

Inovace bakalářského studijního oboru Aplikovaná chemie

<http://aplchem.upol.cz>

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Tento projekt je spolufinancován
Evropským sociálním fondem a státním
rozpočtem České republiky.



evropský
sociální
fond v ČR



EVROPSKÁ UNIE



MINISTERSTVO ŠKOLSTVÍ,
MLÁDEŽE A TĚLOVÝCHOVY



OP Vzdělávání
pro konkurenceschopnost



OKRESNÍ HOSPODÁŘSKÁ
KOMORA OLOMOUČ

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Názvosloví funkčních derivátů uhlovodíků

Substituční názvoslovný princip (substituční názvosloví):

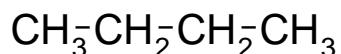
předpony

ostatní substituenty

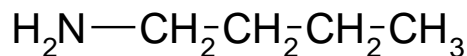
základní skelet

přípona

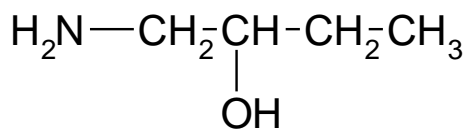
ten substituent, který je hlavní skupinou a má nejvyšší prioritu



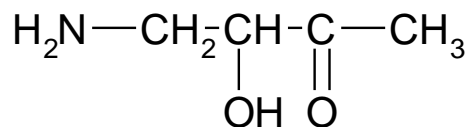
butan



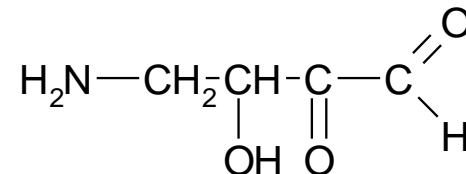
butan-1-amin



1-aminobutan-2-ol



4-amino-3-hydroxybutan-2-on



4-amino-3-hydroxy-2-oxobutan-1-al

Seřazení nejdůležitějších skupin podle klesající priority

1	Radikály	11	Ketony
2	Anionty a Kationty	12	Alkoholy a fenoly
3	Kyseliny (v pořadí COOH, SO ₃ H)	13	Hydroperoxydy
4	Anhydridy	14	Aminy
5	Estery	15	Iminy
6	Halogenidy kyselin	16	Hydraziny
7	Amidy	17	<i>Ethery následované. sulfidy</i>
8	Hydrazidy	18	<i>Peroxydy následované disulfidy</i>
9	Nitrily	19	<i>Halogensloučeniny</i>
10	Aldehydy	20	<i>Nitrosoučeniny</i>

Pozn. Funkčně skupinový (radikálový) názvoslovný princip

Chlorethan $\text{CH}_3\text{-CH}_2\text{-Cl}$ ethylchlorid (z $\text{H}\text{---}\text{Cl}$)

ethanamin $\text{CH}_3\text{-CH}_2\text{-NH}_2$ ethylamin (z $\text{H}\text{---}\text{NH}_2$)

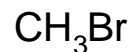
Skupina	Funkční skupinové jméno
R-CN	-kyanid
R-OH	-alkohol
R-O-R	-ether
R-S-R	-sulfid
R-CO-R	-keton
R-Cl	-chlorid
R-Br	-bromid
R-I	-jodid

Přehled nejdůležitějších funkčních skupin

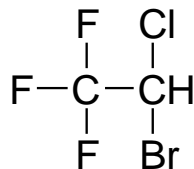
Funkční skupina	předpona	přípona	Typ sloučeniny
X (F,Cl,Br,I)	Fluor-, chlor-, brom- jod-	(-fluorid, -chlorid....)	Halogenderiváty
O=CHR	oxo- [formyl-]	-al [-karbaldehyd]	aldehydy
O=CRR	oxo-	-on (-keton)	ketony
HO-	hydroxy-	-ol (-alkohol)	alkoholy, fenoly, enoly, hemiacetaly
H-O-O-	hydroperoxy-	-	hydroperoxydy
R-O- (Např. CH ₃ -O-)	R- oxy- (methoxy-)	(-ether) -	ethery
H-S-	sulfanyl- /merkpto-/	-thiol	thioly (např. thioalkoholy, thiofenoly)
HO-S-	sulfeno-	sulfenová kyselina	sulfenové kyseliny
$\begin{array}{c} \text{HO}-\text{S}- \\ \\ \text{O} \end{array}$	sulfino-	sulfínová kyselina	sulfínová kyselina
$\begin{array}{c} \text{O} \\ \\ \text{HO}-\text{S}- \\ \\ \text{O} \end{array}$	sulfo-	sulfonová kyselina	sulfokyseliny
R-S-	R-sulfanyl- /R-merkpto/ /R-thio/	(-sulfid)	sulfidy (thioethery)
S=	thioxo-	-thial -thion	thioaldehydy thioketony

$\text{H}_2\text{N}-$	amino-	-amin	primární aminy
$\begin{array}{c} \text{R}-\text{N}- \\ \\ \text{H} \end{array}$	R-amino-	-amin	sekundární amin
$\begin{array}{c} \text{R}-\text{N}- \\ \\ \text{R} \end{array}$	di-R-amino-	-amin	terciální amin
$\begin{array}{c} \text{R} \\ \\ \text{R}-\text{N}^{\oplus}- \\ \\ \text{R} \end{array}$	tri-R-amonio-	tri-R-amonium	kvarterní amoniové hydroxidy nebo soli
$\begin{array}{c} \text{HO}-\text{N}- \\ \\ \text{H} \end{array}$	hydroxyamino-	-hydroxylamin	hydroxylaminy
$\text{O}=\text{N}-$	nitroso-	-	nitroso-sloučeniny
$\text{O}_2\text{N}-$	nitro-	-	nitrolátky
$\text{H}-\text{N}=\text{}$	imino-	-imin	iminy
$\text{HO}-\text{N}=\text{}$	hydroxyimino-	-oxim	oximy
$\text{H}_2\text{N}-\text{NH}-$	hydrazino-	-hydrazin	hydrazino-sloučeniny
$\begin{array}{c} \text{H}_2\text{N}-\text{N}=\text{} \\ \ominus \quad \oplus \end{array}$	hydrazono-	-hydrazon	hydrazony
$\text{N}=\text{N}=\text{}$	diazo-	-	diazosloučeniny
$\begin{array}{c} -\text{N}=\text{N}- \\ \ominus \quad \oplus \end{array}$	azo-	-	azosloučeniny
$\text{N}=\text{N}=\text{N}-$	azido-	-azid	azidy

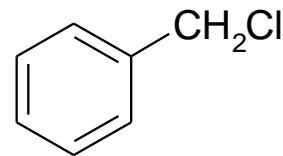
Příklady k tabulce funkčních skupin



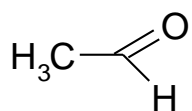
brommethan
(methylbromid)



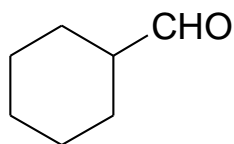
2-brom-2-chlor-1,1,1-trifluorethan



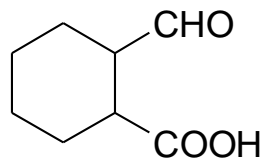
(chlormethyl)benzen
(benzylchlorid)



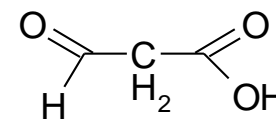
ethanal
(acetaldehyd)



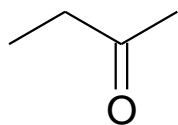
cyklohexankarbaldehyd



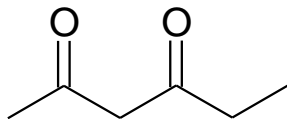
2-formylcyklohexan-
karboxylová kyselina



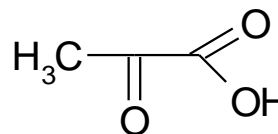
3-oxopropanová kyselina



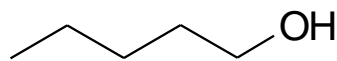
butan-2-on
(ethyl(methyl)keton)



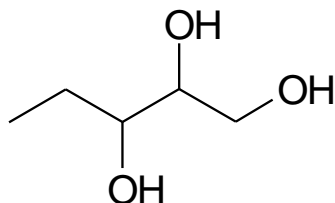
hexan-2,4-dion



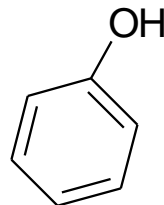
2-oxopropanová kyselina



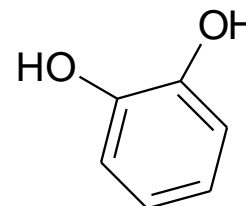
pentanol
(pentylalkohol)



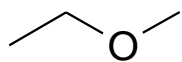
pentan-1,2,3-triol



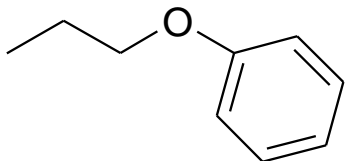
[benzenol] FENOL



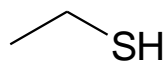
benzen-1,2-diol



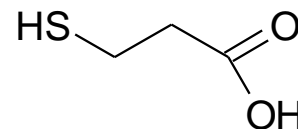
methoxyethan
(ethyl(methyl)ether)



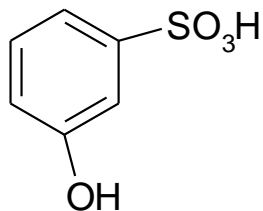
propoxybenzen
(fenyl(propyl)ether)



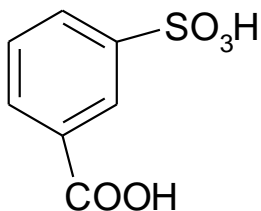
ethanthiol
(ethylthioalkohol)



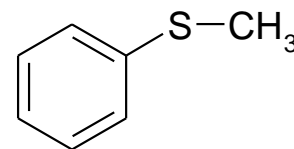
3-sulfanylpropanová kys.



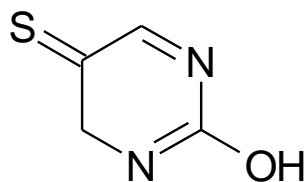
3-hydroxybenzensulfonová kys.



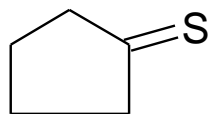
3-sulfobenzenkarboxylová kys.
3-sulfobenzoová kyselina



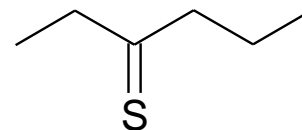
methylsulfanylbenzen
(fenyl(methyl)sulfid
[methylmerkaptobenzen]



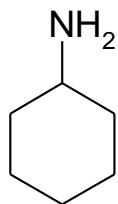
5-thioxo-4,5-dihydropyrimidin-2-ol



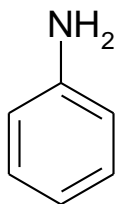
cyklopentanthion



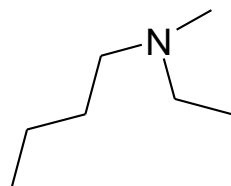
hexan-3-thion
(propyl(ethyl)thioketon)



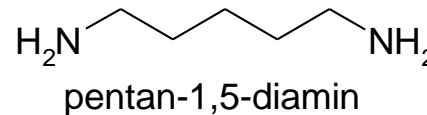
cyklohexanamin
(cyklohexylamin)



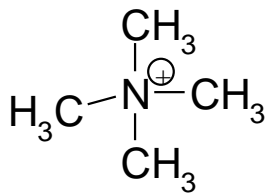
ANILIN



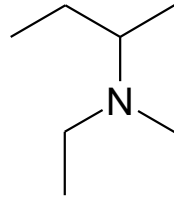
N-ethyl-N-methylbutan-1-amin
(ethyl(methyl)butylamin)



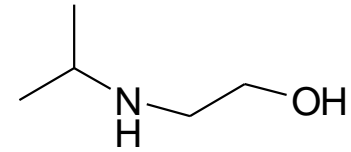
pentan-1,5-diamin



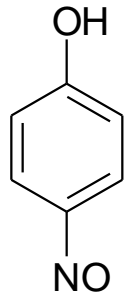
tetramethylammonium-chlorid



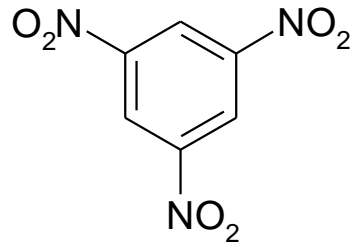
N-ethyl-*N*-methylbutan-2-amin



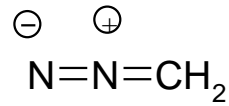
2-(isopropylamino)ethanol



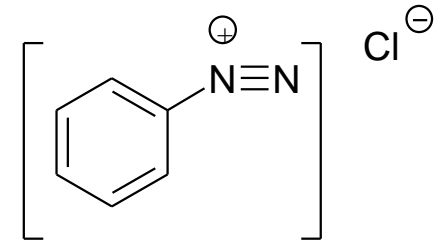
4-nitrosophenol



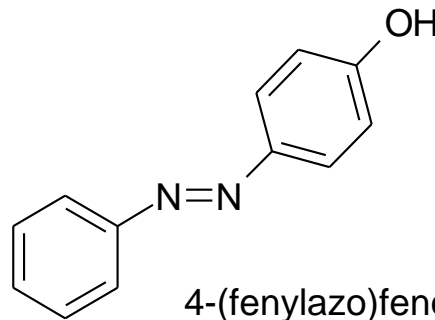
1,3,5-trinitrobenzen



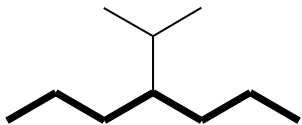
diazomethan



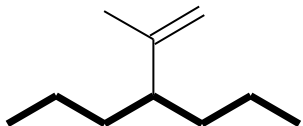
benzendiazonium-chlorid



4-(fenylazo)fenol

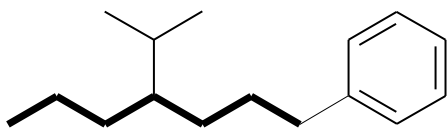


4-isopropylheptan

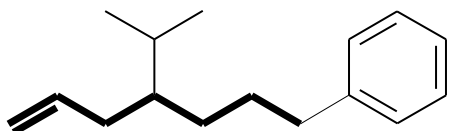


4-isopropenylheptan

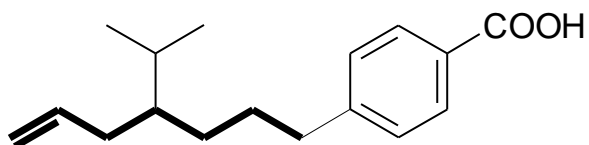
dříve 4-(1-methylethenyl)heptan **nyní:** 4-(prop-1-en-2-yl)heptan



(4-isopropylheptyl)benzen



(4-isopropylhept-6-en-1-yl)benzen



4-(4-isopropylhept-6-en-1-yl)benzenkarboxylová kys

4-(4-isopropylhept-6-en-1-yl)benzoová kyselina

Obecná pravidla k pojmenování organických sloučenin:

V molekule není hlavní skupina ani násobná vazba – hlavní skelet je cyklus, aromát heterocyklus, není-li pak nejdelší uhlíkatý řetězec

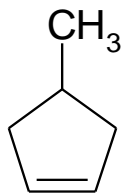
V molekule je navíc přítomná násobná vazba – hlavní skelet je opět cyklus, aromát heterocyklus. Není-li pak viz pravidla – nenasycený skelet.

V molekule jsou i funkční skupiny – hlavní skelet je ten, na kterém je hlavní fční skupina (tzn. s nejvyšší prioritou)

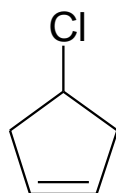
*očíslování hlavního skeletu tak, aby hlavní skupina měla nejnižší polohu lokantu

*hlavní skupina – příponou

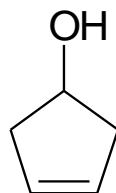
*ostatní substituenty - předponami



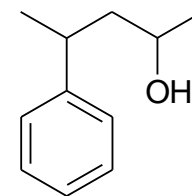
4-methylcyklopent-1-en
(4-methylcyklopenten)



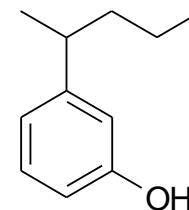
4-chlorocyklopent-1-en



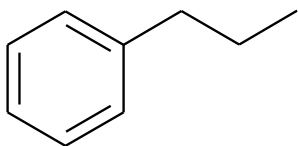
cyklopent-3-en-1-ol



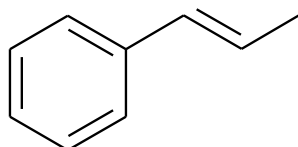
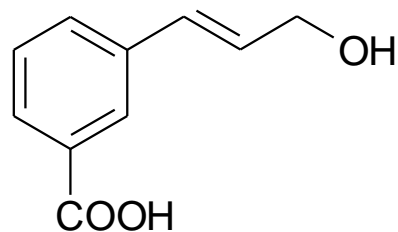
4-fenylpentan-2-ol



3-(pentan-2-yl)fenol

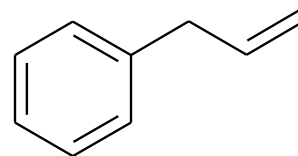


propylbenzen

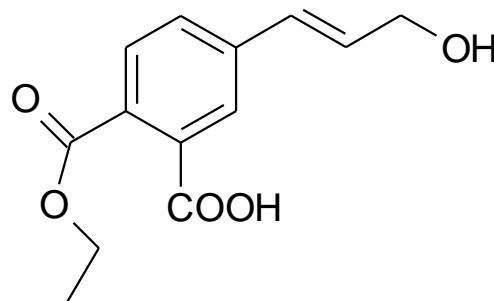


propenylbenzen
((prop-1-en-1-yl)benzen)

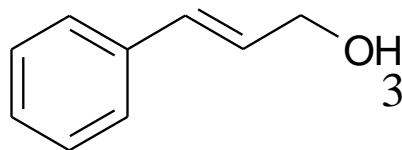
3-(3-hydroxyprop-1-en-1-yl)benzoová kyselina



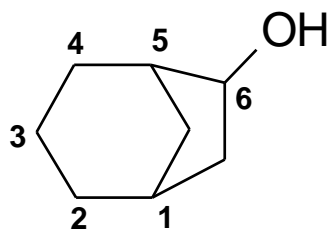
(prop-2-en-1-yl)benzen
nebo allylbenzen
ne 3-fenylprop-1-en



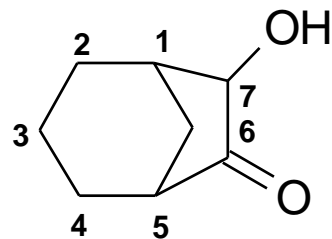
2-(ethoxykarbonyl)-5-(3-hydroxyprop-1-en-1-yl)benzoová kyselina



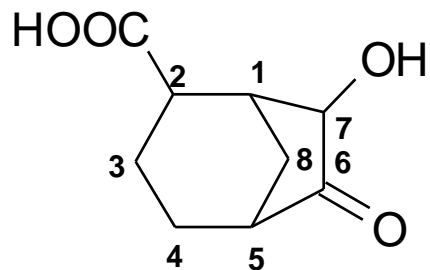
3-fenylprop-2-en-1-ol



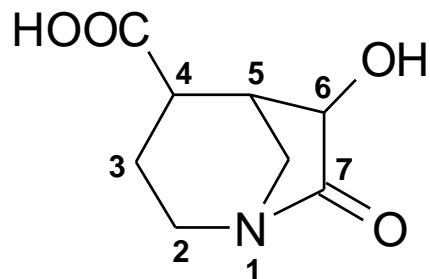
bicyklo[3.2.1]oktan-6-ol



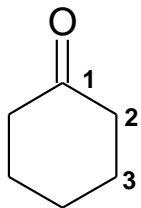
7-hydroxybicyklo[3.2.1]oktan-6-on



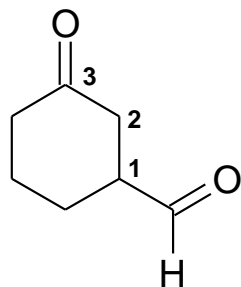
7-hydroxy-6-oxobicyklo[3.2.1]oktan-2-karboxylová kyselina



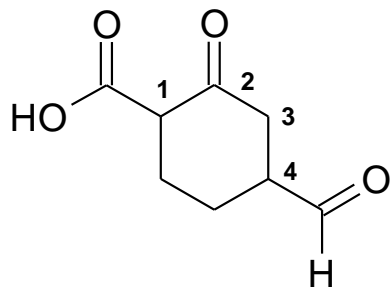
1-aza-6-hydroxy-7-oxobicyklo[3.2.1]oktan-4-karboxylová kyselina



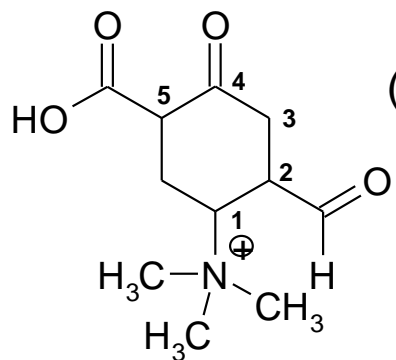
cyklohexanon



3-oxocyklohexan-1-karbaldehyd



4-formyl-2-oxocyklohexan-1-karboxylová kyselina

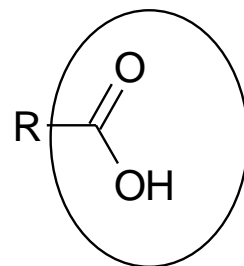


(2-formyl-5-karboxy-4-oxocyklohexan-1-yl)trimethylamonium-chlorid

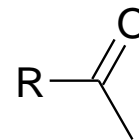


Názvosloví karboxylových kyselin a jejich funkčních derivátů

Karboxylové kyseliny: RCOOH



Karboxyl

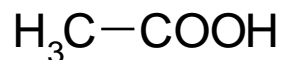


acyl-

Racionální názvosloví:

a) Karboxyl je hlavní skupinou a je součástí skeletu:

uhlovodík + ová kyselina



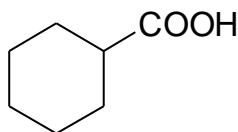
ethanová kyselina



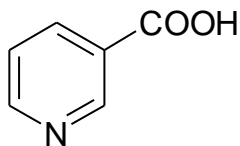
ethandiová kyselina

b) Karboxyl je hlavní skupinou, ale není součástí skeletu:

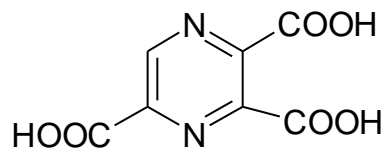
uhlovodík + karboxylová kyselina



cyklohexankarboxylová kyselina

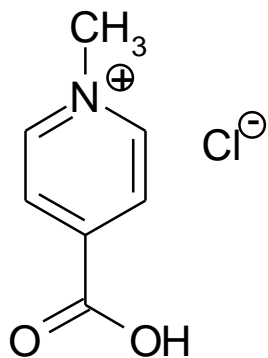


pyridin-3-karboxylová kyselina

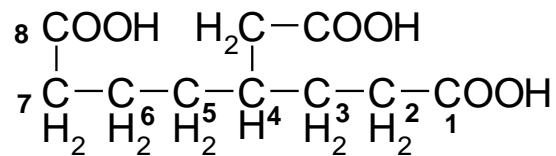


pyrazin-2,3,5-trikarboxylová kyselina

c) Karboxyl není hlavní skupinou: předpona **-karboxy**



4-karboxy-1-methylpyridinium chlorid



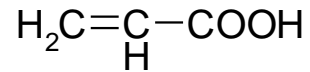
4-(karboxymethyl)oktandiová kyselina

Triviální názvosloví kyselin

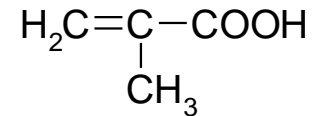
Nasyčené alifatické kyseliny

	monokarboxylová kyselina	Acyl-	dikarboxylová kyselina	Acyl-
1	mravenčí	Formyl-	-	
2	octová	Acetyl-	šťavelová	Oxalyl-
3	propionová	Propionyl-	malonová	Malonyl-
4	máselná	Butyryl-	jantarová	Sukcinyl-
5	valerová	Valeryl-	glutarová	Glutaryl-
6	kapronová	Kapronyl-	adipová	Adipoyl-
12	laurová	Lauroyl-		
16	palmitová	Palmitoyl-		
18	stearová	Stearoyl-		

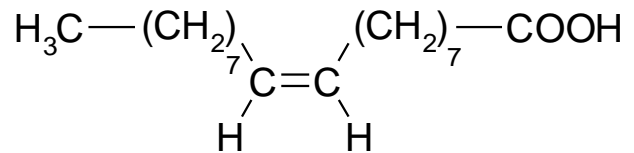
Nenasycené kyseliny



kyselina akrylová (akryloyl-)

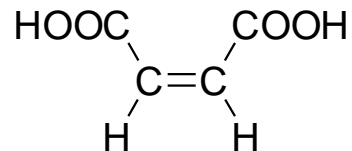


kyselina methakrylová (methakryloyl-)



(cis) kyselina olejová

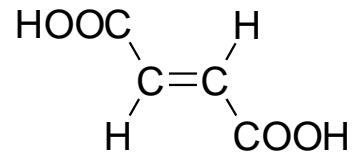
(trans forma - kys. elaidová)



kyselina maleinová (maleinoyl-)

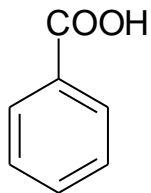
[(Z)-but-2-endiová kyselina]

[cis-but-2-endiová kyselina]

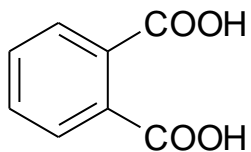


kyselina fumarová (fumaroyl-)

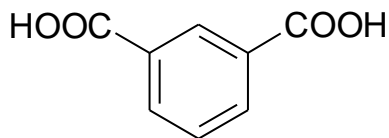
Aromatické kyseliny:



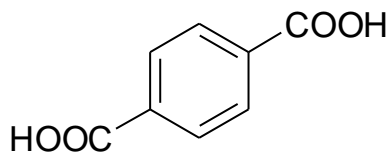
kyselina benzoová (benzoyl-)



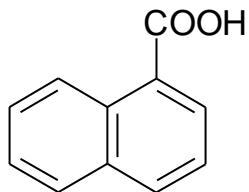
kyselina ftalová (ftaloyl-)



kyselina isoftalová (isoftaloyl-)

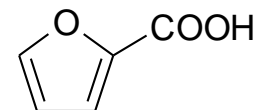


kyselina tereftalová (tereftaloyl-)

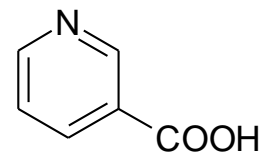


kyselina 1-naftoová (nafto-1-yl)

Heterocyklické kyseliny:



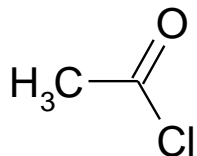
kyselina furoová (furoyl-)
(pyroslizová)



kyselina nikotinová (nikotinoyl-)

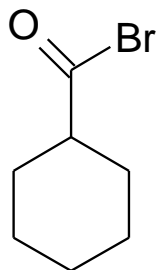
Halogenidy kyselin: RCOX

a) Je-li hlavní skupinou a součástí skeletu: **acyl+halogenid**



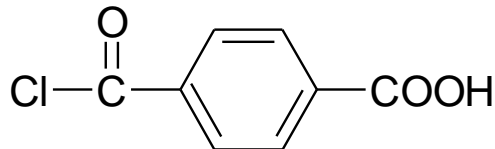
acetylchlorid (ethanoylchlorid)
chlorid kyseliny octové

b) Je hlavní skupinou, ale není součástí řetězce: přípona **karbonylhalogenid**



cyklohexankarbonylbromid
(bromid kyseliny cyklohexankarboxylové)

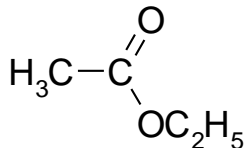
c) Je-li přítomná skupina s vyšší preferencí: předpona **halogenkarbonyl-**



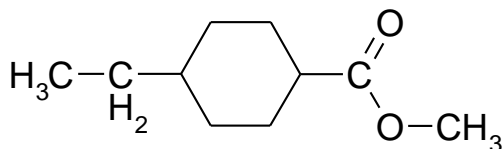
4-(chlorkarbonyl)benzoová kyselina

Estery kyselin: RCOOR

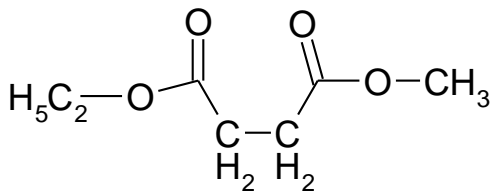
a) Je-li hlavní skupinou: **uhlovodíkový zbytek+kmen acylu + -oát příp. -át**



etyl-acetát (ethyl-ethanoát)
ethylester kyseliny octové

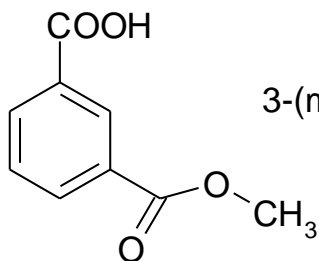


methyl-4-ethylcyklohexankarboxylát



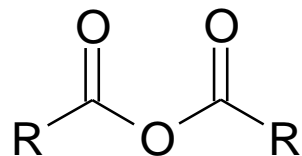
ethyl-methyl-sukcinát (ethyl-methyl-butandioát)

b) Je-li v molekule skupina s vyšší preferencí: předpona: **alkoxykarbonyl-**

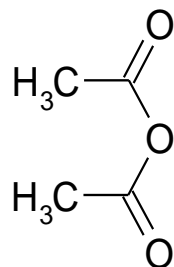


3-(methoxykarbonyl)benzoová kyselina

Anhydridy kyselin:

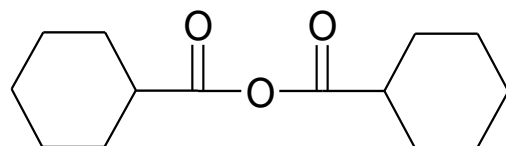


a) symetrické: **kmen acylu+anhydrid**



acetanhydrid (ethanhydrid)

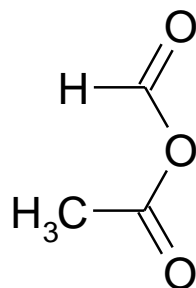
anhydrid kyseliny octové



cyklohexankarboxanhydrid

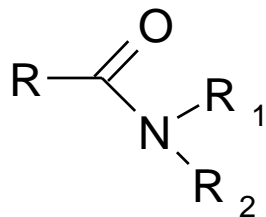
anhydrid kyseliny cyklohexankarboxylové

b) nesymetrické

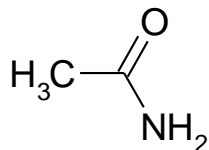


smíšený anhydrid kyseliny octové a mravenčí

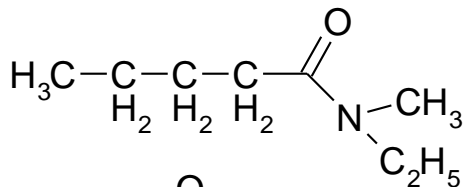
Amidy kyselin



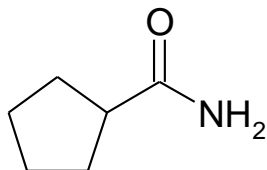
a) Je-li hlavní skupinou: **kmen acylu+amid**



acetamid (ethanamid)
amid kyseliny octové

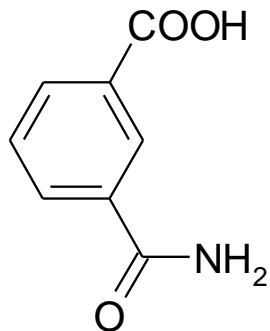


N-ethyl-*N*-methylpentanamid
N-ethyl-*N*-methylamid kys.pentanové



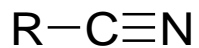
cyklopentankarboxamid

b) Je-li skupina s vyšší preferencí: předpona –**karbamoyl**

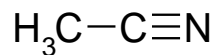


3-karbamoylbenzoová kyselina

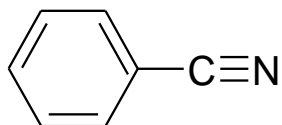
Nitrily



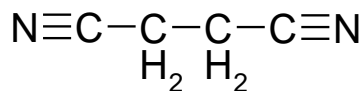
a) Je-li hlavní skupinou: **kmen acylu+onitril (nitril)**



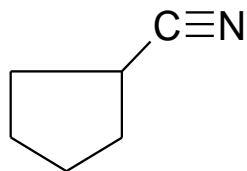
acetonitril (ethannitril)



benzonitril

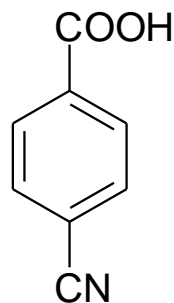


butandinitril (sukcinonitril)

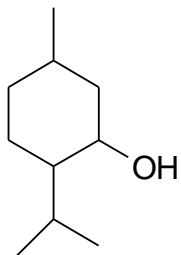


cyklopentankarbonitril

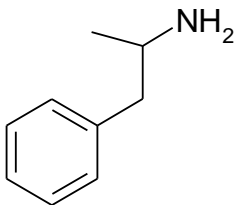
b) Není-li hlavní skupinou: předpona **kyan-**



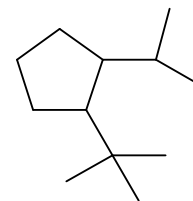
4-kyanbenzoová kyselina



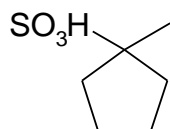
2-isopropyl-5-methylcyklohexanol



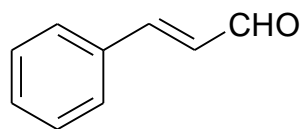
1-fenylpropan-2-amin



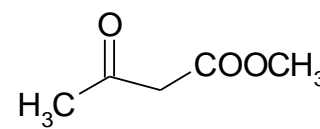
1-(*terc*-butyl)-2-isopropylcyklopentan



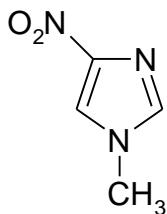
1-methylcyklopentansulfonová kyselina



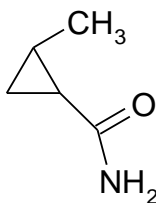
3-fenylprop-2-en-1-al



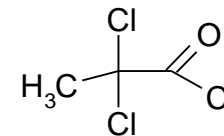
methyl-3-oxobutanoát
(methylester kyseliny 3-oxobutanové)



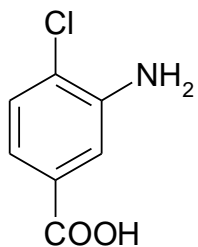
1-methyl-4-nitroimidazol



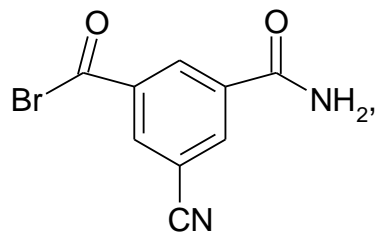
2-methylcyklopropankarboxamid



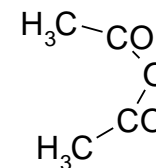
2,2-dichloropropanoylchlorid;
(chlorid kyseliny 2,2-dichloropropanové)



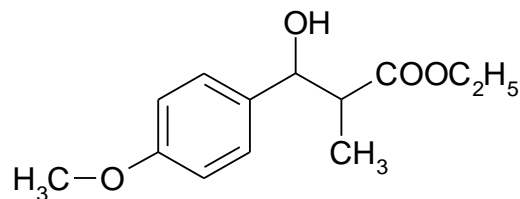
3-amino-4-chlorbenzoová kyselina



3-karbamoyl-5-kyanbenzoylbromid
(bromid kyseliny 3-karbamoyl-5-
kyanbenzoové)



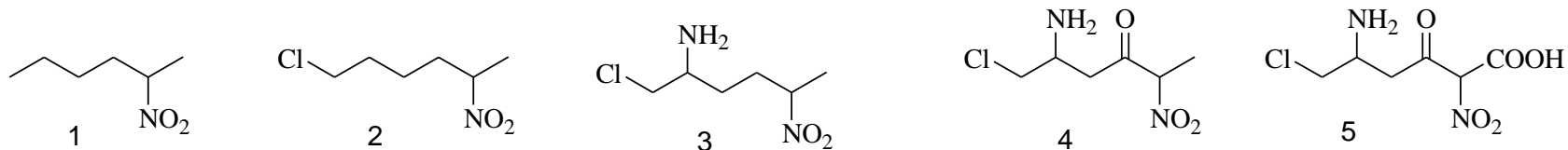
ethananhydrid;
(acetanhydrid)



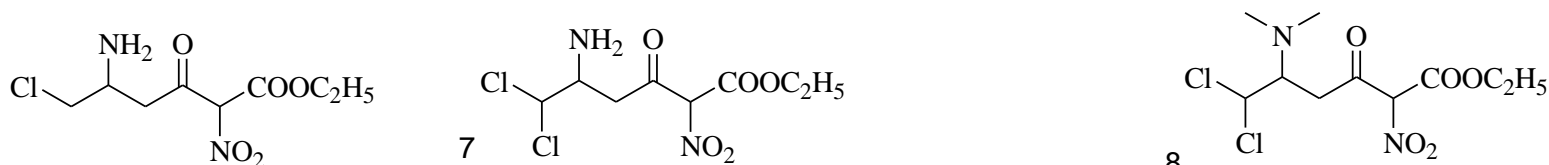
ethyl-3-hydroxy- 3-(4-methoxyfenyl)-2-methylpropanoát
(ethylester kyseliny 3-(4-methoxyfenyl)-3-hydroxy-2-methylpropanové)

Seminární úkoly:

1. Pojmenujte tyto sekvence sloučenin:



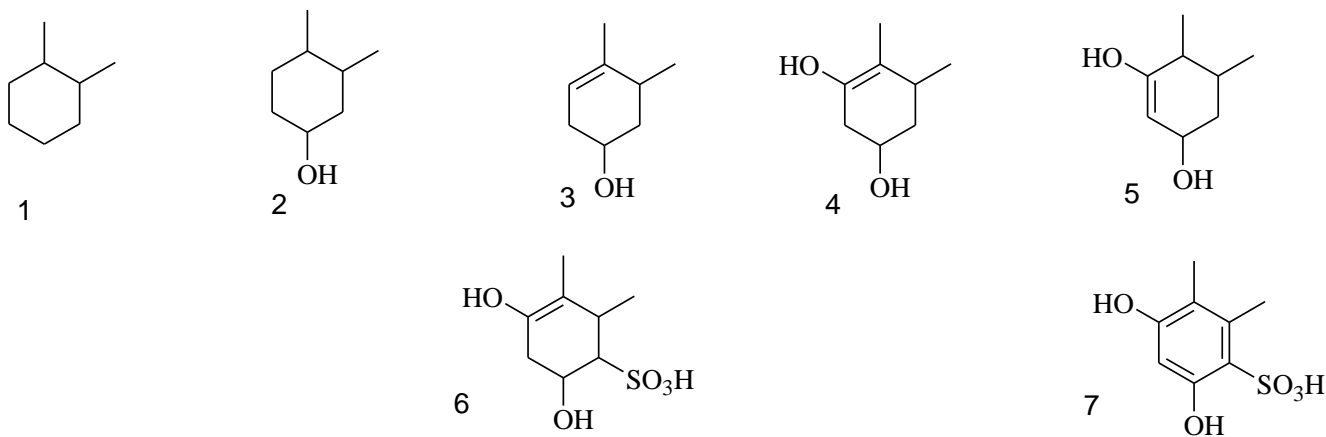
A



6

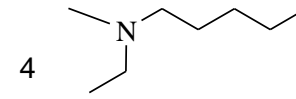
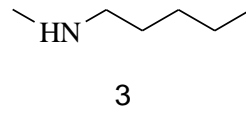
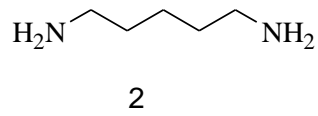
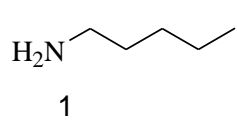
ethyl-5-amino-6,6-dichlor-2-nitro-3-oxohexanoát

B

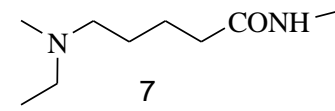
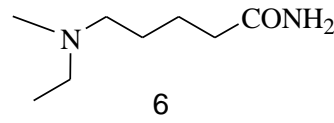
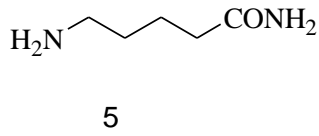


4,6-dihydroxy-2,3-dimethylcyclohex-3-en-1-sulfonová kyselina

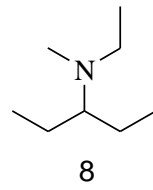
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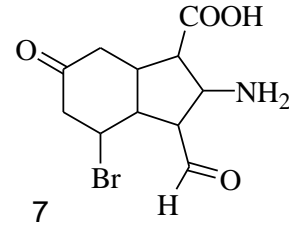
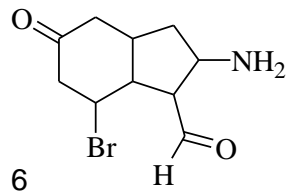
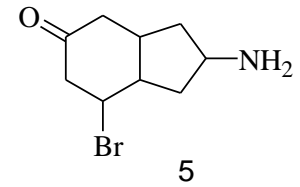
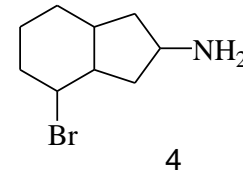
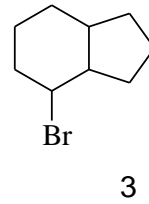
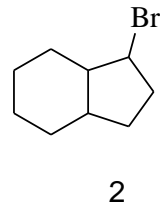
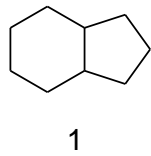
N-ethyl-*N*-methylpentan-1-amin



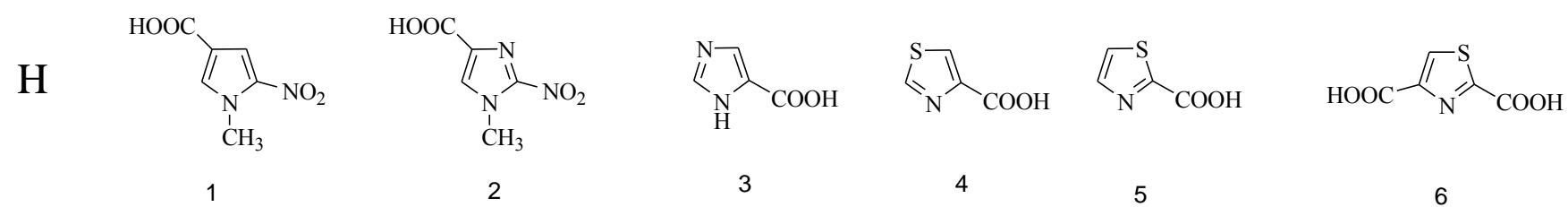
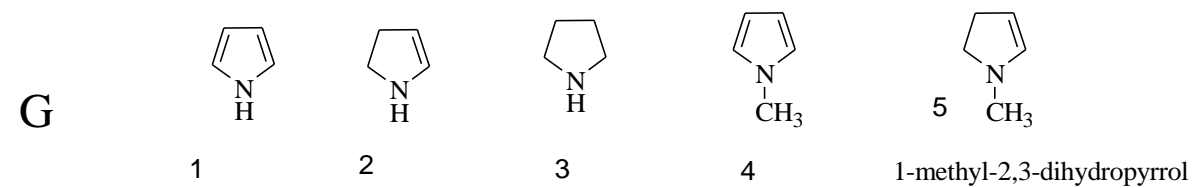
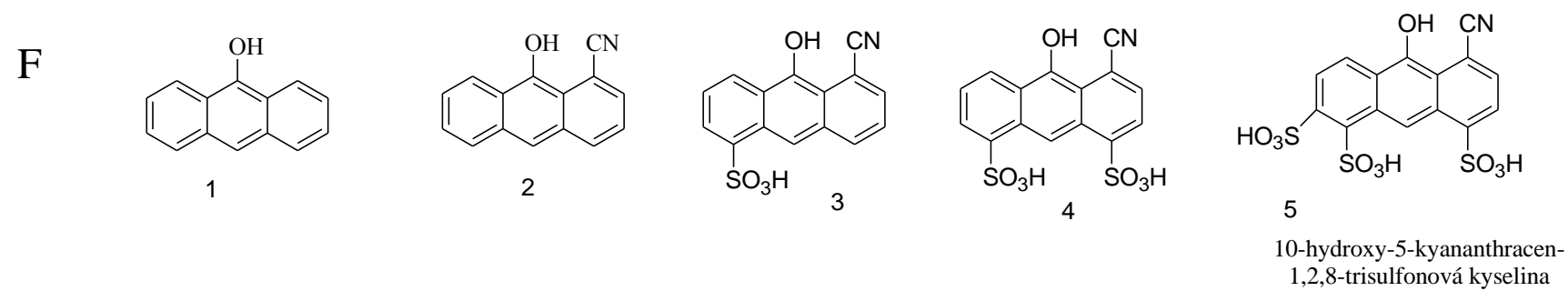
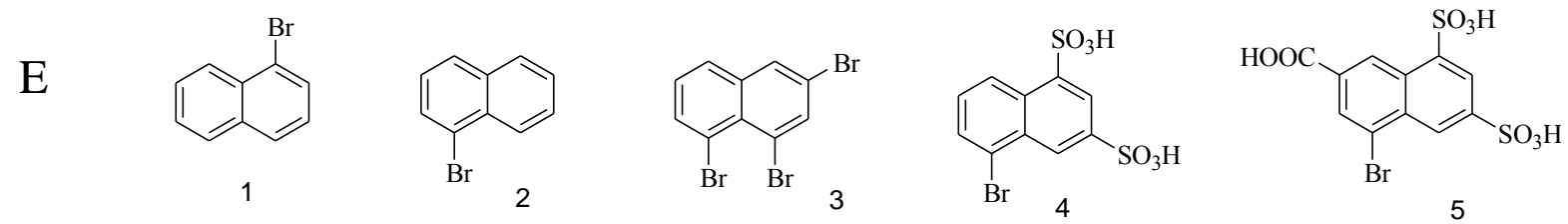
5-(ethyl(methyl)amino)-*N*-methylpentanamid



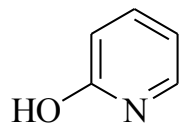
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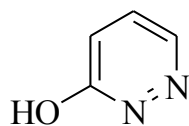
8-amino-5-brom-3-oxobicyklo[4.3.0]nonan-7-karbaldehyd



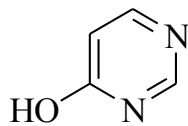
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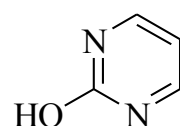
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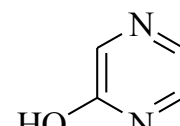
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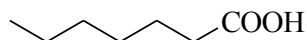


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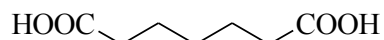


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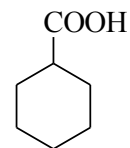
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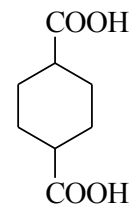
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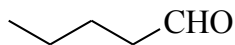


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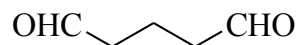


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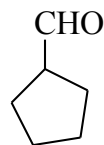
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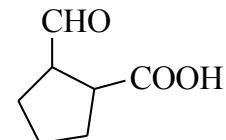
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2



3



4