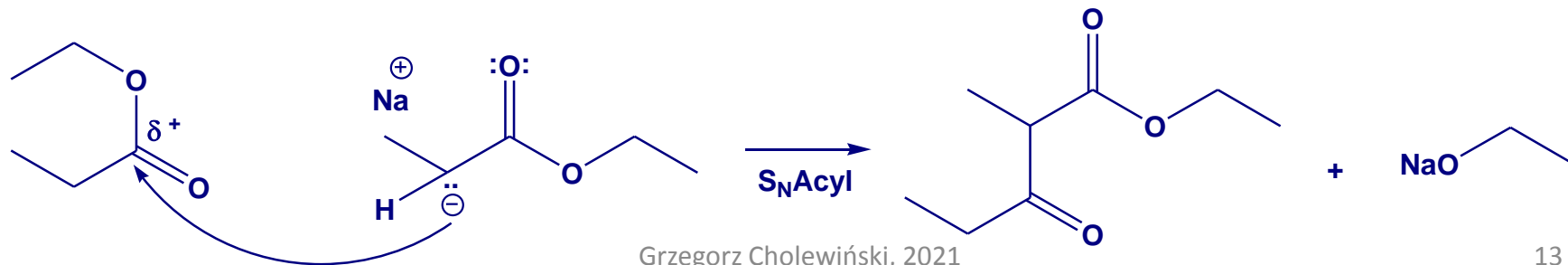
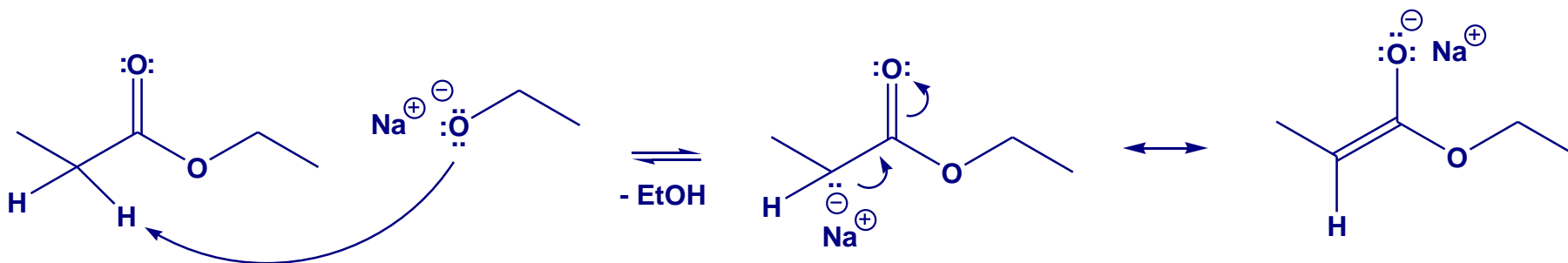
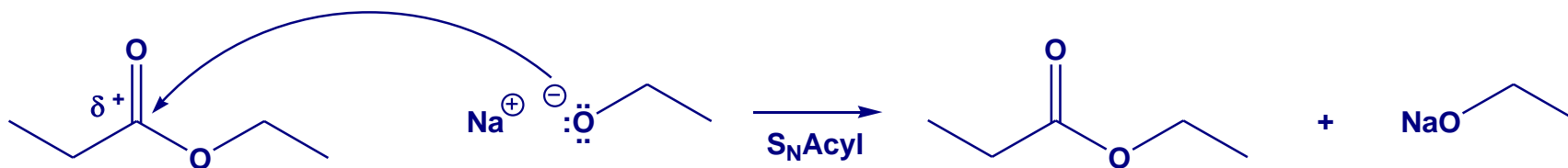


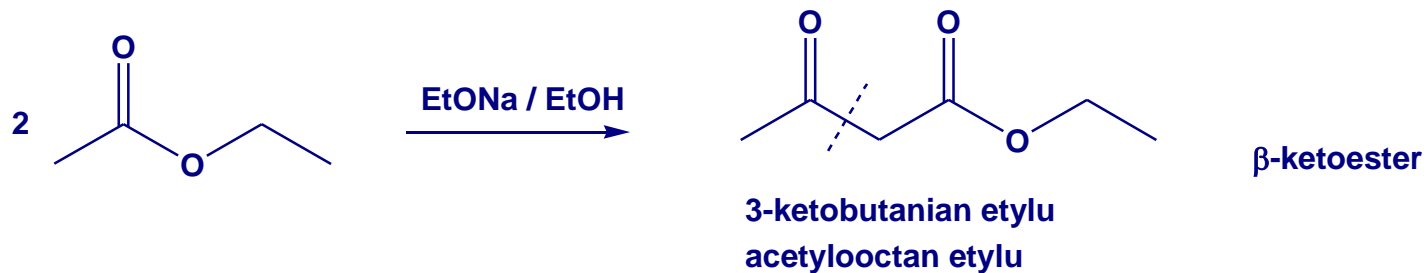
β -ketoester

+ EtONa

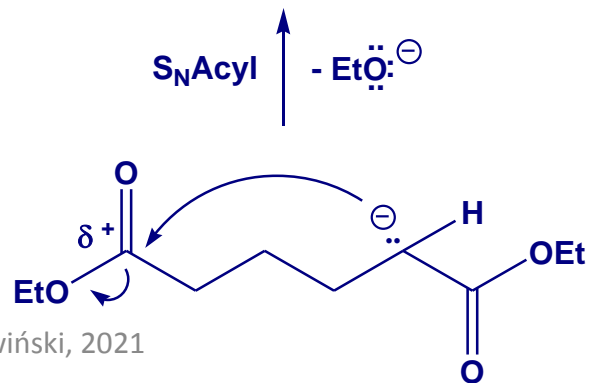
3-keto-2-metylopentanian etylu

β -keto-2-metylopentanian etylu

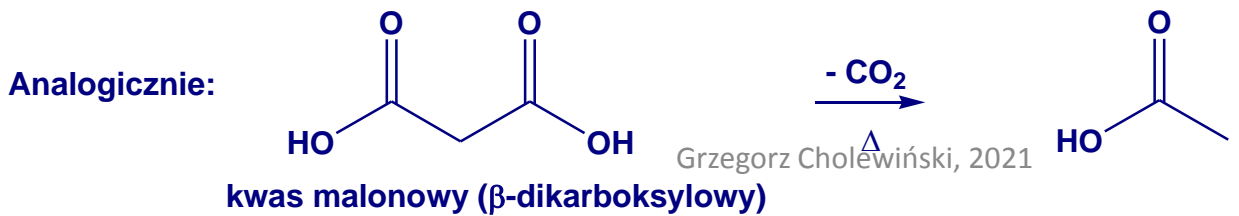
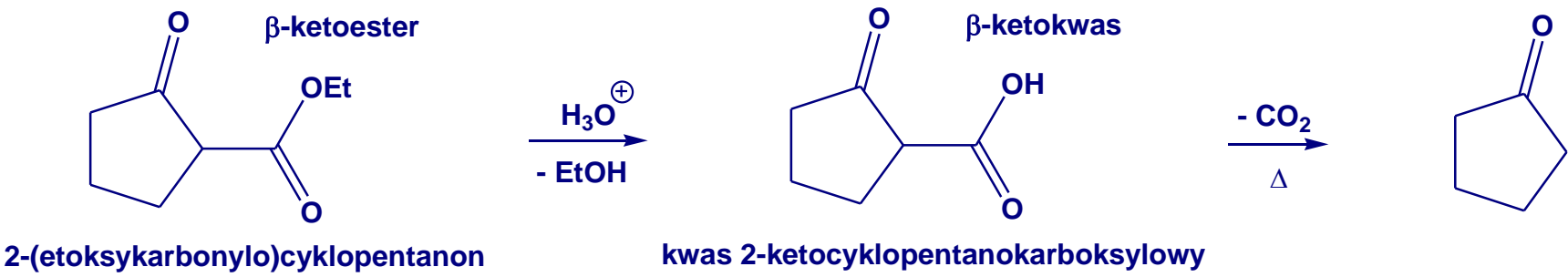
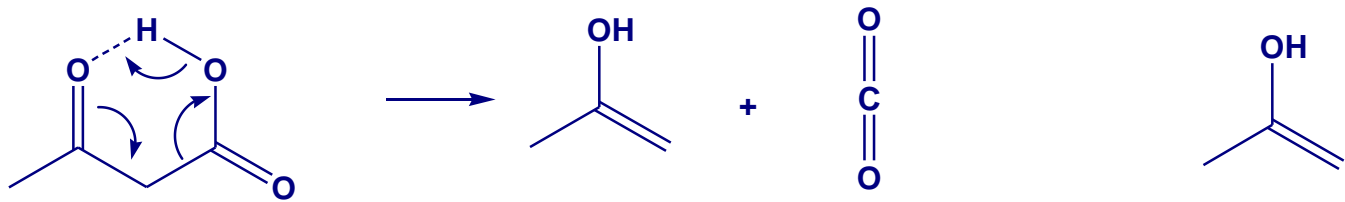
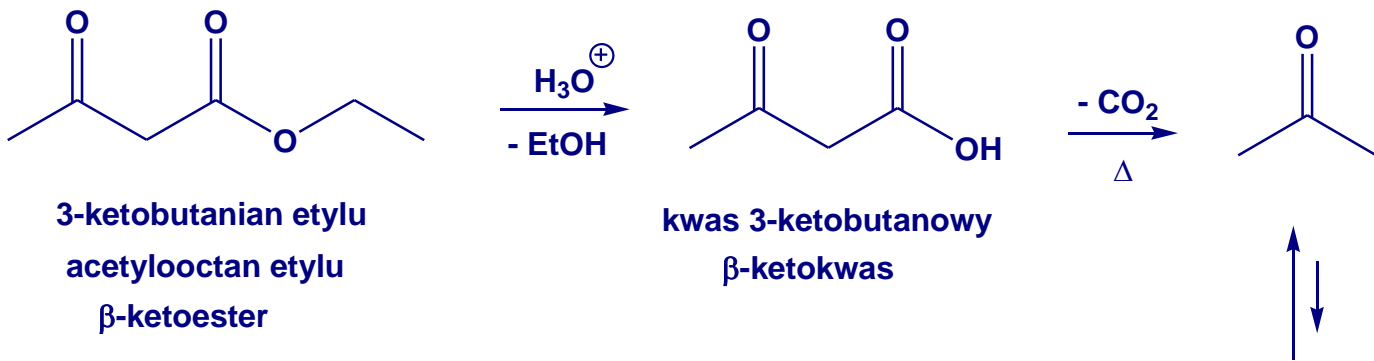




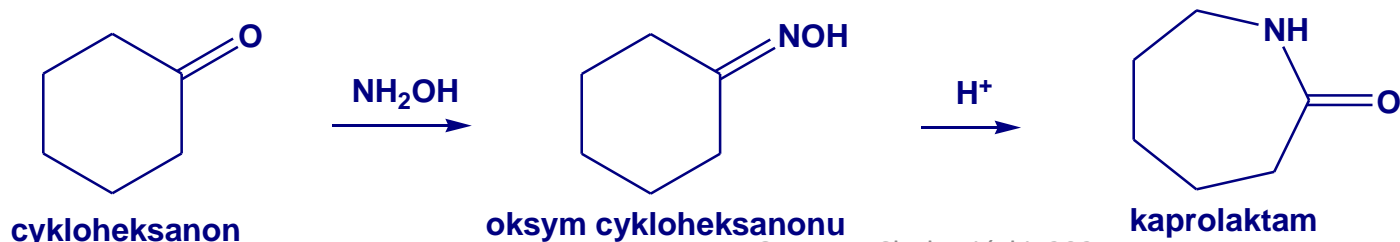
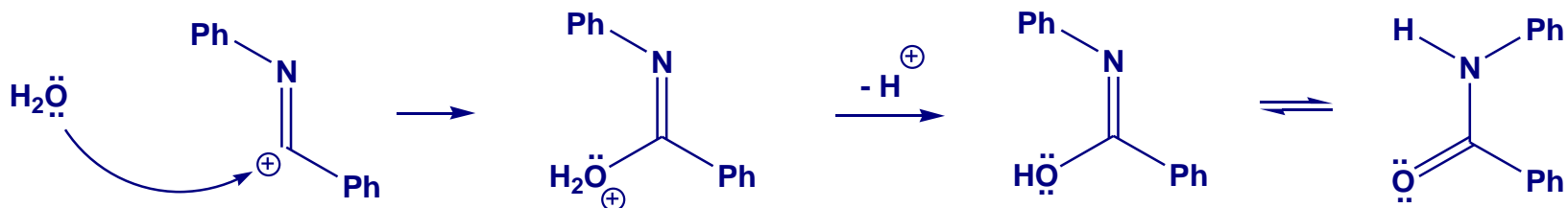
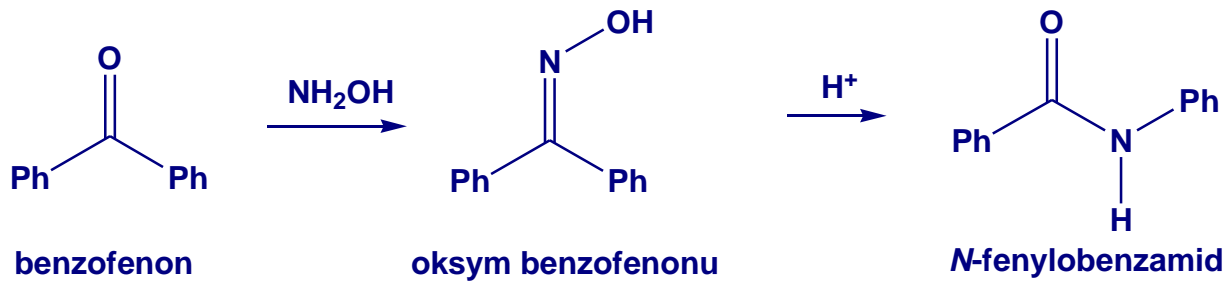
Kondensacja Dieckmanna



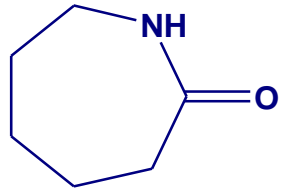
Dekarboksylacja β -ketokwasów



Przegrupowanie Beckmanna w syntezie amidów

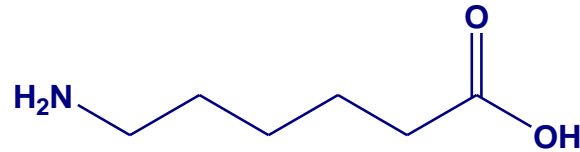


Poliamidy

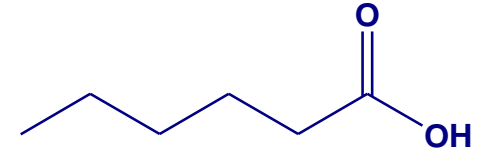


kaprolaktam

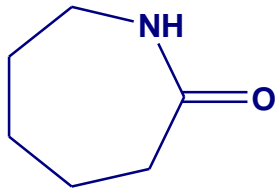
hydroliza



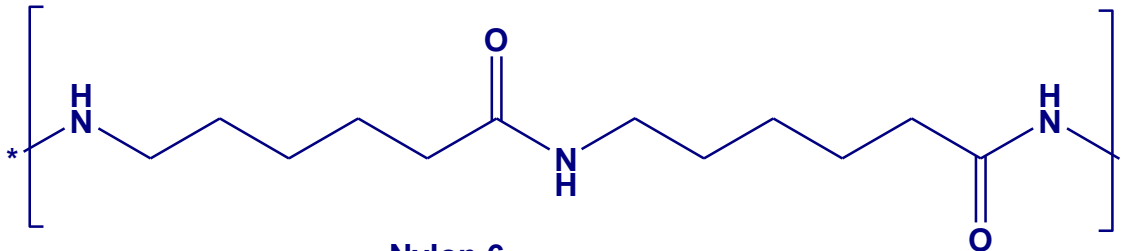
kwas ε-aminokapronowy



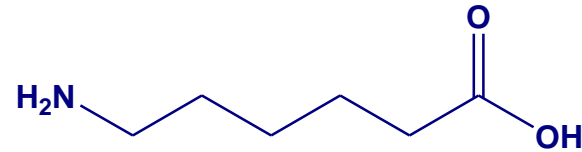
kwas kapronowy (heksanowy)



ROP (ring opening polymerization)

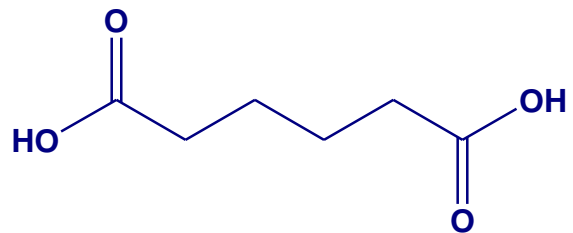


Nylon 6



polikondensacja





kwasy adypinowy

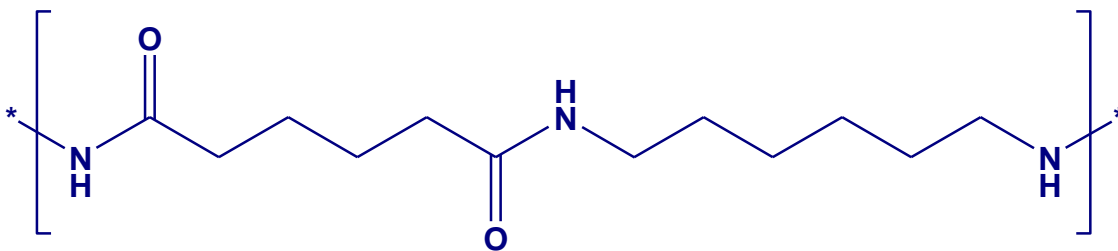
+



1,6-diaminoheksan

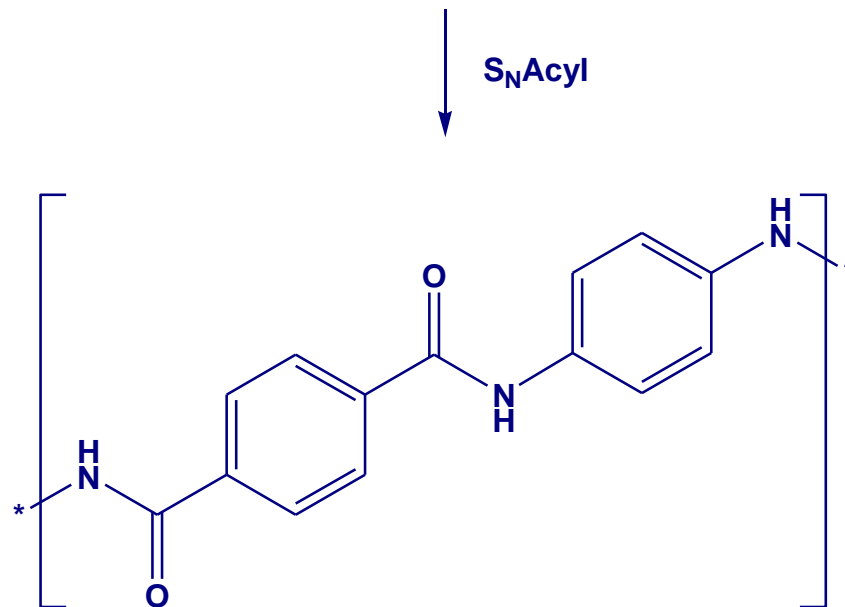
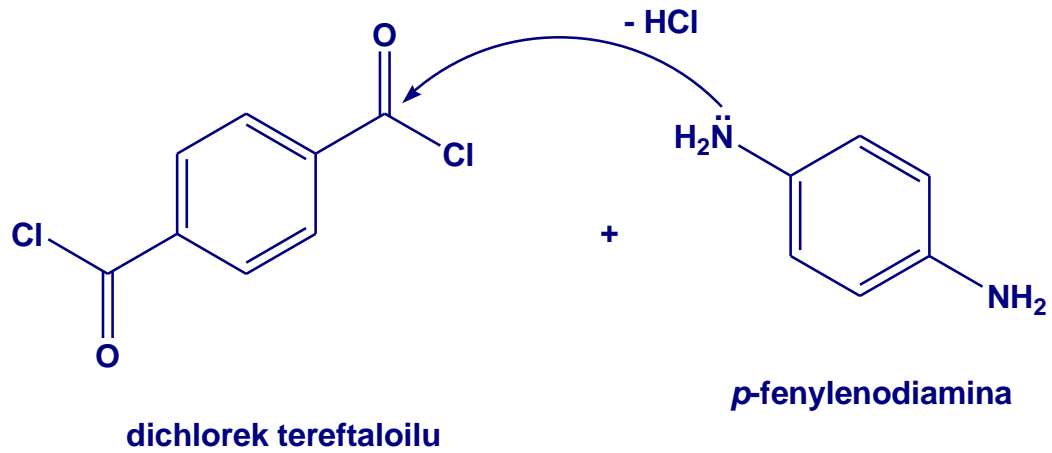


polikondensacja

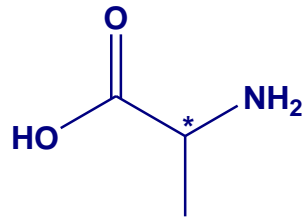


Nylon 66

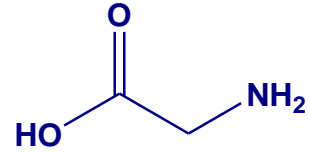
Przykład poliaramidu



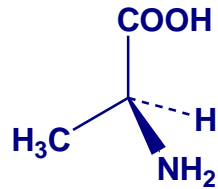
Peptydy i białka – naturalne amidy i poliamidy



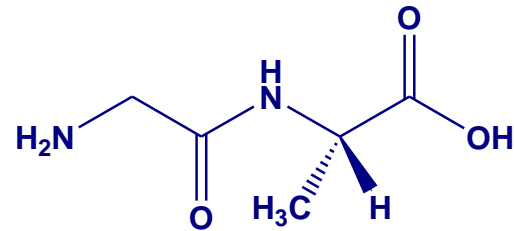
kwas 2-aminopropionowy
alanina



kwas aminooctowy
glicyna

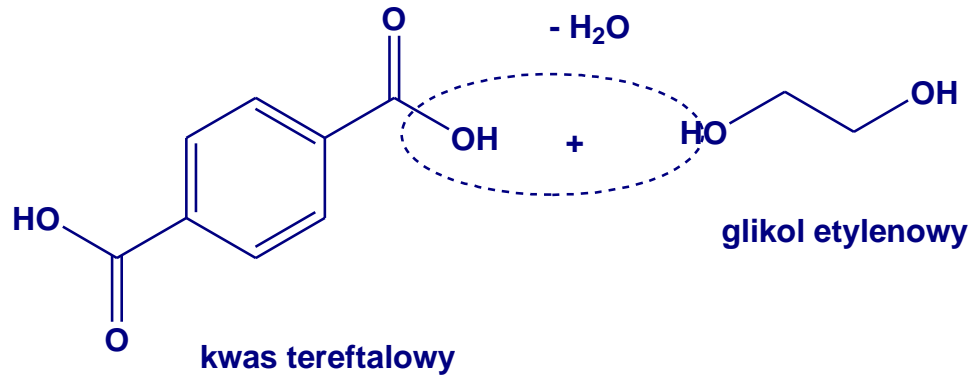


(S)-alanina

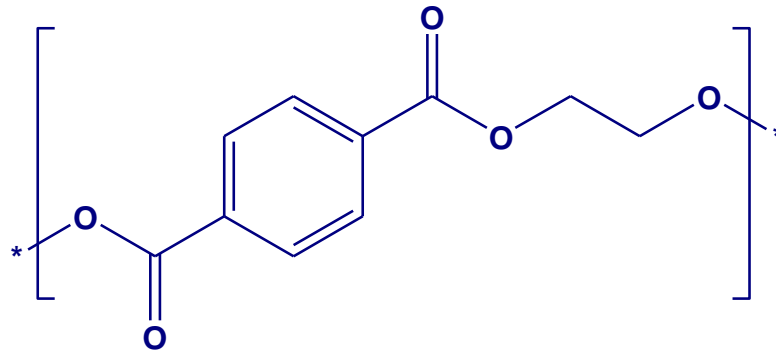


glicyloalanina
H-Gly-Ala-OH

Przykład poliestru

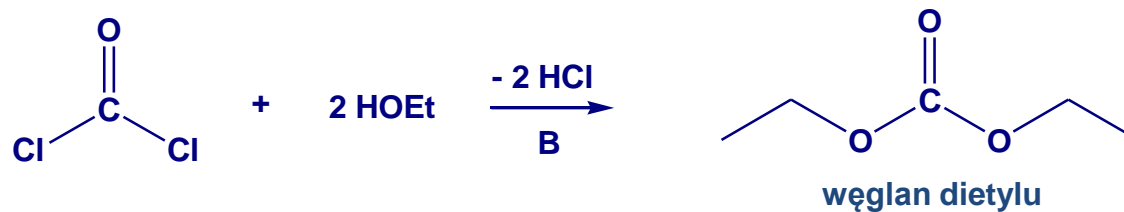
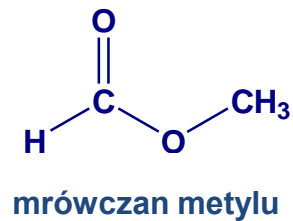
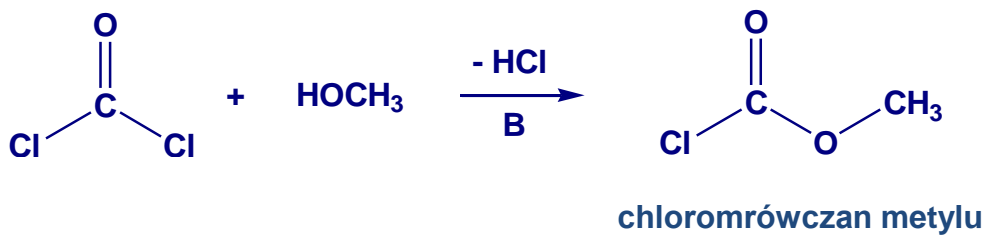
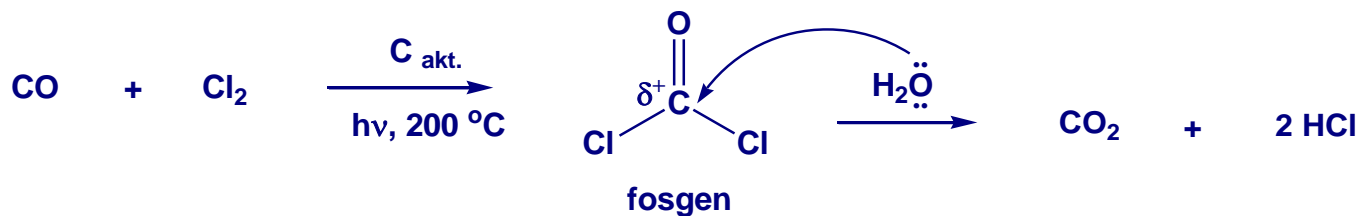
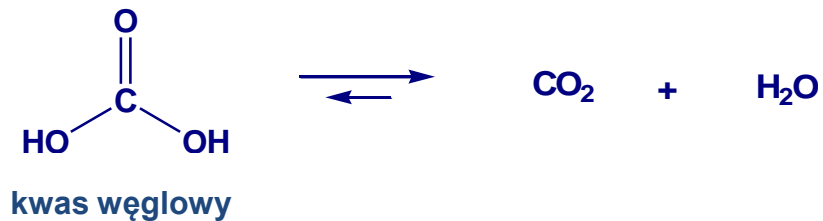


polikondensacja, poliestryfikacja

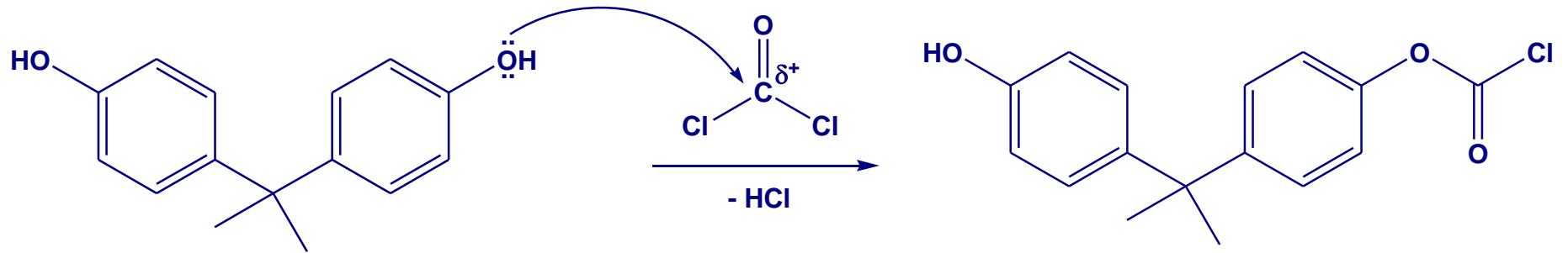


poli(tereftalan etylenu) PET

Pochodne kwasu węglowego



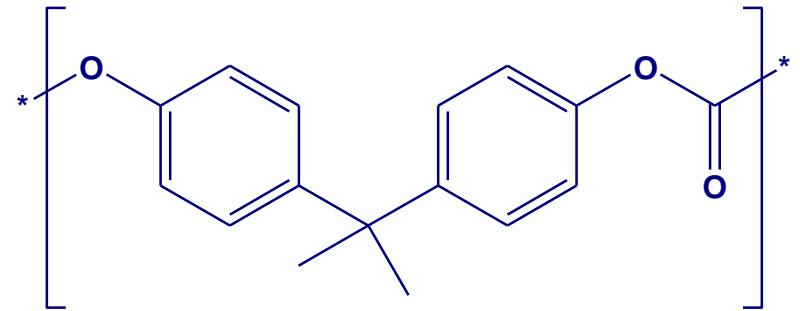
Przykład poliwęglanu



Bisfenol A
Bisphenol A (BPA)
2,2-Bis(4-hydroksyfenylo)propan

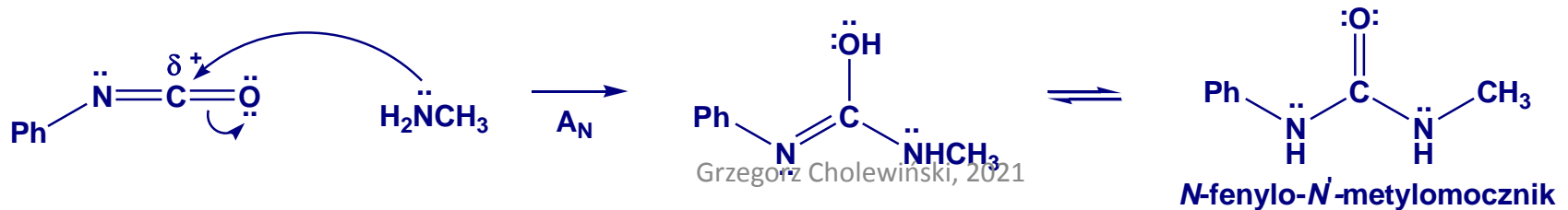
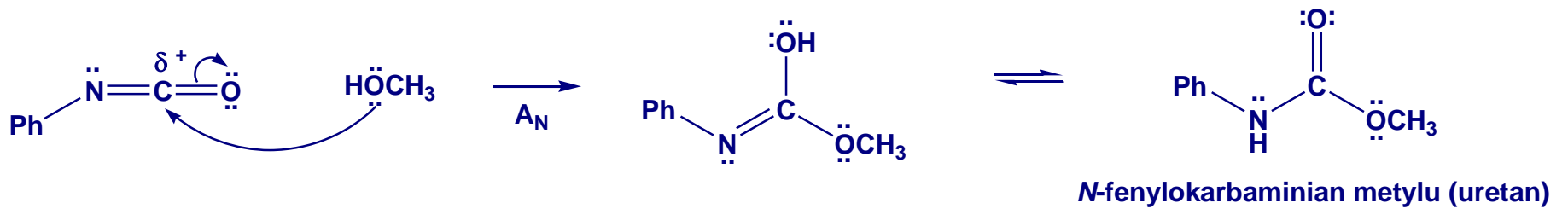
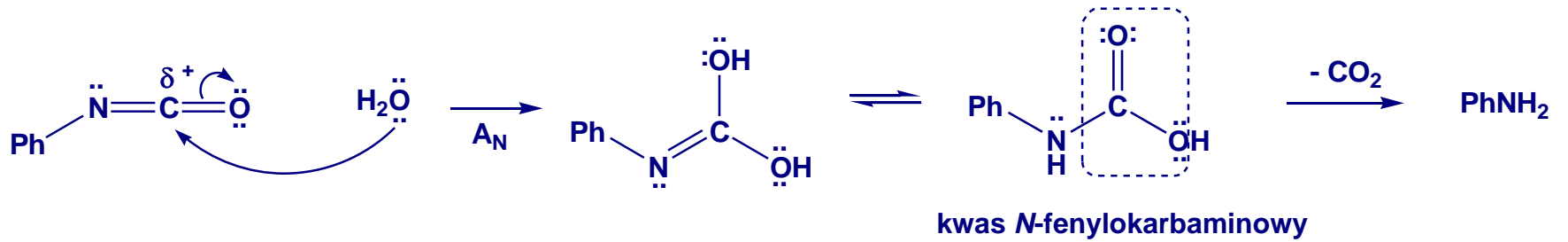
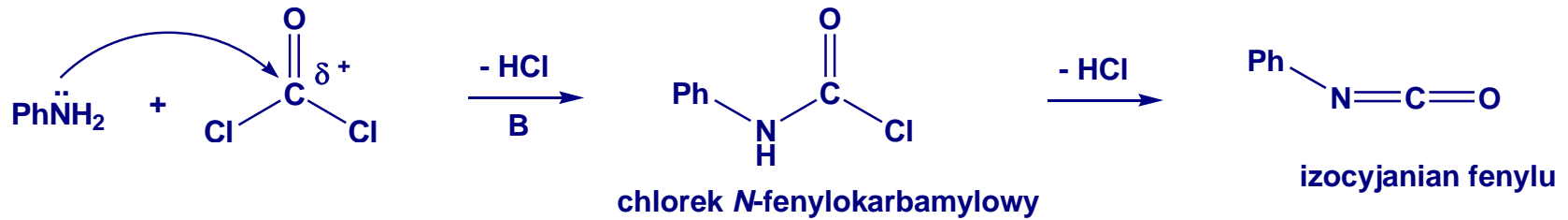
chloromrówczan

polikondensacja



poliwęglan (PC – polycarbonate)

Izocyjaniany



Przykład poliuretanu

