

## **CHEMICKÉ VZORCE**

**Monosacharidy**  
**Oligosacharidy**

**Aminokyseliny**

**Lipidy**  
**Složky lipidů**

**Nukleové kyseliny**  
**Složky nukleových kyselin**

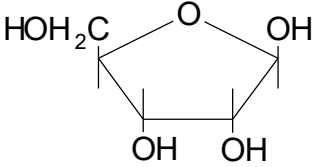
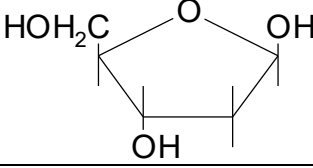
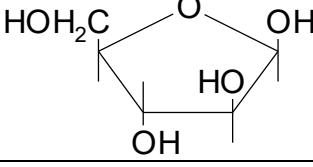
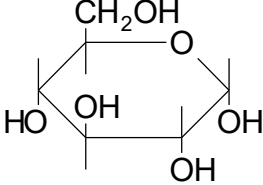
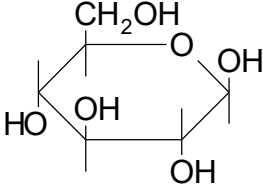
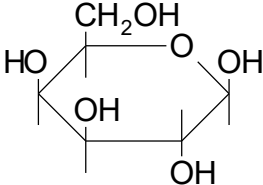
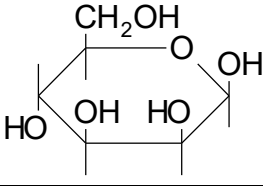
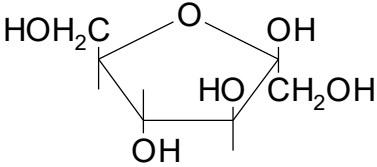
**Karoteny**  
**Xanthofyly**  
**Chlorofyly**  
**Chromatografie rostlinných barviv**

**Deriváty fenolu**

**Chromogenní substráty**

**Barevné reakce sacharidů**  
**Barevné reakce aminokyselin a bílkovin**

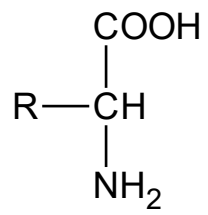
# MONOSACHARIDY

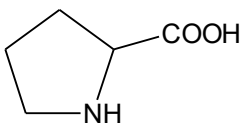
<b>PENTOSY</b>		
<b>aldopentosey</b>		
ribosa	$\beta$ -D-ribofuranosa	
deoxyribosa	2-deoxy- $\beta$ -D-ribofuranosa	
arabinsa	$\beta$ -D-arabinofuranosa	
<b>HEXOSY</b>		
<b>aldohexosey</b>		
glukosa	$\alpha$ -D-glukopyranosa	
glukosa	$\beta$ -D-glukopyranosa	
galaktosa	$\beta$ -D-galaktopyranosa	
mannosa	$\beta$ -D-mannopyranosa	
<b>ketohexosey</b>		
fruktosa	$\beta$ -D-fruktofuranosa	

## OLIGOSACHARIDY

<b>DISACHARIDY</b>		
<b>redukující</b>		
maltosa	4-O- $\alpha$ -D-glukopyranosyl-D-glukopyranosa	
cellobiosa	4-O- $\beta$ -D-glukopyranosyl-D-glukopyranosa	
laktosa	4-O- $\beta$ -D-galaktopyranosyl-D-glukopyranosa	
<b>neredukující</b>		
trehalosa	$\alpha$ -D-glukopyranosyl- $\alpha$ -D-glukopyranosid	
sacharosa	$\alpha$ -D-glukopyranosyl- $\beta$ -D-fruktofuranosid	
<b>TRISACHARIDY</b>		
<b>neredukující</b>		
rafinosa	4-O- $\alpha$ -D-galaktopyranosyl- $\alpha$ -D-glukopyranosyl- $\beta$ -D-fruktofuranosid	

# AMINOKYSELINY

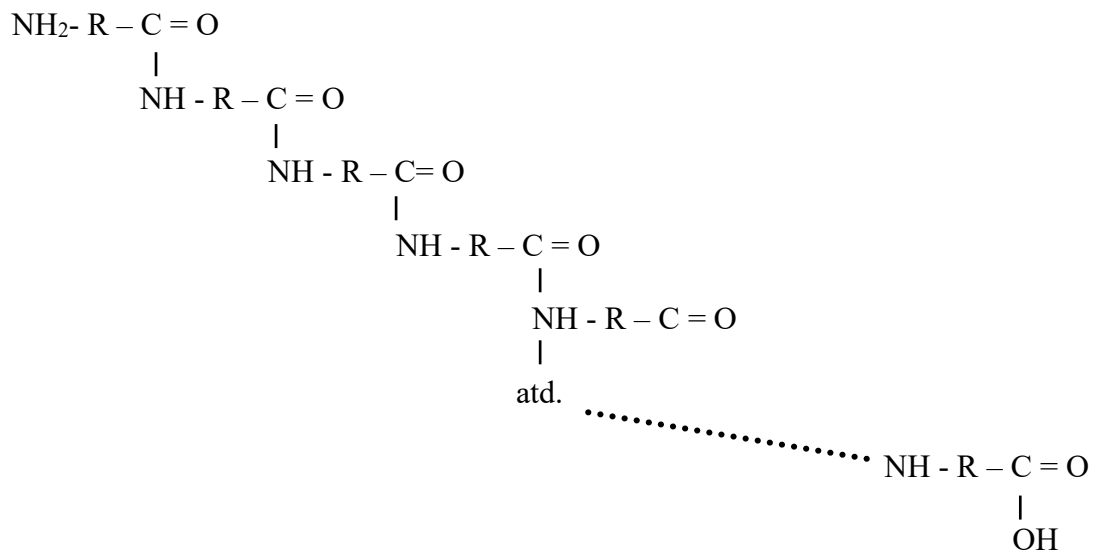


aminokyselina		R =
glycin	gly	H ———
alanin	ala	CH <sub>3</sub> ———
valin	val	$  \begin{array}{c}  \text{H}_3\text{C} \\  \diagdown \\  \text{CH} \text{ ———} \\  \diagup \\  \text{H}_3\text{C}  \end{array}  $
leucin	leu	$  \begin{array}{c}  \text{H}_3\text{C} \\  \diagdown \\  \text{CH}-\text{CH}_2 \text{ ———} \\  \diagup \\  \text{H}_3\text{C}  \end{array}  $
isoleucin	ile	$  \begin{array}{c}  \text{H}_3\text{C}-\text{CH}_2 \\  \diagdown \\  \text{CH} \text{ ———} \\  \diagup \\  \text{H}_3\text{C}  \end{array}  $
prolin	pro	

lysin	lys	
arginin	arg	
kyselina asparagová	asp	
kyselina glutamová	glu	
asparagin	asn	
glutamin	gln	
fenylalanin	phe	
tyrosin	tyr	
histidin	his	
tryptofan	trp	

serin	ser	HO-CH <sub>2</sub> —
cystein	cys	HS-CH <sub>2</sub> —
threonin	thr	$\begin{array}{c} \text{H}_3\text{C}-\text{CH}- \\   \\ \text{OH} \end{array}$
methionin	met	$\begin{array}{c} \text{H}_3\text{C}-\text{S}-\text{CH}_2-\text{CH}_2- \\   \\ \text{CH}_2 \end{array}$

**primární struktura bílkovin:**



## LIPIDY

(jednoduché /neutrální/ lipidy)

<b>monoacylglyceroly</b>	1-monoacylglycerol	$\begin{array}{c} \text{R-CO-O-CH}_2 \\   \\ \text{HO-CH} \\   \\ \text{HO-CH}_2 \end{array}$
	2-monoacylglycerol	$\begin{array}{c} \text{HO-CH}_2 \\   \\ \text{R-CO-O-CH} \\   \\ \text{HO-CH}_2 \end{array}$
<b>diacylglyceroly</b>	1,2-diacylglycerol	$\begin{array}{c} \text{R-CO-O-CH}_2 \\   \\ \text{R-CO-O-CH} \\   \\ \text{HO-CH}_2 \end{array}$
	1,3-diacylglycerol	$\begin{array}{c} \text{R-CO-O-CH}_2 \\   \\ \text{HO-CH} \\   \\ \text{R-CO-O-CH}_2 \end{array}$
<b>triacylglyceroly</b>		$\begin{array}{c} \text{R-CO-O-CH}_2 \\   \\ \text{R-CO-O-CH} \\   \\ \text{R-CO-O-CH}_2 \end{array}$

R = alifatický řetězec (zbytek mastné kyseliny)

## SLOŽKY LIPIDŮ

glycerol		$  \begin{array}{c}  \text{HO} - \text{CH}_2 \\    \\  \text{HO} - \text{CH} \\    \\  \text{HO} - \text{CH}_2  \end{array}  $
<b>mastné kyseliny</b>		
<i>nasyčené</i>		
palmitová	$\text{C}_{16}\text{H}_{32}\text{O}_2$	$\text{CH}_3 - (\text{CH}_2)_{14} - \text{COOH}$
stearová	$\text{C}_{18}\text{H}_{36}\text{O}_2$	$\text{CH}_3 - (\text{CH}_2)_{16} - \text{COOH}$
<i>nenasyčené</i>		
olejová	$\text{C}_{18}\text{H}_{34}\text{O}_2$ (18 : 1)	$\text{CH}_3 - (\text{CH}_2)_7 - \text{CH} = \text{CH} - (\text{CH}_2)_7 - \text{COOH}$
linolová	$\text{C}_{18}\text{H}_{32}\text{O}_2$ (18 : 2)	$\text{CH}_3 - (\text{CH}_2)_4 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH} - (\text{CH}_2)_7 - \text{COOH}$
linolenová	$\text{C}_{18}\text{H}_{30}\text{O}_2$ (18 : 3)	$\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH} - (\text{CH}_2)_7 - \text{COOH}$
arachidonová	$\text{C}_{20}\text{H}_{32}\text{O}_2$ (20 : 4)	$\text{CH}_3 - (\text{CH}_2)_4 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH} - (\text{CH}_2)_3 - \text{COOH}$

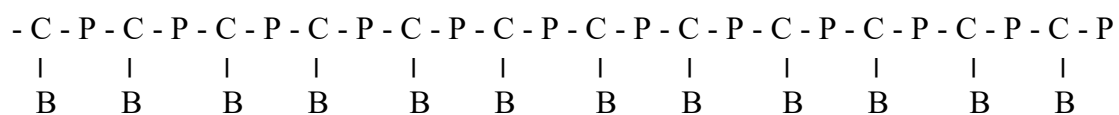


## NUKLEOVÉ KYSELINY

RNA - kyselina ribonukleová

DNA - kyselina deoxyribonukleová

### primární struktura:

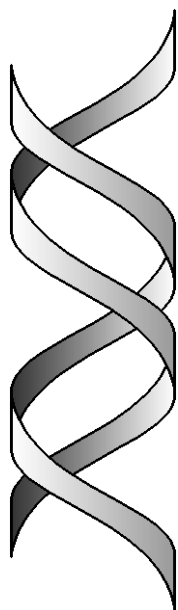


C = cukerný zbytek

P = fosfátový zbytek

B = báze

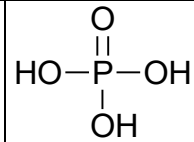
### sekundární struktura DNA:



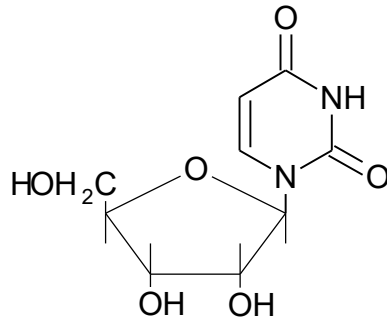
## SLOŽKY NUKLEOVÝCH KYSELIN

<b>CUKERNÉ SLOŽKY</b>		
ribosa	RNA	
deoxyribosa	DNA	
<b>BÁZE</b>		
<b>purinové</b>		
adenin	RNA, DNA	
guanin	RNA, DNA	
<b>pyrimidinové</b>		
cytosin	RNA, DNA	
uracil	RNA	
thymin	DNA	

## FOSFÁT

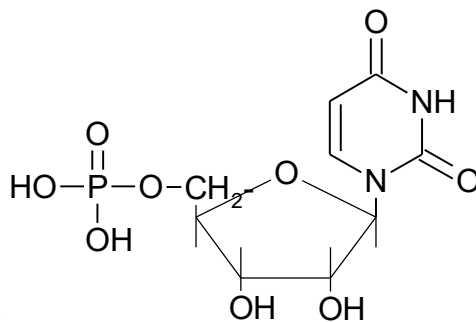


**nukleosid** = cukr + báze

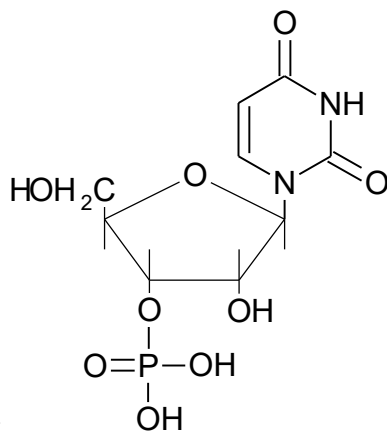


příklad: uridin

**nukleotid** = cukr + báze + fosfátový zbytek



příklad: uridin-5'-fosfát

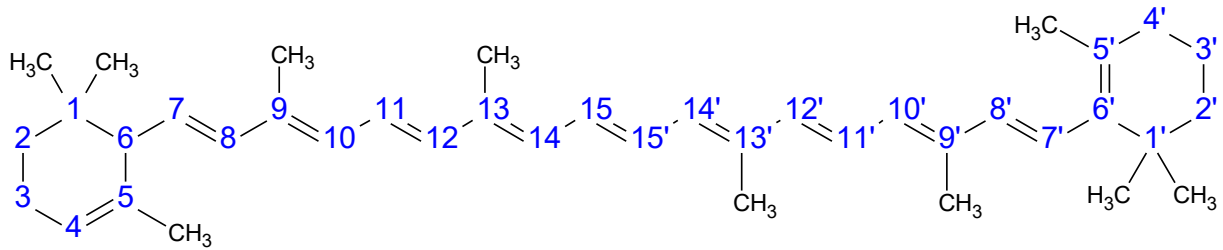


příklad: uridin-3'-fosfát

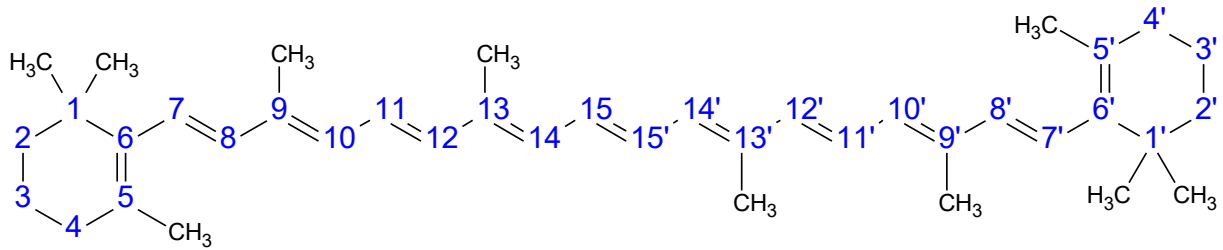
(NA = polynukleotid)

# KAROTENY

## $\alpha$ -karoten

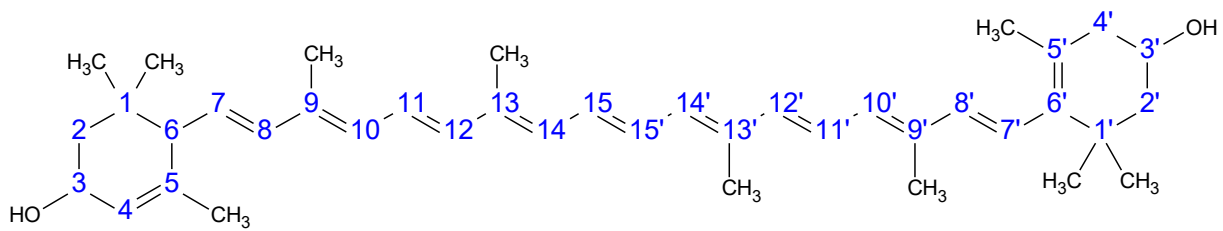


## $\beta$ -karoten



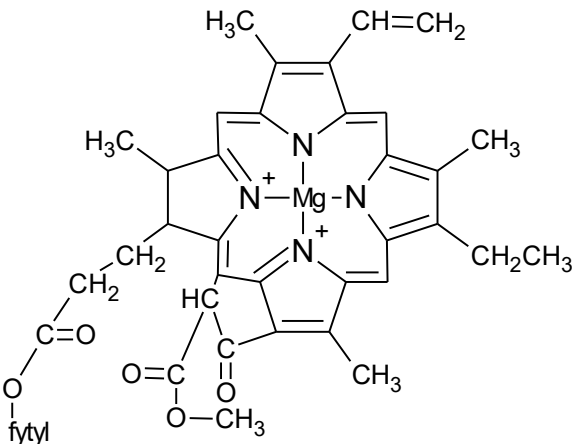
# XANTHOFYLY

## **lutein** (3,3'-dihydroxy- $\alpha$ -karoten)

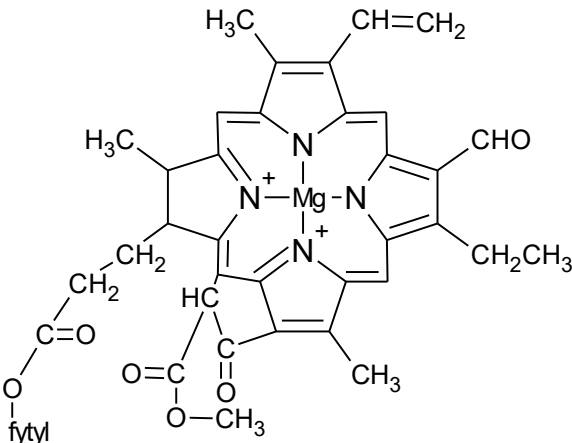


**CHLOROFYLY**

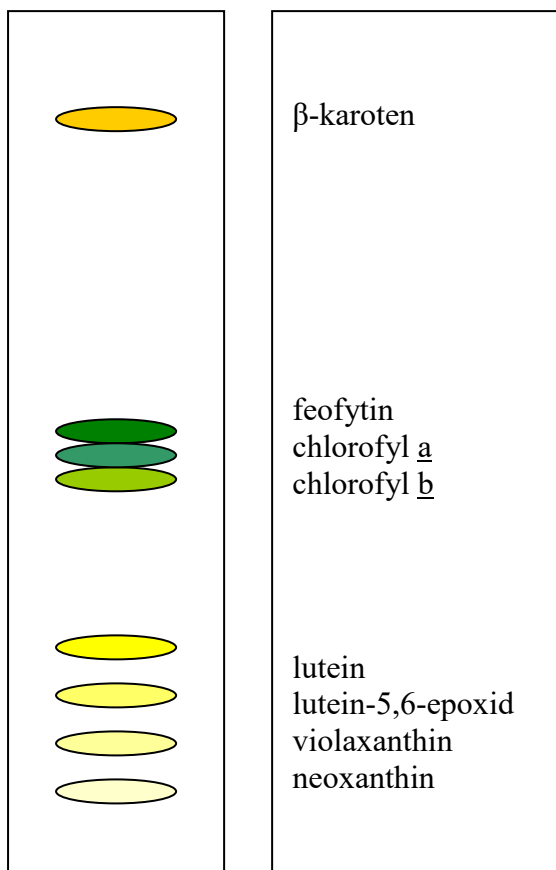
**chlorofyl a**



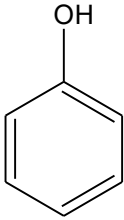
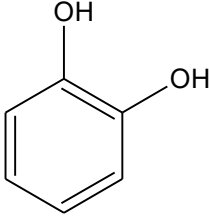
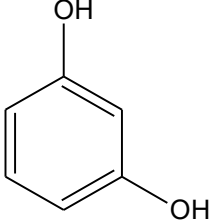
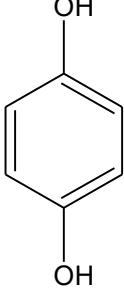
**chlorofyl b**

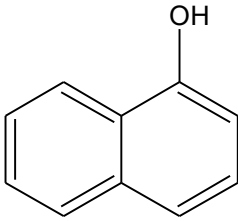
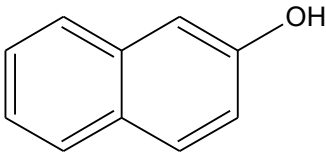
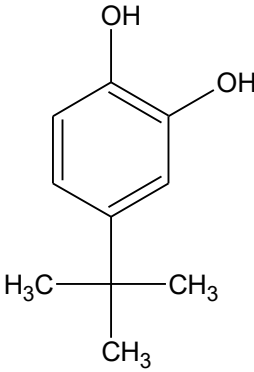


## Chromatografie rostlinných barviv

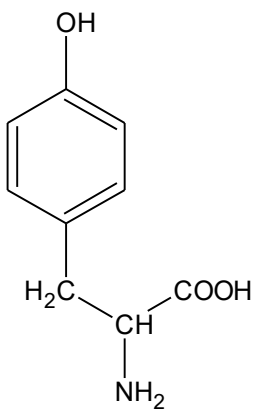
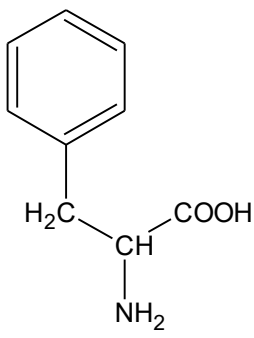
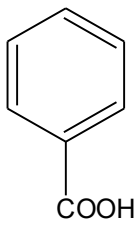
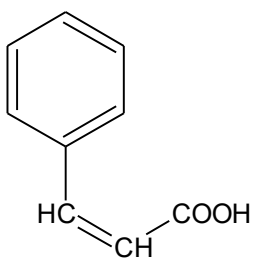


## DERIVÁTY FENOLU

fenol	hydroxybenzen	
pyrokatechol	1,2-dihydroxybenzen	
resorcin	1,3-dihydroxybenzen	
hydrochinon	1,4-dihydroxybenzen	

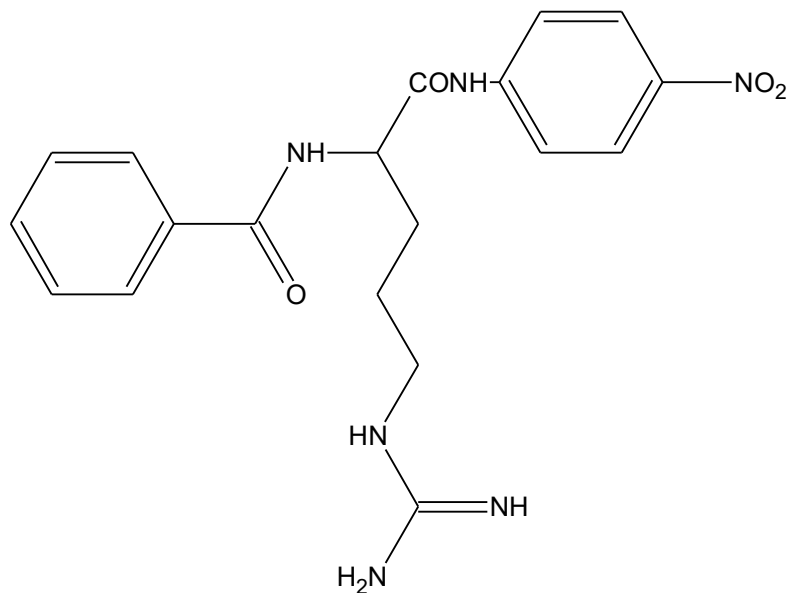
1-naftol		 <chem>Oc1ccc2ccccc12</chem>
2-naftol		 <chem>Oc1ccc2ccccc12</chem>
4-terciární butylkatechol		 <chem>CC(C)(C)c1ccc(O)c(O)c1</chem>



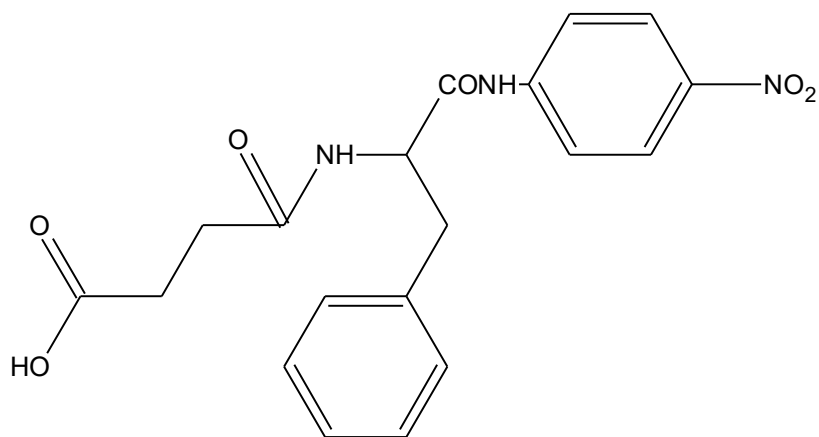
tyrosin		
fenylalanin		
kyselina benzoová		
kyselina skořicová	kyselina β-fenylakrylová	

## CHROMOGENNÍ SUBSTRÁTY

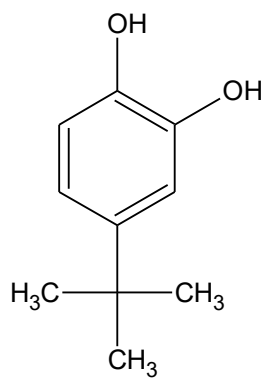
### **N $\alpha$ -benzoyl-D,L-arginin-p-nitroanilid (BAPNA)**



### **N-sukcinyl-L-fenylalanin-p-nitroanilid (SPPNA)**

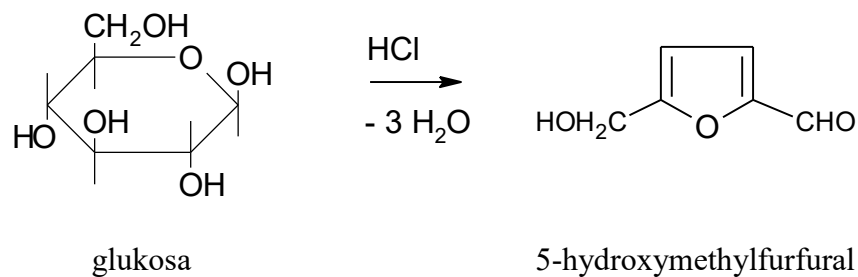
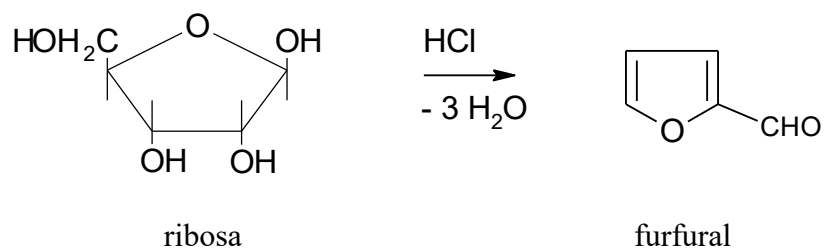


### 4-terciární butylkatechol (TBC)

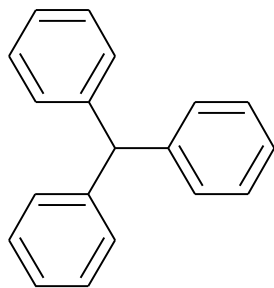


## BAREVNÉ REAKCE SACHARIDŮ

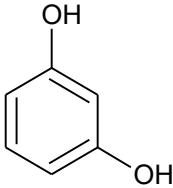
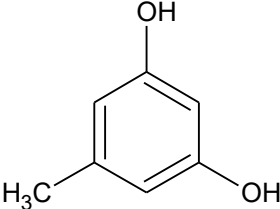
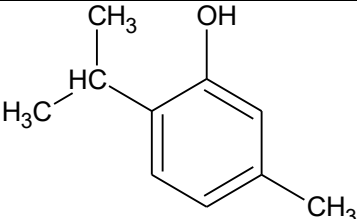
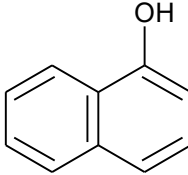
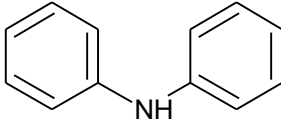
### Reakce založené na tvorbě furfuralu a jeho derivátů



furfural  
5-hydroxymethylfurfural + aromatické fenoly, aromatické aminy → analoga  
trifenylmethanových  
barviv

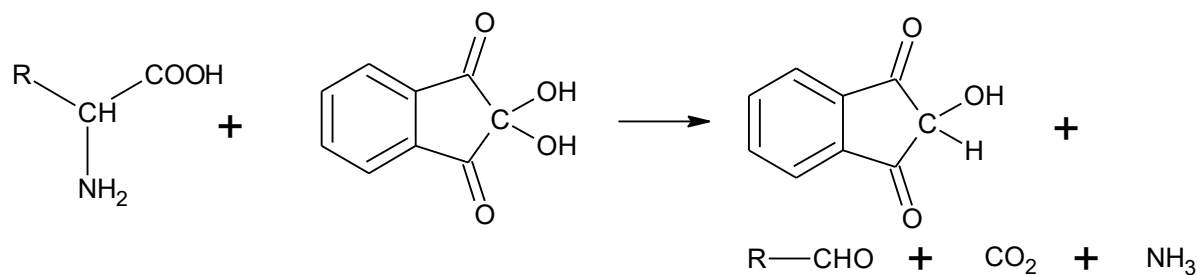


trifenylmethan

resorcin	1,3-dihydroxybenzen	
orcin	5-methyl-1,3-dihydroxybenzen	
thymol	1-hydroxy-3-methyl-6-isopropylbenzen	
1-naftol		
difenylamin		

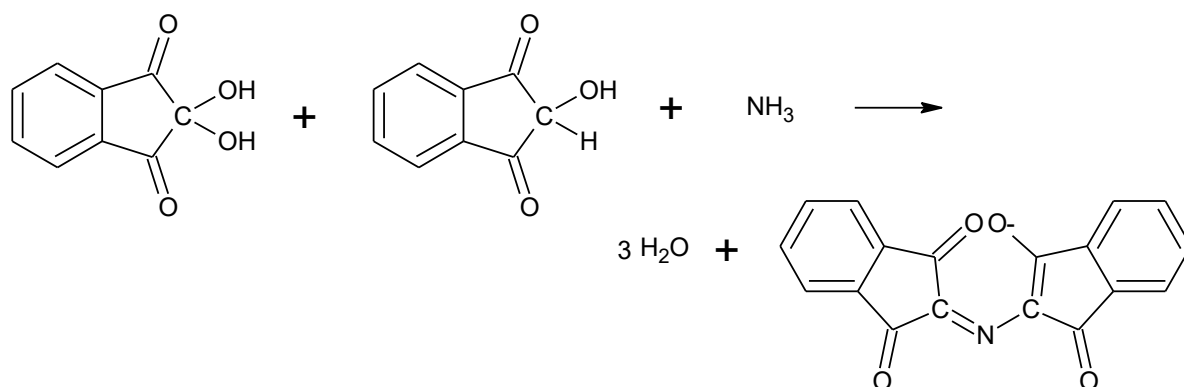
## BAREVNÉ REAKCE AMINOKYSELIN A BÍLKOVIN

### ninhydrinová reakce

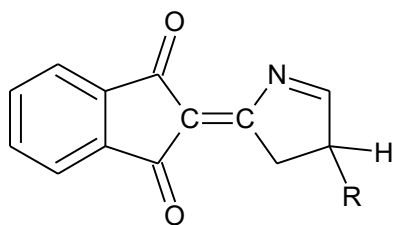


aminokyselina

ninhydrin

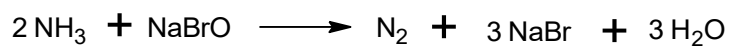
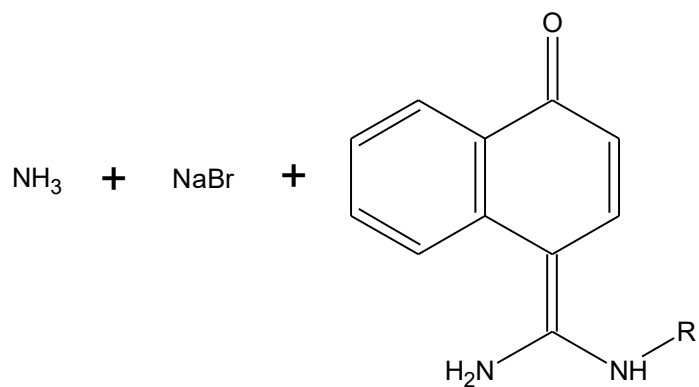
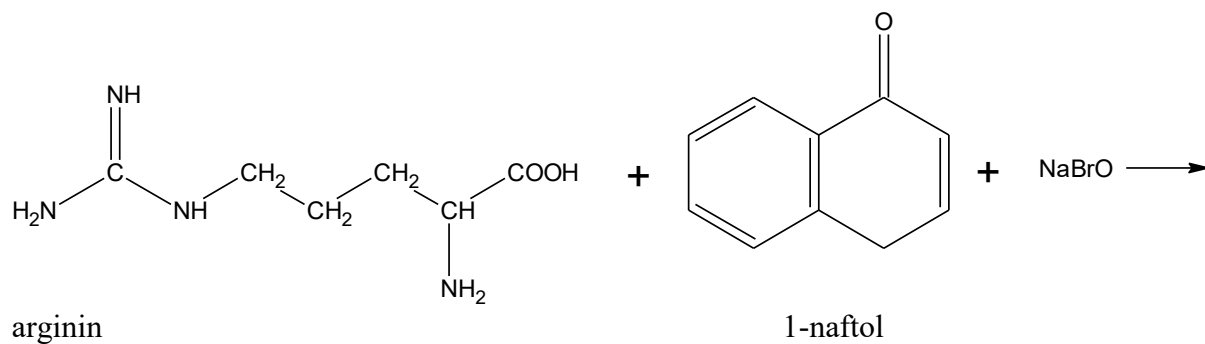


reakční produkt prolinu (hydroxyprolinu):

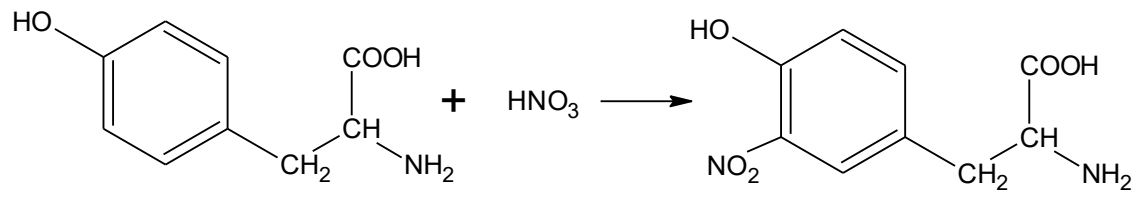


R = -H, -OH

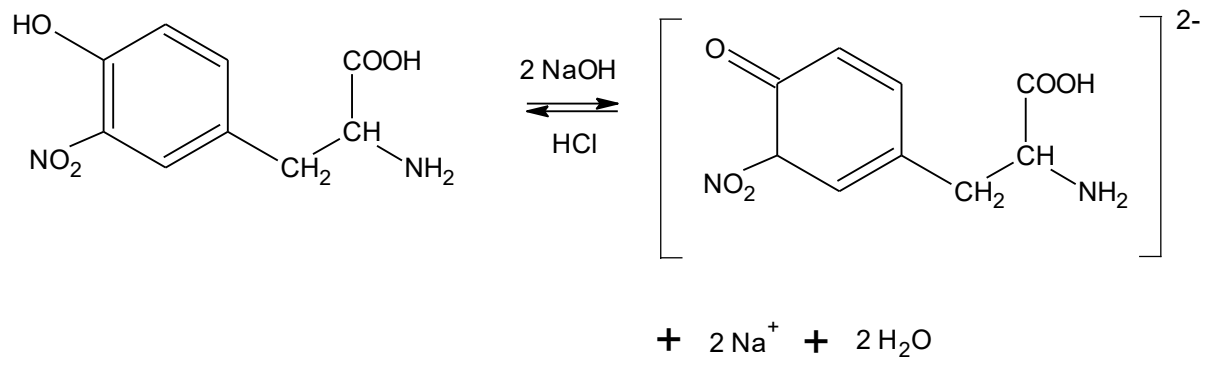
## Sakaguchiho reakce



### xanthoproteinová reakce

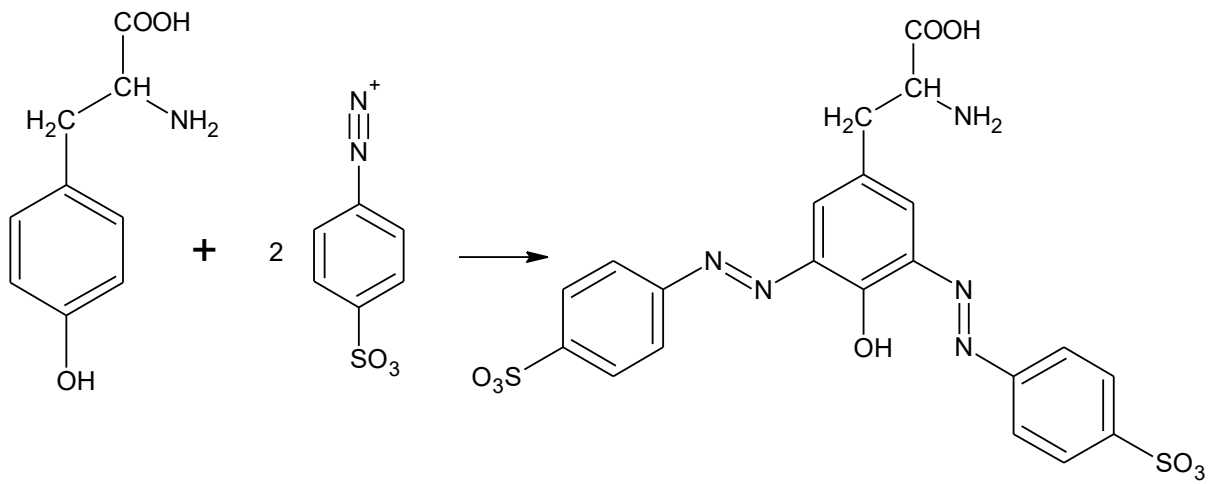


tyrosin

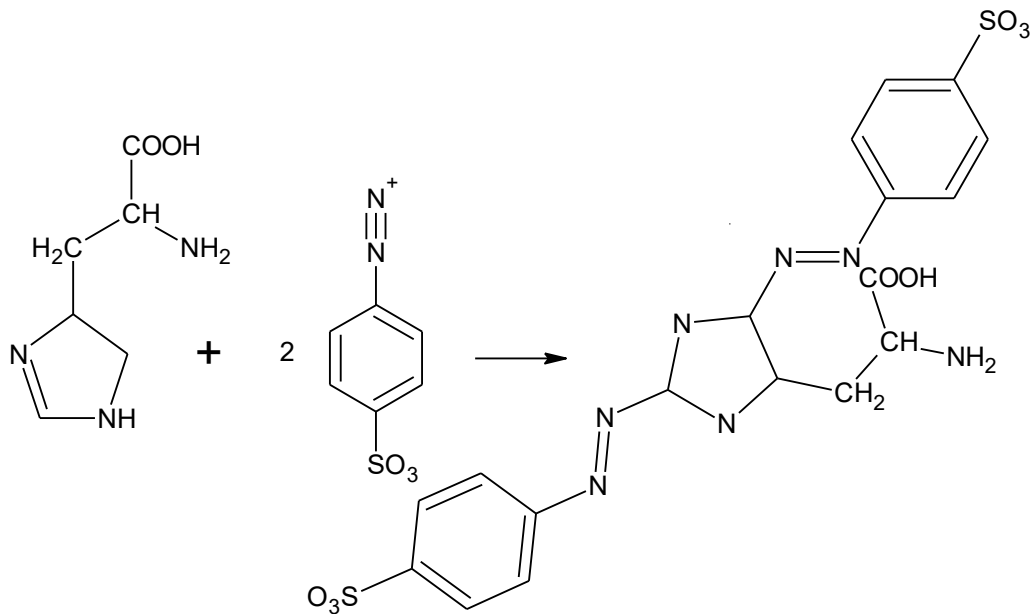




## Paulyho reakce

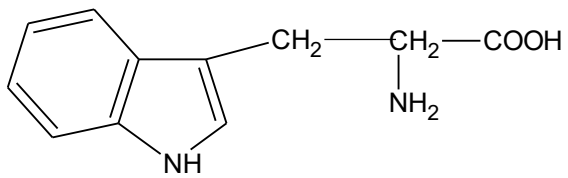
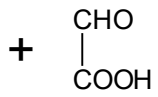
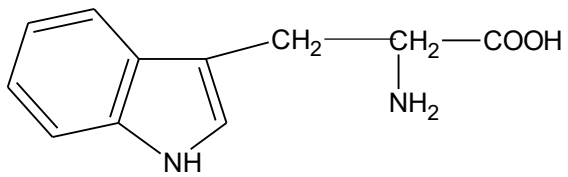


## tyrosin

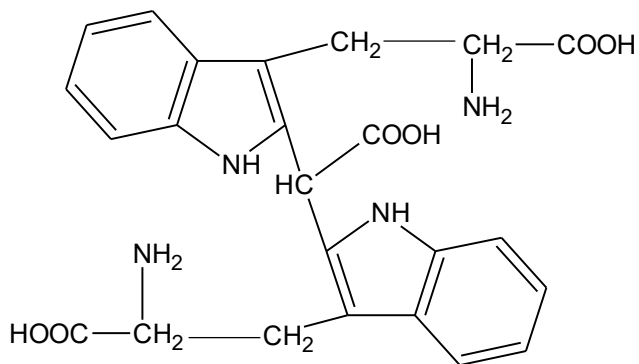
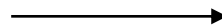


## histidin

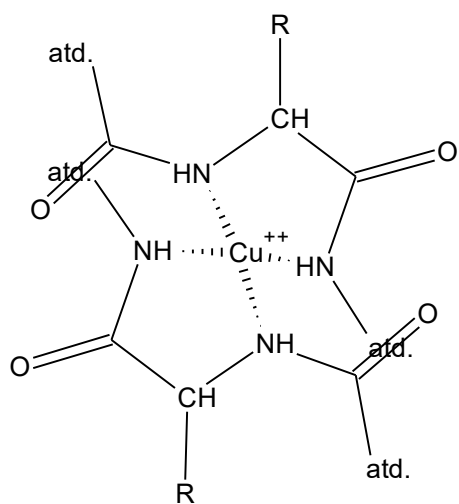
## Adamkiewiczova reakce



tryptofan



## biuretová reakce



## biuret

