ORGANSKA KEMIJA 1 – seminar

2. Nomenklatura

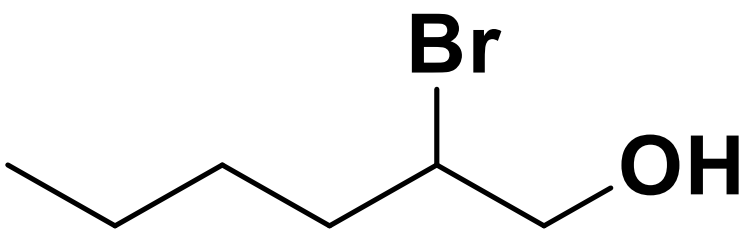
Seminar: Matija Popović, mag. chem. (mpopovic1@chem.pmf.hr)

Predavanja: prof. dr. sc. Ivana Biljan (ibiljan@chem.pmf.hr)

IUPAC-ova pravila:

POLOŽAJ FUKCIJSKE SKUPINE (MANJEG PRIORITETA)	PREFIKS FUNKCIJSKE SKUPINE (MANJEG PRIORITETA	UGLJIKOVODIČNI KOSTUR	POLOŽAJ FUNKCIJSKE SKUPINE (VEĆEG PRIORITETA)	SUFIKS FUKCIJSKE SKUPINE (VEĆEG PRIORITETA)

2-bromheksan-1-ol



Alkani - nerazgranati

- Korijen naziva + nastavak an

Korijeni naziva i odgovarajući nazivi alkana

Broj atoma ugljika u najduljem lancu	Korijen naziva	Kondenzirana strukturna formula	Naziv
1	met-	CH_4	metan
2	et-	CH_3CH_3	etan
3	prop-	$CH_3CH_2CH_3$	propan
4	but-	$CH_3(CH_2)_2CH_3$	butan
5	pent-	$CH_3(CH_2)_3CH_3$	pentan
6	heks-	$CH_3(CH_2)_4CH_3$	heksan
7	hept-	$CH_3(CH_2)_5CH_3$	heptan
8	okt-	$CH_3(CH_2)_6CH_3$	oktan
9	non-	$CH_3(CH_2)_7CH_3$	nonan
10	dek-	$CH_3(CH_2)_8CH_3$	dekan
11	undek-	$CH_3(CH_2)_9CH_3$	undekan
12	dodek-	$CH_3(CH_2)_{10}CH_3$	dodekan
13	tridek-	$CH_3(CH_2)_{11}CH_3$	tridekan
14	tetradek-	$CH_3(CH_2)_{12}CH_3$	tetradekan
15	pentadek-	$CH_3(CH_2)_{13}CH_3$	pentadekan
16	heksadek-	$CH_3(CH_2)_{14}CH_3$	heksadekan
17	heptadek-	$CH_3(CH_2)_{15}CH_3$	heptadekan
18	oktadek-	$CH_3(CH_2)_{16}CH_3$	oktadekan
19	nonadek-	$CH_3(CH_2)_{17}CH_3$	nonadekan
20	ikos-	$CH_3(CH_2)_{18}CH_3$	ikosan

ALKANI – razgranati

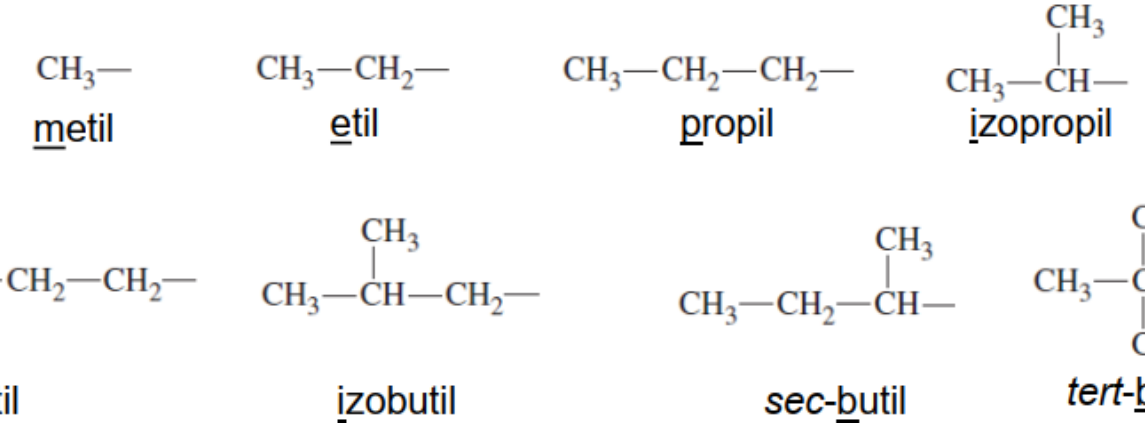
1. Nađite najdulji kontinuirani lanac ugljikovih atoma (glavni lanac) – korijen naziva + an. Ako ima više lanaca iste duljine, glavni je onaj s više ogranaka.

2. Numerirajte glavni lanac počevši od kraja koji je bliže prvom ogranku.

3. Imenujte supstituente glavnog lanca kao alkilne skupine (korijen naziva + il) i označite njihov položaj brojevima ugljikovih atoma glavnog lanca za koje su supstituenti vezani.

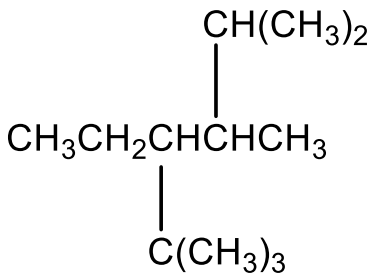
4. Ako postoji više supstituenata, poredajte ih abecedno. Prisutnost dvaju ili više jednakih alkilnih supstituenata izražava se prefiksima di-, tri-, tetra- koji ne ulaze u obzir pri određivanju abecednog slijeda.

BOČNI OGRANCI:

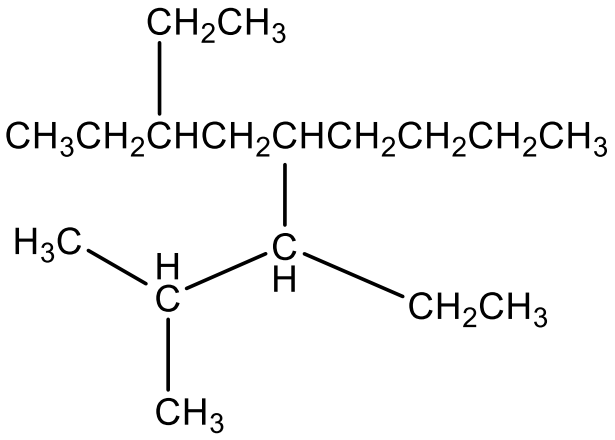


1. Imenujte spojeve

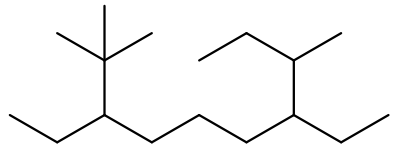
a)



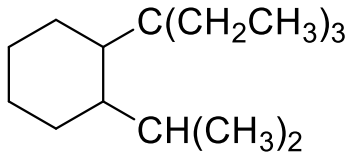
b)



c)



d)



ALKENI

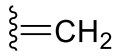
1. Nađite najdulji lanac atoma ugljika koji sadrži najveći broj dvostrukih veza (korijen naziva + nastavak – *en*).

- Lanac se numerira tako da dvostruka veza dobije što niži broj (numeriranje počinje od kraja koji je bliže dvostrukoj vezi).
- Ukoliko je u molekuli prisutan dulji lanac ugljikovih atoma tada on čini osnovu imena (čak i kad sadrži manji broj dvostrukih veza).

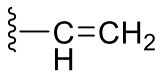
2. Dvostruke veze imaju prednost pred alkilnim skupinama i halogenim atomima prilikom numeriranja.

3. Spojevi s dvjema dvostrukim vezama nazivaju se *dieni*. Trieni imaju tri dvostruke veze, *tetraeni* četiri, itd. Položaj dvostrukih veza označava se brojevima

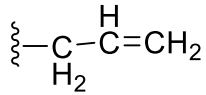
Supstituenti koji se izvode iz alkena: *alkenilne skupine -enil*



metilenska skupina



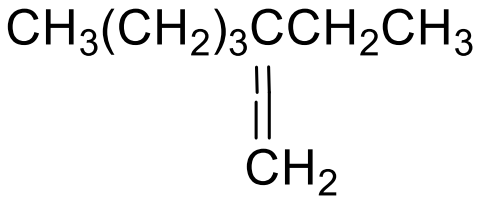
vinilna (etenilna) skupina



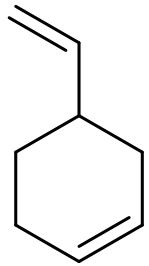
alilna (prop-2-enilna) skupina

2. Imenujte spojeve prema IUPAC-ovim pravilima

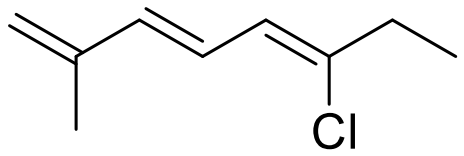
a)



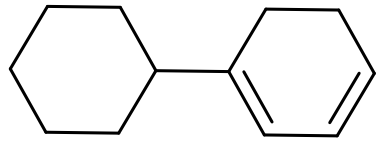
b)



c)



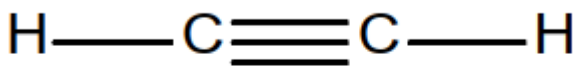
d)



ALKINI

1. Nađite najdulji lanac atoma ugljika koji sadrži najveći broj višestrukih veza (korijen naziva + nastavak *–in*). Lanac se numerira tako da trostruka veza dobije što niži broj (numeriranje počinje od kraja koji je bliže trostrukoj vezi).

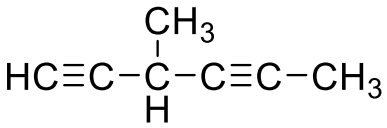
2. Ako se dvostruka i trostruka veza mogu obilježiti istim brojem, tada dvostruka veza ima prednost (prioritet) i pripisuje joj se niži broj.



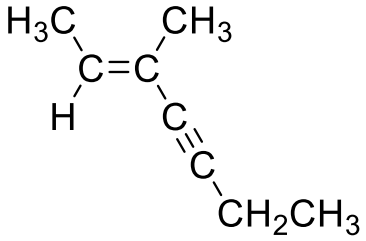
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3. Imenujte spojeve prema IUPAC-ovim pravilima

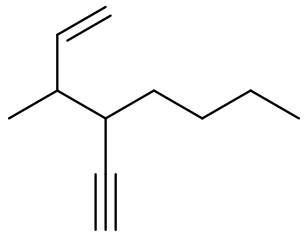
a)



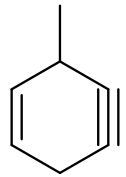
b)



c)

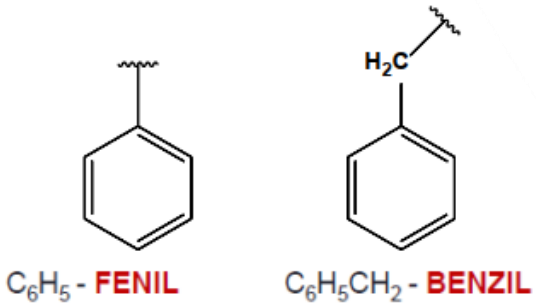


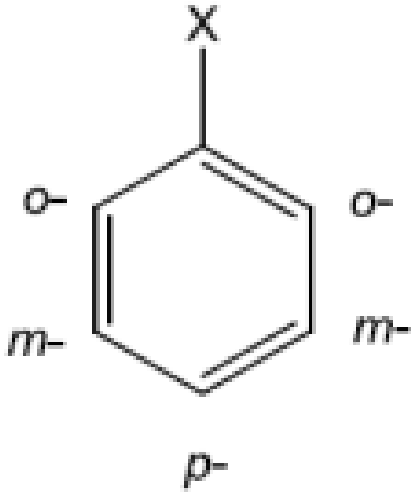
d)



AROMATI

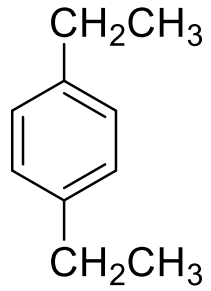
- na osnovno ime (benzen) navode se nazivi supstituenata kao prefiks
- ako se na benzenskoj jezgri nalazi više supstituenata, njihovi položaji se označuju s brojevima tako da broj 1 ima funkcijska skupina najvišeg prioriteta
- disupstituirani benzeni se mogu označiti i uporabom prefiksa ***ortho- (o-), meta- (m-)*** i ***para- (p-)***
- benzenski prsten kao supstituent druge molekule:



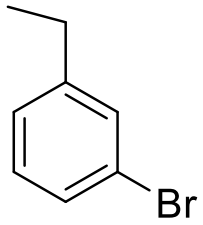


4. Imenujte spojeve prema IUPAC-ovim pravilima

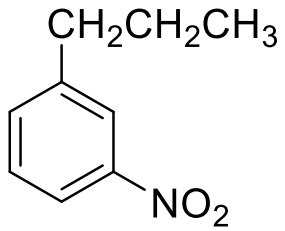
a)



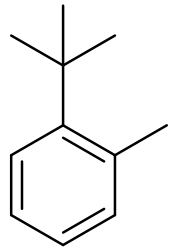
c)



b)



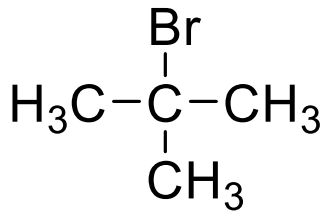
d)



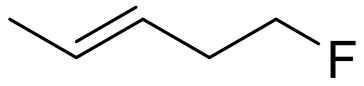
ALKIL-HALOGENIDI

5. Imenujte spojeve prema IUPAC-ovim pravilima

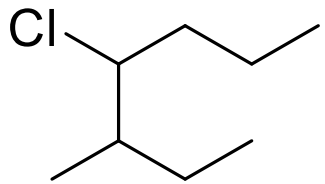
a)



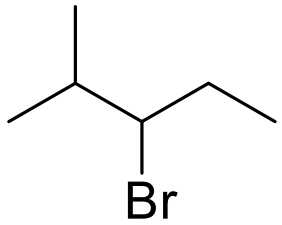
c)



b)



d)



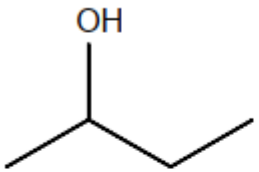
ALKOHOLI

1. Nađite najdulji lanac atoma ugljika koji sadrži hidroksilnu skupinu:
   - naziv lanca + položaj OH skupine + *ol*

2. Numerirajte taj lanac počevši od kraja koji je najbliži hidroksilnoj skupini.

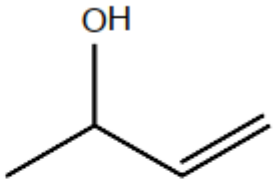
3. Hidroksilna skupina ima prednost pred alkilnim skupinama, halogenim atomima i nezasićenim vezama.

4. Ako hidroksilna skupina nije glavna u spoju, označava se prefiksom *hidroksi-*.



butan-2-ol

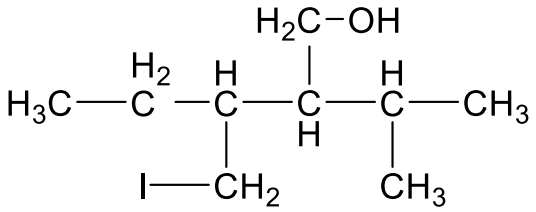
~~but-2-ol~~



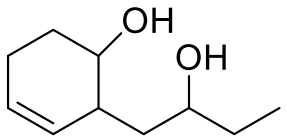
but-3-en-2-ol

6. Imenujte spojeve prema IUPAC-ovim pravilima

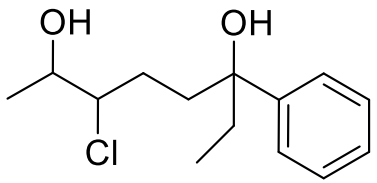
a)



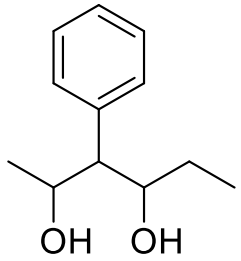
b)



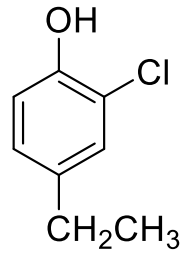
c)



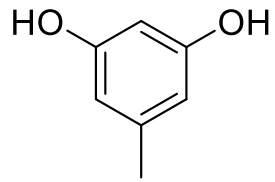
d)



e)



f)

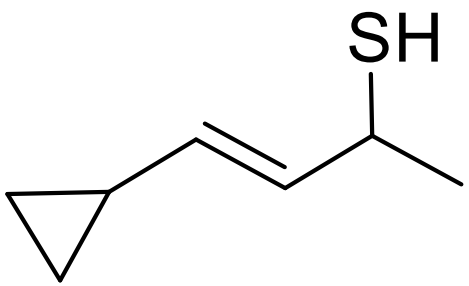


TIOLI

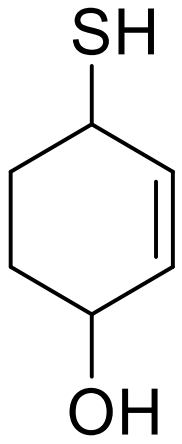
1. Tioli ili merkaptani su strukturni analozi alkohola
2. menuju se po istim pravilima kao i alkoholi, samo se nastavak *-ol* zamjeni s natavkom *–tiol*
3. kad se tiolna skupina navodi u prefiksu imenuje se kao *sulfanil-*

7. Imenujte spojeve prema IUPAC-ovim pravilima

a)

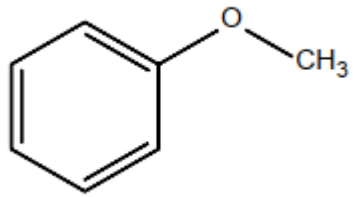


b)



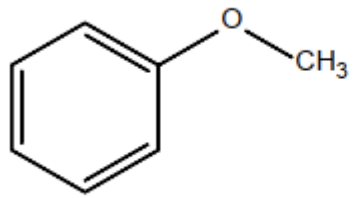
ETERI

1. Funkcijsko-razredna nomenklatura: abecedno se imenuju dvije alkilne ili arilne skupine vezane na kisik i dodaje se riječ –eter



fenil-metil-eter

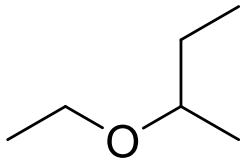
2. Supstitucijska nomenklatura: složenija alkilna skupina se koristi kao osnova imena, a ostatak etera se navodi kao alkoksidna skupina.



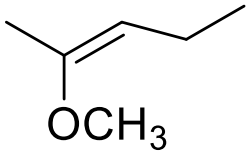
metoksibenzen

8. Imenujte spojeve prema IUPAC-ovim pravilima

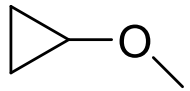
a)



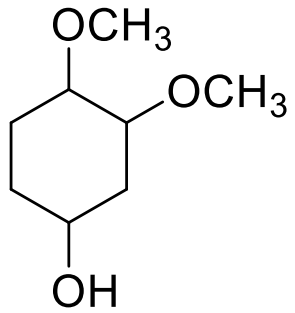
c)



b)

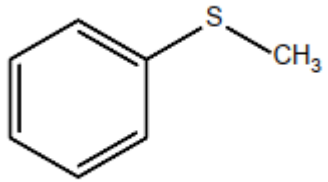


d)



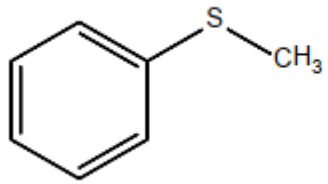
SULFIDI (tioeteri)

1. Funkcijsko-razredna nomenklatura: abecedno se imenuju dvije alkilne ili arilne skupine vezane na sumpor i dodaje se riječ –sulfid.



fenil-metil-sulfid

2. Supstitucijska nomenklatura: isto kao i kod etera, samo se „alkoksi” zamjeni s alkiltio.



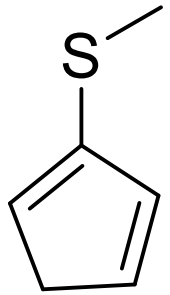
metiltiobenzen

9. Imenujte spojeve prema IUPAC-ovim pravilima

a)

$CH_3CH_2SCH_2CH_2CH_3$

b)



AMINI

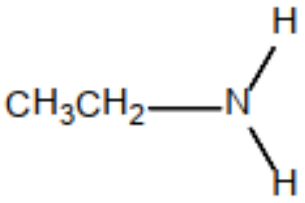
1. Osnovno ime određuje najdulji neprekinuti lanac ugljikovih atoma na koji je vezana amino skupina:
   - naziv lanca + položaj amino skupine + *-amin*

2. Ako je supstituent vezan na dušikov atom dobiva prefiks *N-*, a ostali supstituenti se označuju brojevima

3. Ako amino skupina nije najprioritetnija u spoju, navodi se kao prefiks i označava s *amino-*.

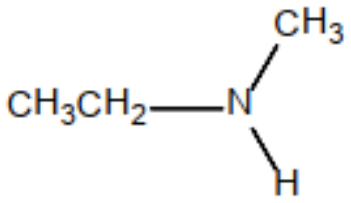
Primjer primarnih, sekundarnih i tercijarnih amina:

1°



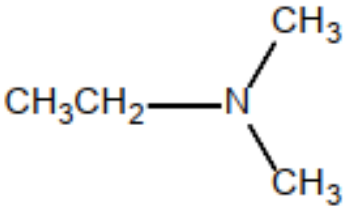
etan-1-amin

2°



N-metiletan-1-amin

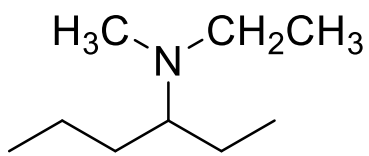
3°



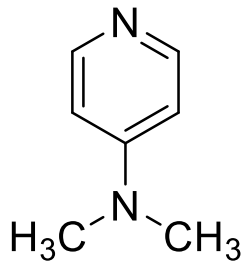
N,N-dimetiletan-1-amin

10. Imenujte spojeve prema IUPAC-ovim pravilima

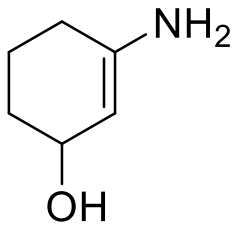
a)



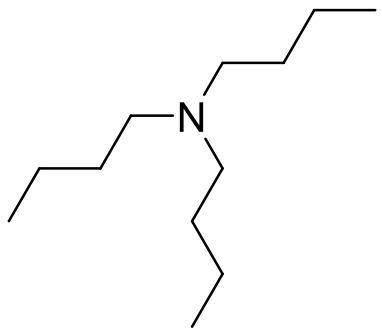
b)



c)



d)





FUNKCIJSKA SKUPINA	SUFIKS KAO GLAVNA FUNKCIJSKA SKUPINA	PREFIKS KAO SPOREDNA FUNKCIJSKA SKUPINA
karboksilne kiseline	-ska kiselina	karboksi-
esteri	alkil- -oat	alkoksikarbonil-
kiselinski halogenidi	-oil	halogenformil-
amidi	-amid	karbamoil-
nitrili	-onitrili	cijano-
aldehidi	-al	formil-
ketoni	-on	okso-
alkoholi	-ol	hidroksi-
tioli	-tiol	sulfanil-
amini	-amin	amino-
alkeni	-en	enil-
alkini	-in	inil-
alkani	-an	il-
eteri	-eter	alkoksi-
sulfidi	-sulfid	alkiltio-
halogenidi		halo-

11. Prikažite strukture navedenih spojeva:

a) 2-metil-4-metoksiheks-2-en

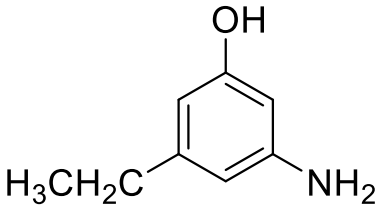
b) 4-ciklopropil-3-klorciklobutan-1,2-diol

c) 4-etil-3-(1-metilpropil)fenol

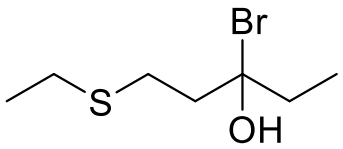
d) 2-etiltiohept-3-in

12. Imenujte spojeve prema IUPAC-ovim pravilima :

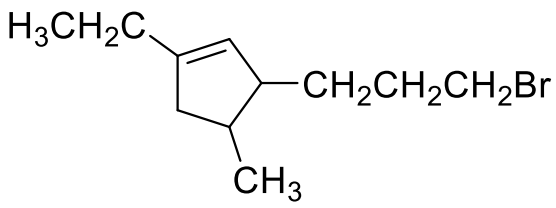
a)



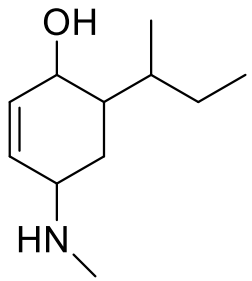
c)



b)



d)

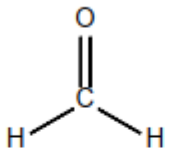


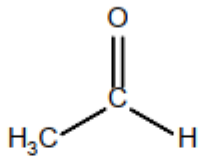
ALDEHIDI

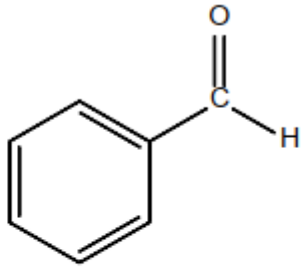
1. Osnovno ime određuje najdulji neprekinuti lanac ugljikovih atoma na koji je vezana aldehidna skupina: naziv lanca + -al

2. Ako je –CHO skupina vezana na prsten, onda se dodaje nastavak *–karbaldehid*

3. Ako aldehidna skupina nije najprioritetnija u spoju, navodi se kao supstituent i označava s prefiksom *formil-*



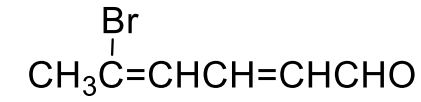




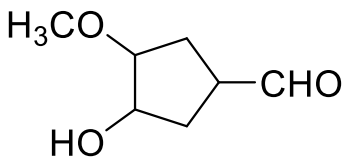
uvriježena imena:	formaldehid	acetaldehid	benzaldehid
supstitucijska imena:	metanal	etanal	benzenkarbaldehid

13. Imenujte spojeve prema IUPAC-ovim pravilima :

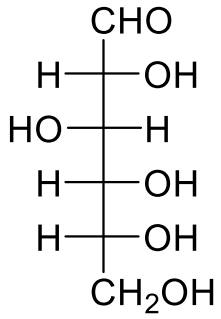
a)



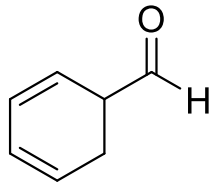
b)



c)



d)

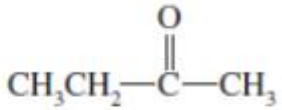


KETONI

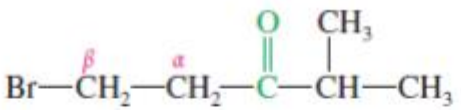
1. Osnovno ime određuje najdulji neprekinuti lanac ugljikovih atoma na koji je vezana ketonska skupina: naziv lanca + položaj skupine + -on

2. Ako aldehidna skupina nije najprioritetnija u spoju, navodi se kao supstituent i označava s prefiksom *okso-*

3. Ketoni se mogu imenovati i funkcijsko-razrednom nomenklaturom*:*

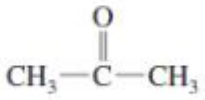


etil-metil-keton

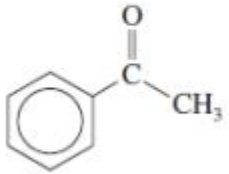


β-brometil-izopropil-keton

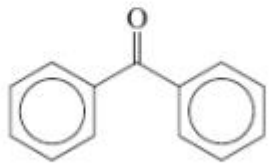
Uvriježena imena:



aceton



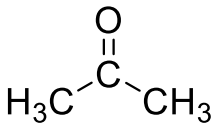
acetofenon



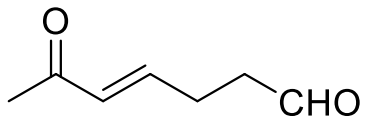
benzofenon

14. Imenujte spojeve prema IUPAC-ovim pravilima :

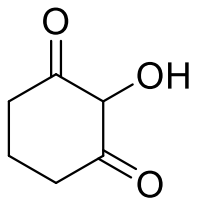
a)



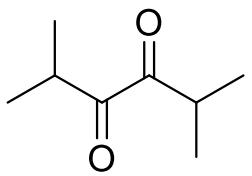
c)



b)



d)



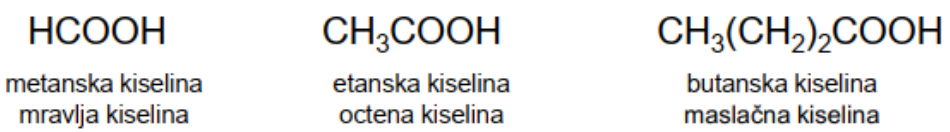
KARBOKSILNE KISELINE

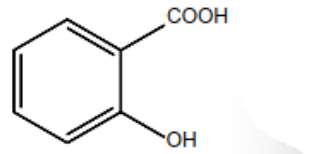
1. Osnovno ime određuje najdulji neprekinuti lanac ugljikovih atoma na koji je vezana karboksilna skupina: naziv lanca + *-ska kiselina*

2. Ako je –COOH skupina vezana na prsten, onda se dodaje nastavak –karboksilna kiselina

3. Aromatske kiseline se imenuju kao derivati benzojeve kiseline.

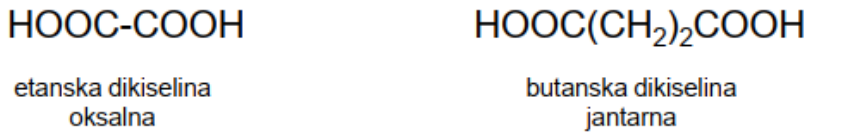
4. Ako karboksilna skupina nije najprioritetnija u spoju, navodi se kao supstituent i označava s prefiksom *karboksi-*

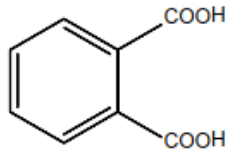




o-hidroksibenzojeva kiselina
salicilna kiselina

5. Dikarboksilne kiseline imenuju se dodatkom nastavka *–ska dikiselina* na osnovno ime

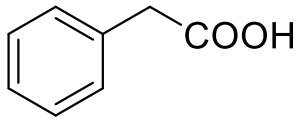




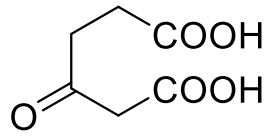
benzen-1,2-dikarboksilna kiselina
o-ftalna kiselina

15. Imenujte spojeve prema IUPAC-ovim pravilima :

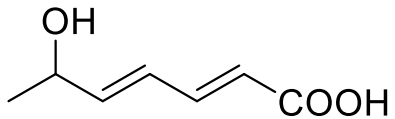
a)



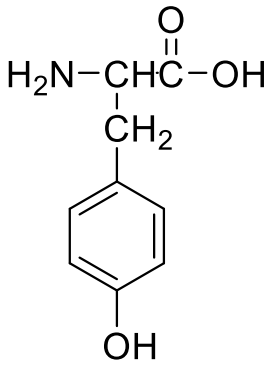
c)



b)



d)

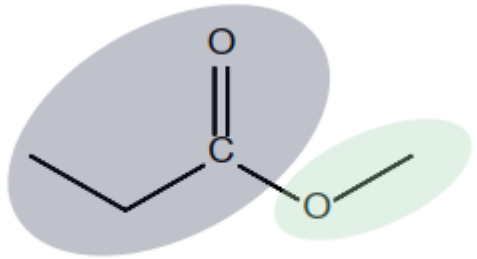


ESTERI

1. Osnovno ime se sastoji od 2 dijela:

    I. alkoholni dio: *alkil*
    II. kiselinski dio: u imenu kiseline se nastavak –*ska* kiselina zamjeni nastavkom –oat

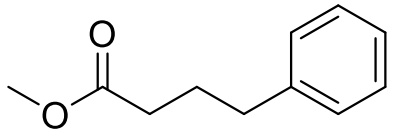
2. Ako esterska skupina nije najprioritetnija u spoju, navodi se kao supstituent i označava s prefiksom *alkoksikarbonil-*



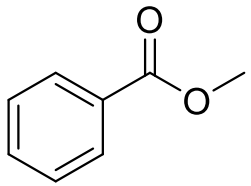
metil-propanoat

16. Imenujte spojeve prema IUPAC-ovim pravilima :

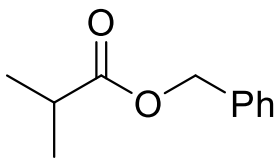
a)



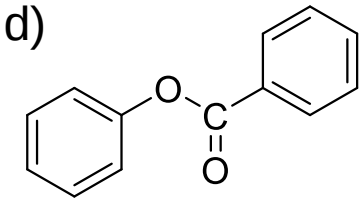
c)



b)



d)

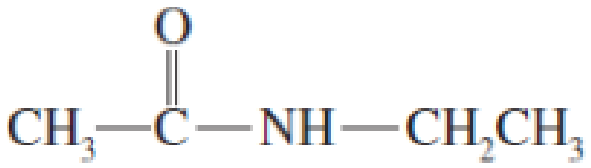


AMIDI

1. Kod primarnih amida se u imenu kiseline nastavak –*ska* kiselina zamjeni nastavkom *–amid*. Sekundarni i tercijarni amidi imenuju se kao N-supstituirani i N,N-disupstituirani primarni amidi.

2. Ako je amidna skupina vezana na prsten dodaje se nastavak *–karboksamid*

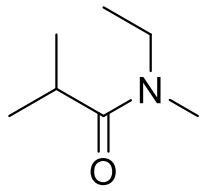
3. Ako amidna skupina nije najprioritetnija u spoju, navodi se kao supstituent i označava s prefiksom *karbamoil-*.



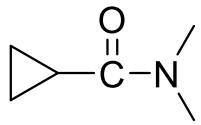
N-etiletanamid
N-etilacetamid

17. Imenujte spojeve prema IUPAC-ovim pravilima :

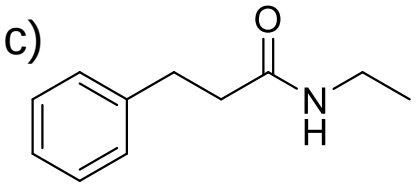
a)



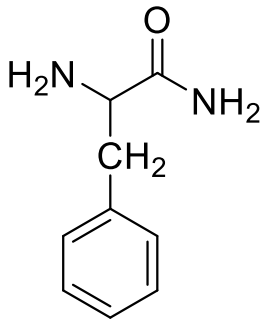
b)



c)



d)



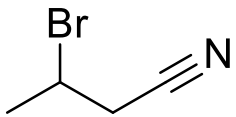
NITRILI

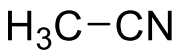
1. U imenu kiseline nastavak –ska kiselina se zamjeni nastavkom *–onitril*.

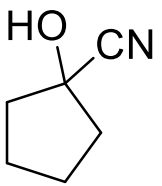
2. Ako je nitrilna skupina vezana na prsten dodaje se nastavak *–karbonitril*

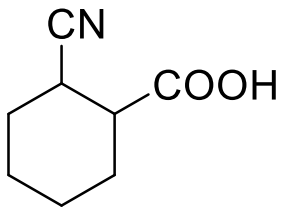
3. Ako nitrilna skupina nije najprioritetnija u spoju, navodi se kao supstituent i označava s prefiksom *cijano-*.

18. Imenujte spojeve prema IUPAC-ovim pravilima :

a) 

c) 

b) 

d) 

KISELINSKI HALOGENIDI

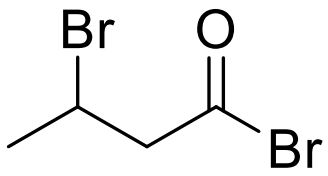
1. U imenu kiseline nastavak –ska kiselina se zamjeni nastavkom *–oil* + *-halogenid*

2. Ako je kiselinsko-halogenidna skupina vezana na prsten dodaje se nastavak *–karbonil-halogenid*

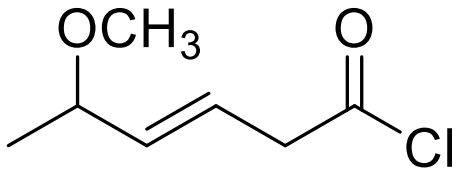
3. Ako kiselinsko-halogenidna skupina nije najprioritetnija u spoju, navodi se kao supstituent i označava s prefiksom *halogenformil-*.

19. Imenujte spojeve prema IUPAC-ovim pravilima :

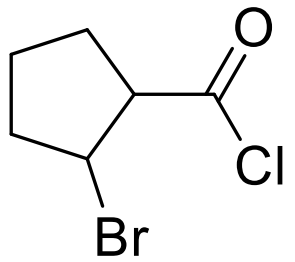
a)



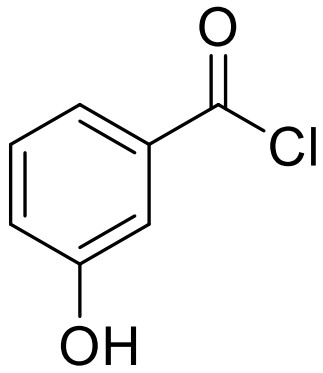
b)



c)



d)



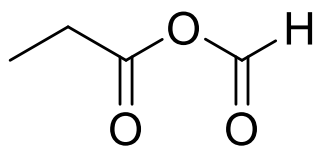
KISELINSKI ANHIDRIDI

1. Simetrični anhidridi: anhidrid + ime odgovarajuće kiseline u genitivu

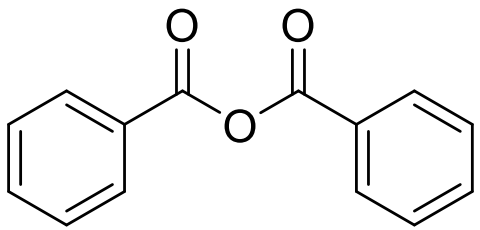
2. Mješoviti anhidridi: anhidrid x i y kiseline (nazivi kiselina abecedno)

20. Imenujte spojeve prema IUPAC-ovim pravilima :

a)



b)

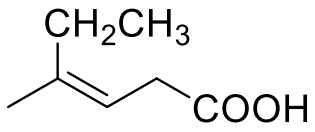




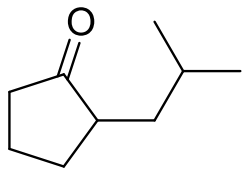
FUNKCIJSKA SKUPINA	SUFIKS KAO GLAVNA FUNKCIJSKA SKUPINA	PREFIKS KAO SPOREDNA FUNKCIJSKA SKUPINA
karboksilne kiseline	-ska kiselina	karboksi-
esteri	alkil- -oat	alkoksikarbonil-
kiselinski halogenidi	-oil	halogenformil-
amidi	-amid	karbamoil-
nitrili	-onitrili	cijano-
aldehidi	-al	formil-
ketoni	-on	okso-
alkoholi	-ol	hidroksi-
tioli	-tiol	sulfanil-
amini	-amin	amino-
alkeni	-en	enil-
alkini	-in	inil-
alkani	-an	il-
eteri	-eter	alkoksi-
sulfidi	-sulfid	alkiltio-
halogenidi		halo-

21. Imenujte spojeve prema IUPAC-ovim pravilima :

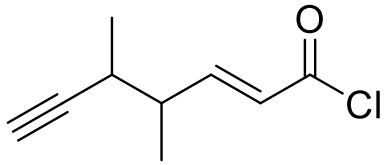
a)



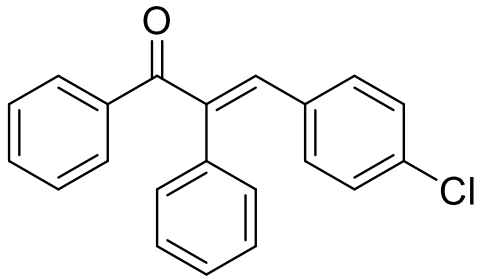
b)



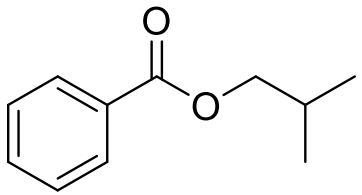
c)



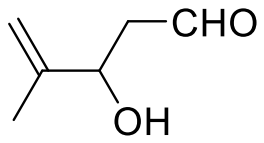
d)



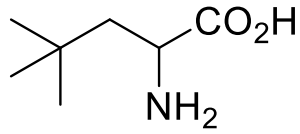
e)



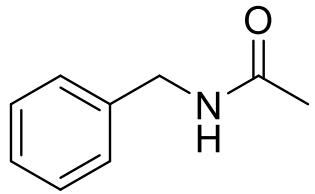
f)



g)



h)



22. Imenujte spojeve prema IUPAC-ovim pravilima :

a) etil-ciklobut-2-enkarboksilat

b) 1-cikloheksil-2,2-dimetilpropan-1-on

c) 5-cijano-3-oksooktanska dikiselina

d) propil-4-etoksi-5-fenil-5-oksopent-2-enoat

e) 4-brom-2-etilciklopentankarboksamid

f) anhidrid benzojeve i 3,4-dimetilpentanske kiseline