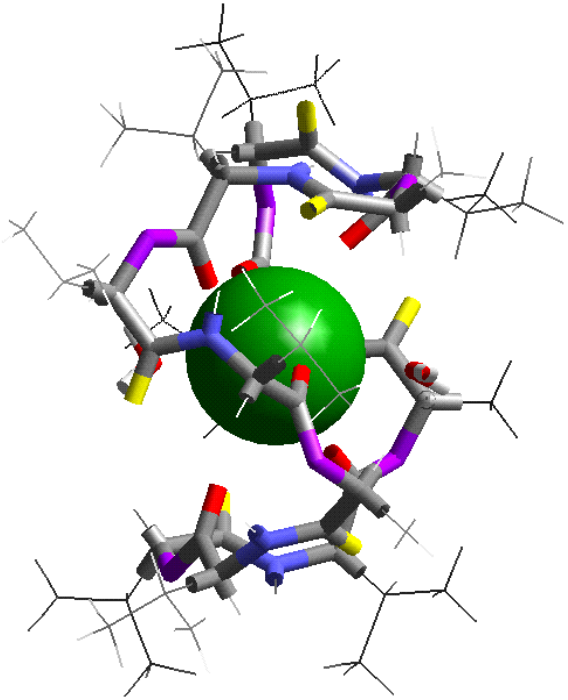
Organické sloučeniny kyslíku



Matej Kohutiar

http://www.wellesley.edu/Chemistry/chem227/lipids/transport.htm

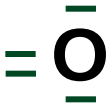
Organické sloučeniny kyslíku

- Alkoholy a fenoly
- Karbonylové sloučeniny
- Karboxylové kyseliny a deriváty
- Ethery

Elektronová konfigurace kyslíku

$1s^2$ $2s^2$ $2p^4$

In organic molecule oxygen is attached covalently



Elektronové efekty
indukční efekt

$$H_3C^{\delta\ \delta+} \rightarrow CH_2^{\ \delta+} \rightarrow Cl^{\ \delta-}$$

Hydroxyderiváty uhlovodíků

- Alkoholy (C_{sp3}-OH)
- Fenoly (C_{ar}-OH)
- Ethery (R-O-R)

Alkoholy

$$-C^{\delta+} \rightarrow O^{\delta-} \leftarrow H^{\delta+}$$

Alkoholy

- 1° alkohol: 1 uhlík ve vazbě na uhlík s hydroxylovou skupinou
- 2° alkohol: 2 uhlíky ve vazbě na uhlík s hydroxylovou skupinou
- 3° alkohol: 3 uhlíky ve vazbě na uhlík s hydroxylovou skupinou

Alkoholy

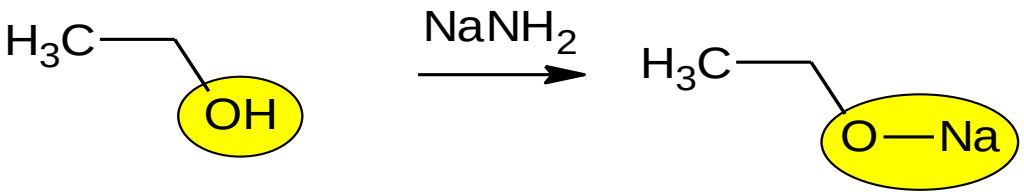
Podle počtu hydroxylových skupin v molekule:

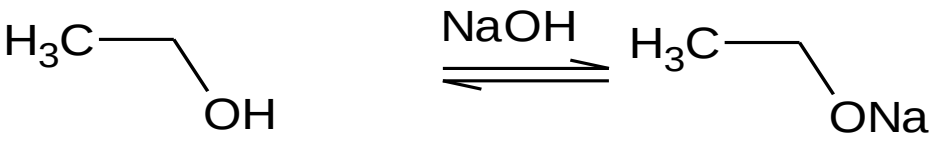
- Monohydroxyderiváty

- Polyhydroxy alkoholy (polyoly)
  Dioly (dihydroxyderiváty)
  Trioly (trihydroxyderiváty)
  Tetroly (tetrahydroxyderiváty)

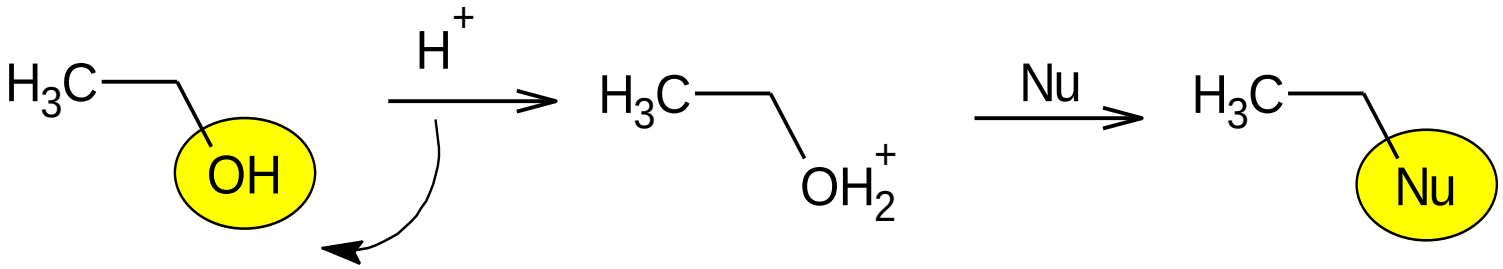
- Fenoly: -OH ve vazbě na aromatický cyklus

Acidita a alkalita

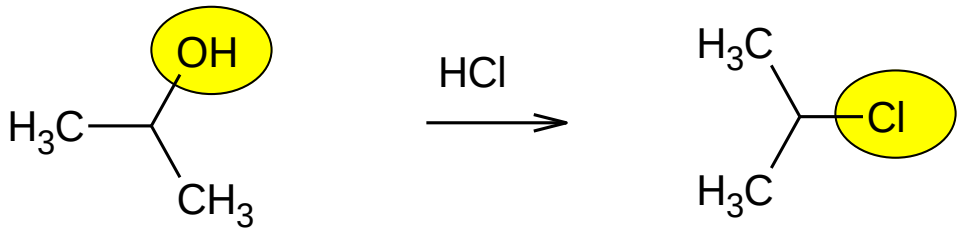


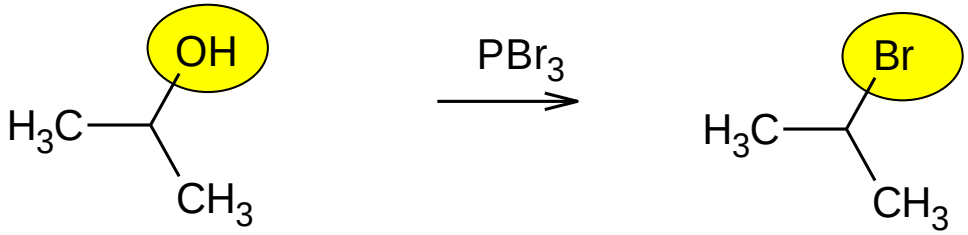


Nukleofilní substituce

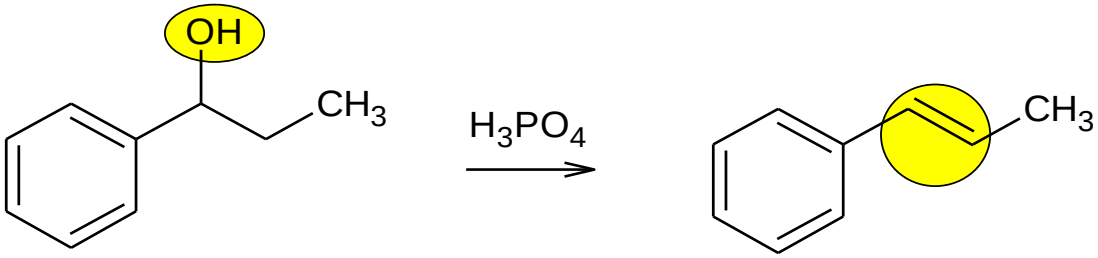


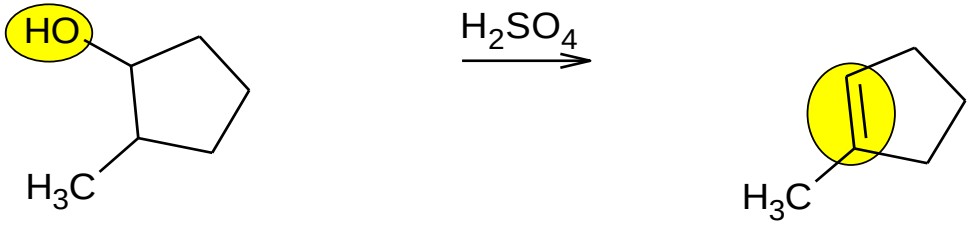
Nukleofilní substituce



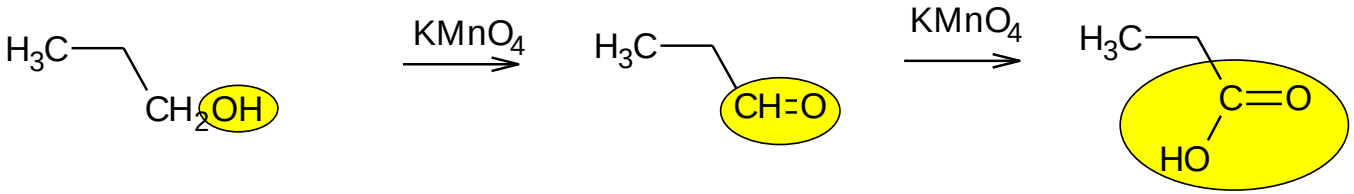


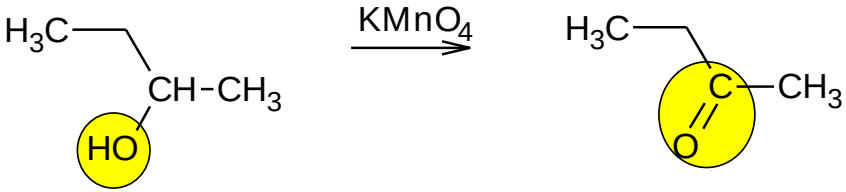
Eliminace

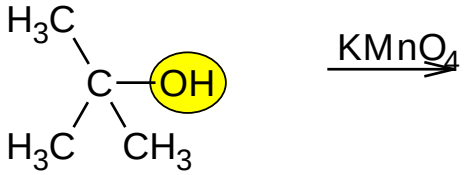




Oxidace alkoholů







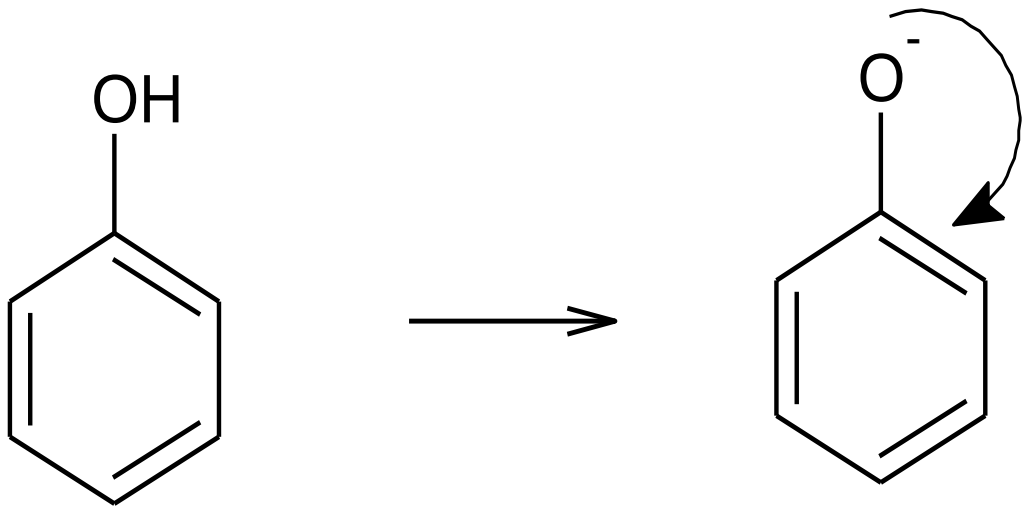
Biologické vlastnosti alkoholů

- Molekuly léčiv často obsahují OH skupinu
- Zvýšení polarity a rozpustnosti ve vodě
- Hypnotická aktivita stupá od terciárních k primárním a.
- Steroidy, hormony

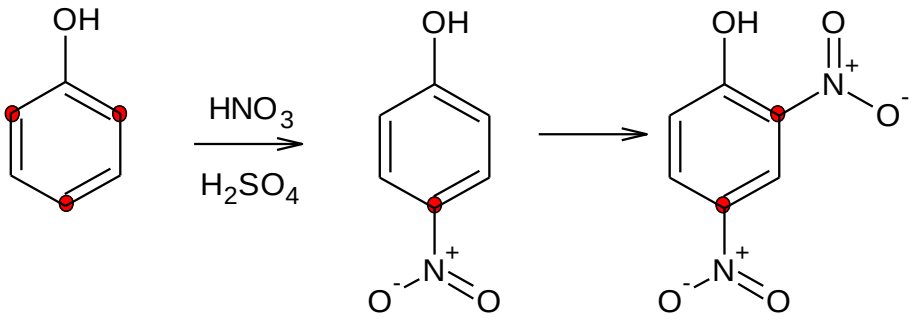
- Metanol
- Etanol
- Glycerol

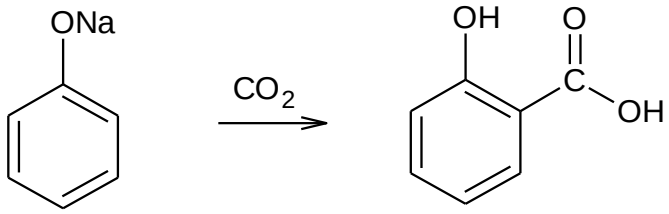
FENOLY

Fenoly

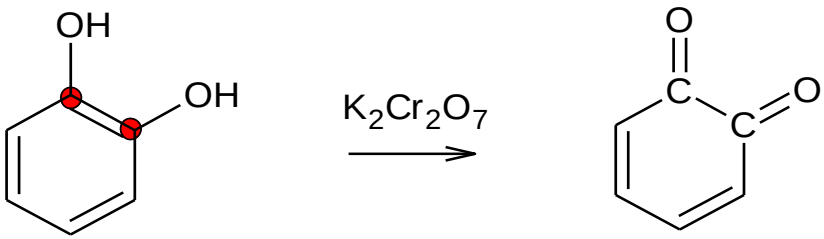


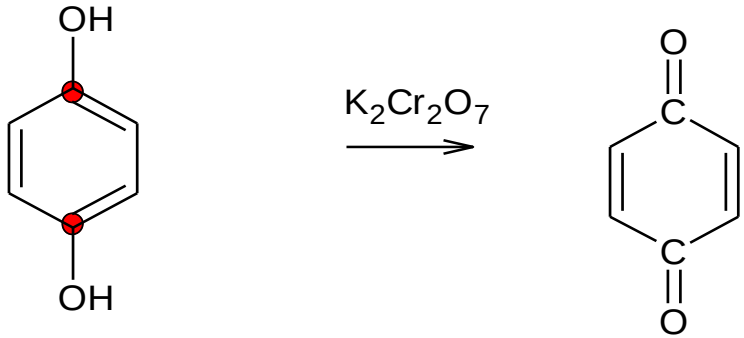
Reakce fenolů





Reakce fenolů



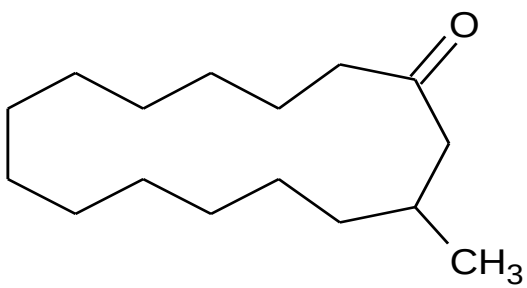


Biologické vlastnosti fenolů

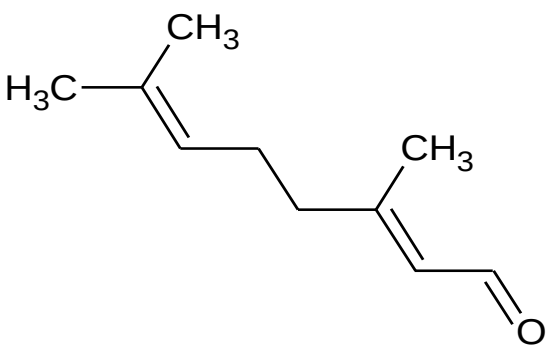
- Velmi reaktivní skupina

- Fenol
- Resorcinol
- Salicylová kyselina
- Acetylsalicylová kyselina

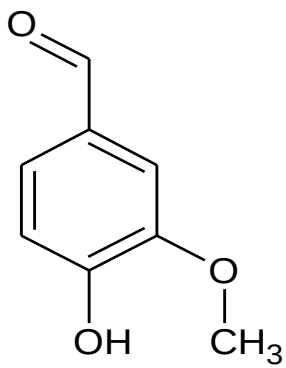
KARBONYLOVÉ SLOUČENINY



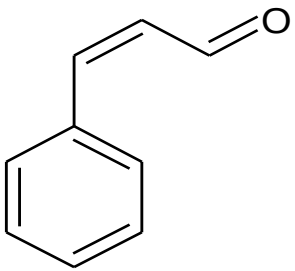
muscone



citral

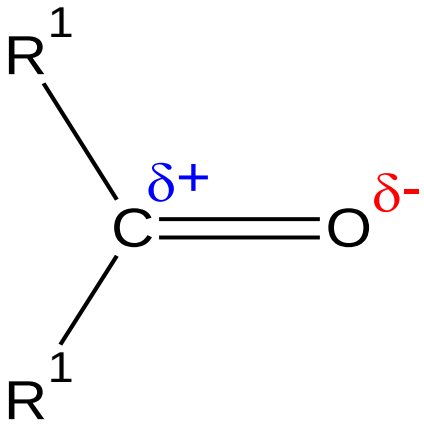


vanilin

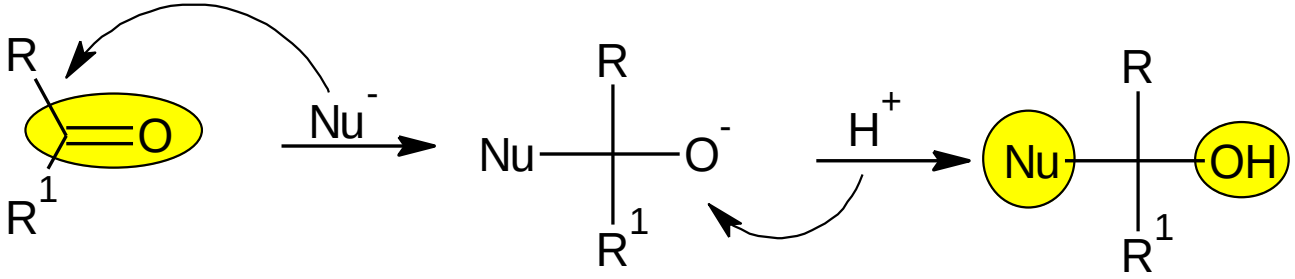


cinnamaldehyde

Reaktivita



Nukleofilní adice



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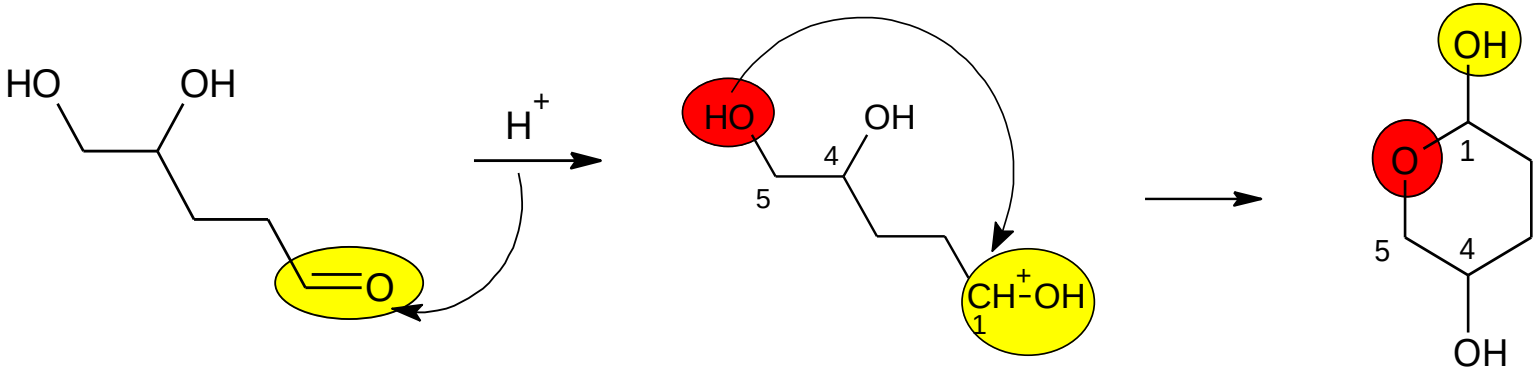

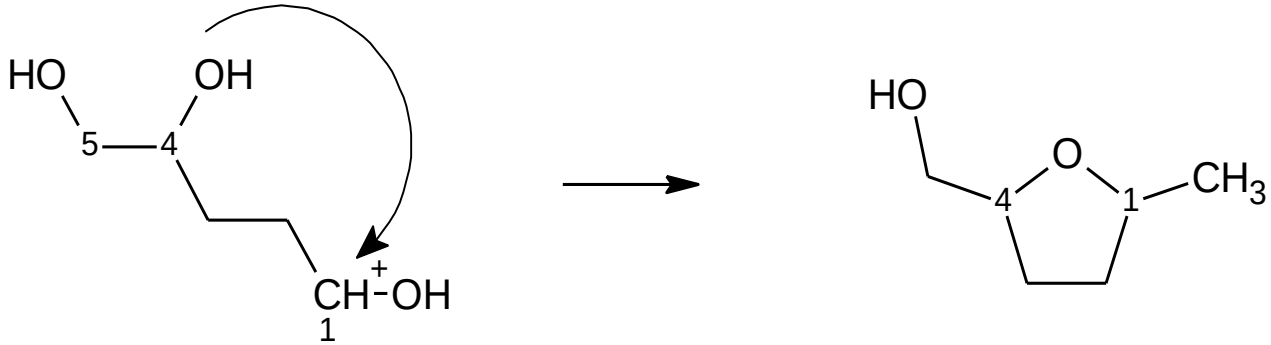

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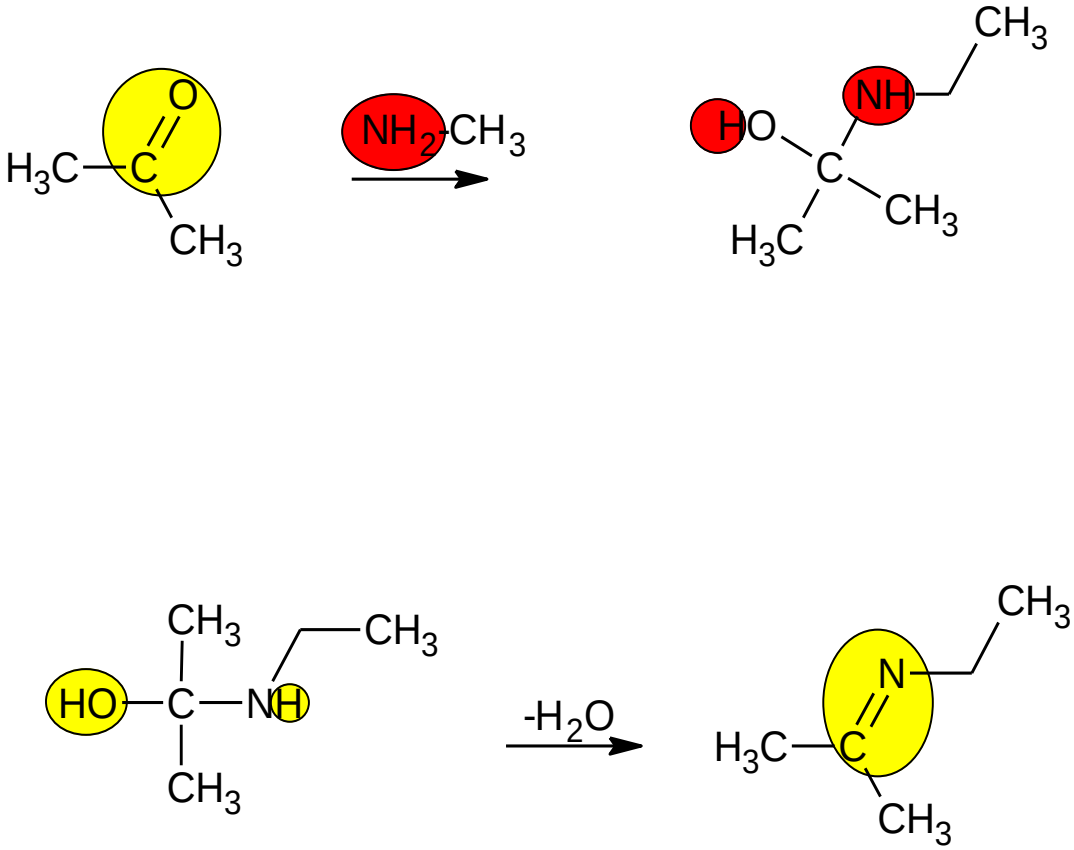
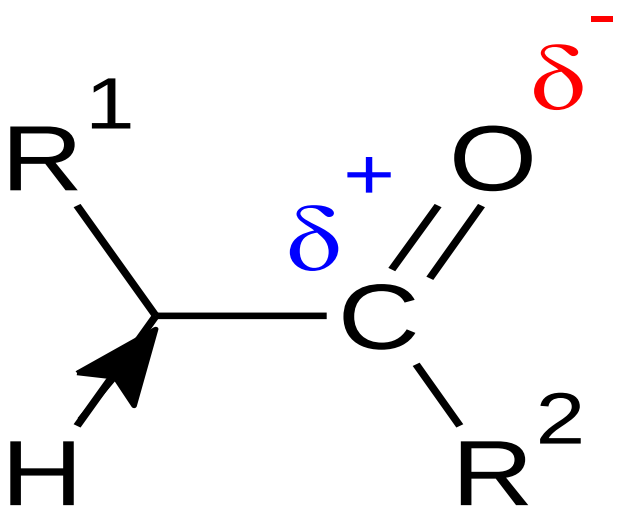
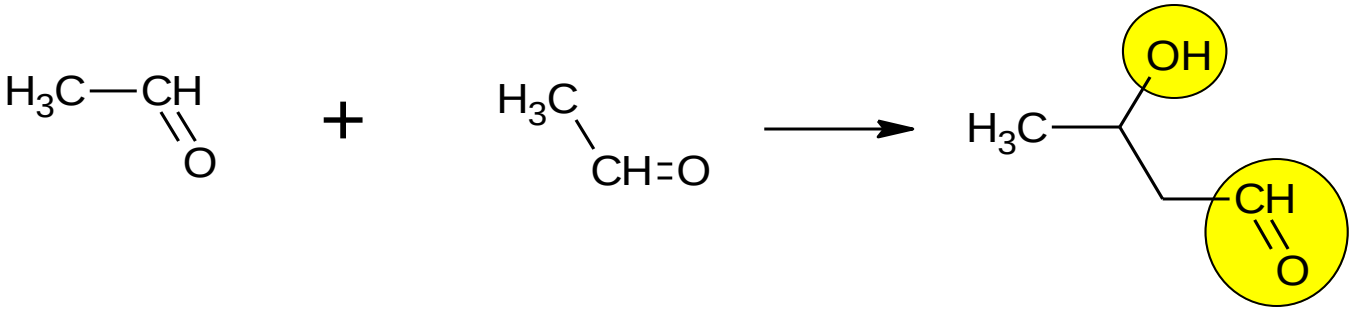


Aldolová kondenzace

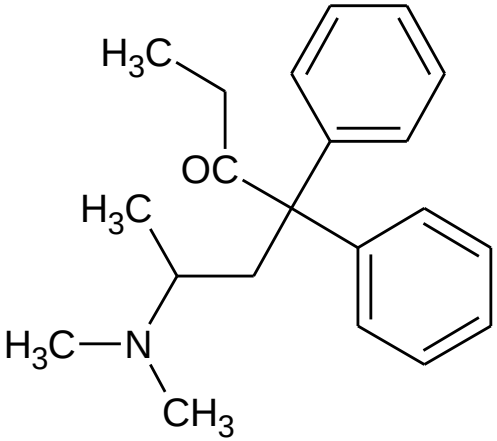


Aldolová kondenzace

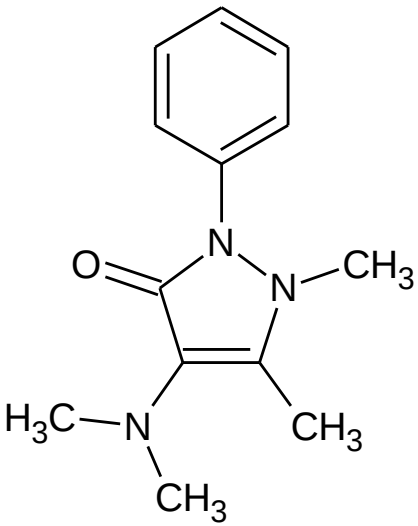


Biologické efekty karbonylových sloučenin

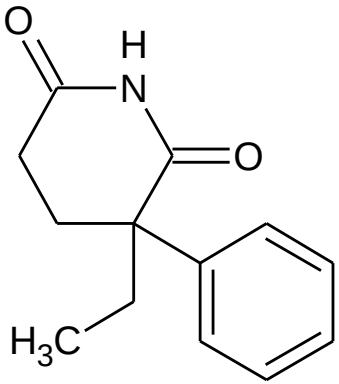
- Reaktivní skupina
- Formaldehyd
- Benzaldehyd
- Aceton
- Steroidní hormony



methadone



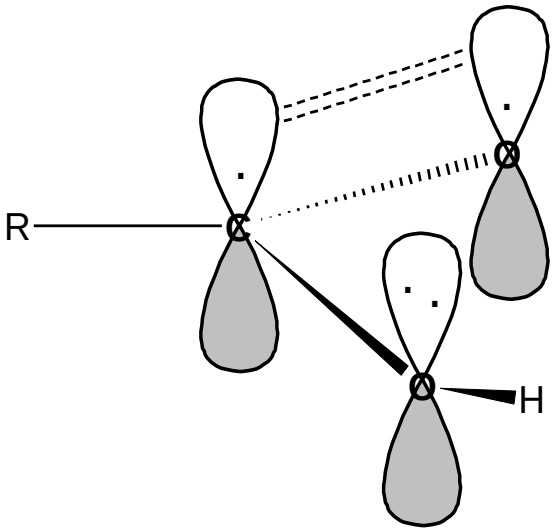
aminophenazon

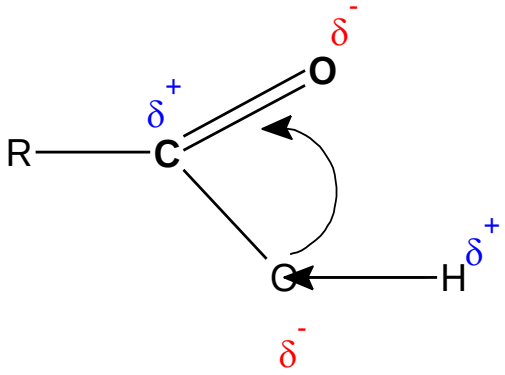


glutethimid

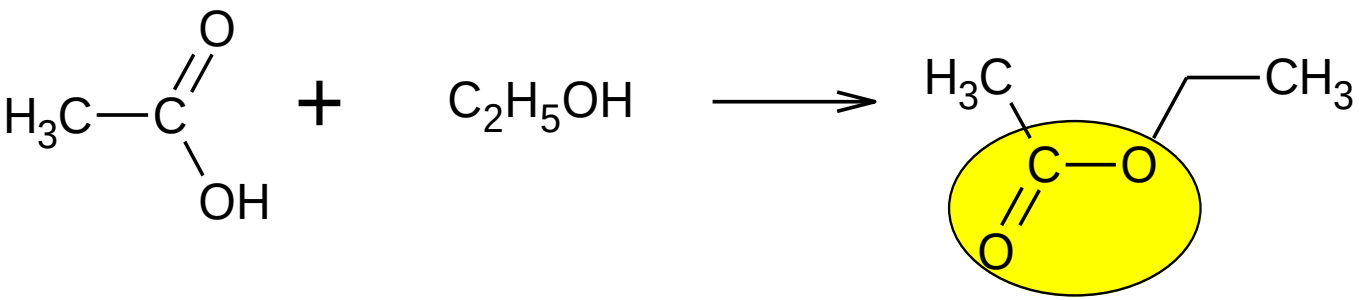
KARBOXYLOVÉ KYSELINY

Karboxylové kyseliny



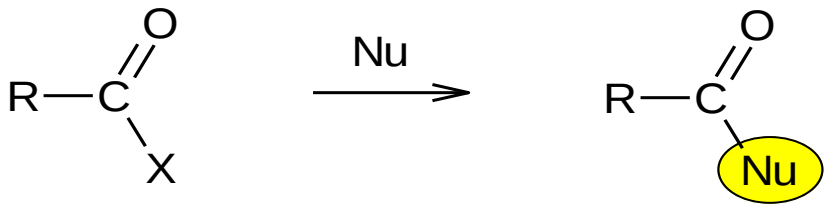


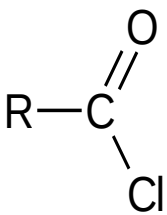
Nukleofilní substituce
esterifikace

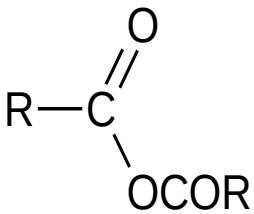


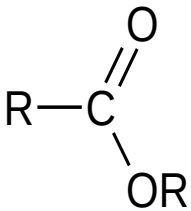
DERIVÁTY KK

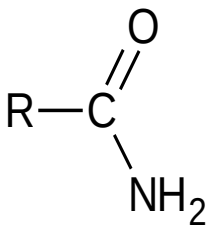
Funkční deriváty

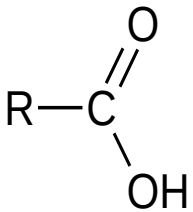




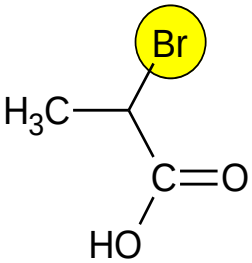


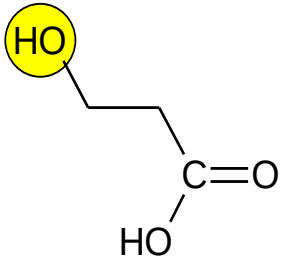


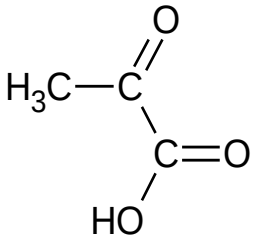


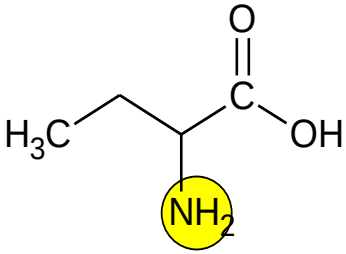


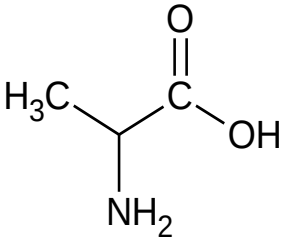
Substituční deriváty











Důležité substituční deriváty KK

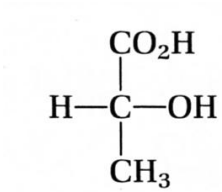
Dicarboxylic acids

HOOC-COOH – oxalic acid

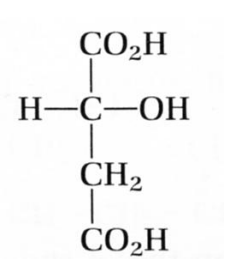
HOOC-CH_2-COOH – malonic acid

HOOC-CH_2-CH_2-COOH – succinic acid (citric cycle)

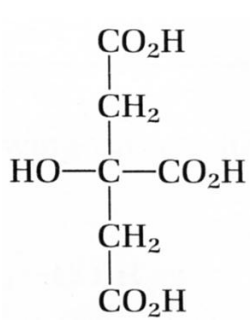
HCCO-CH_2-CH_2-CH_2-COOH – glutaric acid



lactic acid



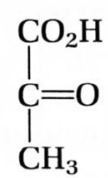
malic acid



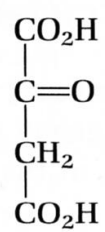
citric acid

-OH group containing acids

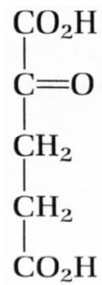
Ketoacids



pyruvic

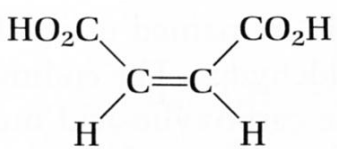


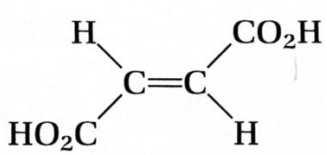
oxaloacetic acid



α-ketoglutaric acid

Unsaturated acids





Maleic acid and fumaric acid are geometric isomers