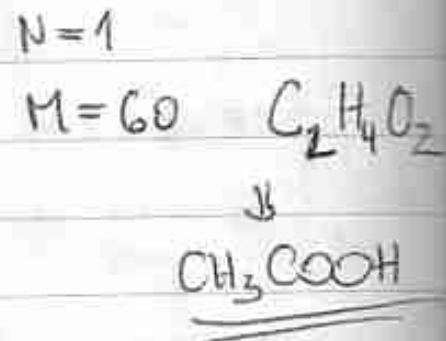
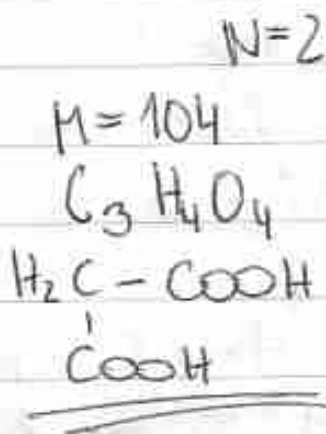


FUNKCIONALNE SKUPINE

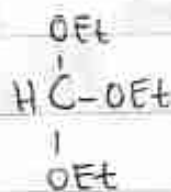
① vodotopna kislina - do 5C atomov

$$\frac{M}{N} = 53 \pm 1 \rightarrow \text{dekarboksilacija} \Rightarrow \frac{M}{N} = 59 \pm 1$$

$$- \text{CO}_2 \Rightarrow M - 44$$

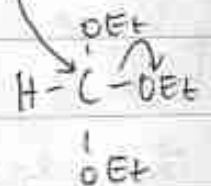
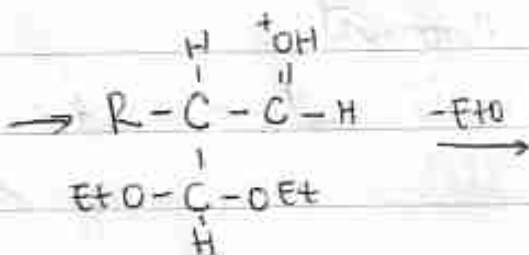
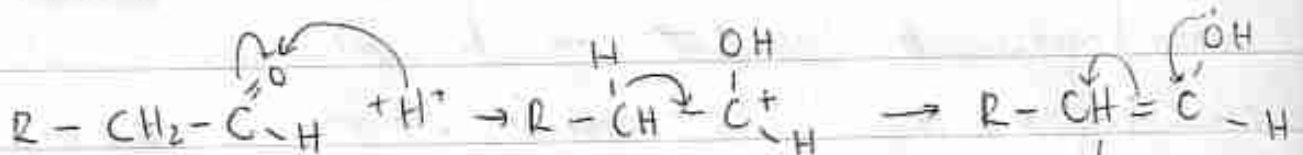


② etilortoformiat



^1H - premik enačilen za aldehid (9-10ppm)

po reakciji → premik enačilen za CH_2 skupino na kislinu



③ topma ν rodi \rightarrow do 5C atomov

topma ν etru \rightarrow ni rol ali aminokislina

Ne vsebuje halogena, N ali S

Reducira del $\text{KMnO}_4 \rightarrow$ alkohol, aldehyd, ~~etru~~

razbarva brom ν $\text{CCl}_4 \rightarrow$ alkohol, multipla vez

reagira z acetilkloridom \rightarrow alkohol

reakcija z natrijem \rightarrow alkohol

gre za alkohol do 5C atomov

④ vsebuje N in Cl

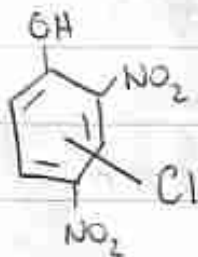
metopina ν rodi \rightarrow ima več kot 5C atomov

metopina ν HCl \rightarrow ni amin

topma ν $\text{NaHCO}_3 \rightarrow$ ~~fenol~~ fenol z elektronskimi privlačnimi skupinami, kislina

reagira z acetilkloridom \rightarrow fenol, (alkohol, amin)

ne reagira z $\text{AgNO}_3 \rightarrow$ klor nekam na obroč ali imidno skupino. Predlog:



⑤ vsebuje $\text{C}_7\text{H}_7\text{O}$

reagira z bromovim kisl. \rightarrow aldehyd, prim. ali sek. alkohol

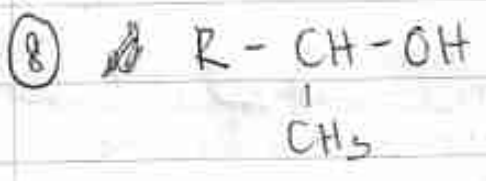
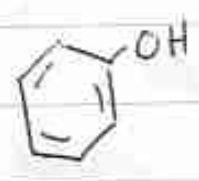
singlet pri 9,0 ppm \rightarrow aldehydni proton

RCHO

6) talcjošna reakcija s AgNO_3 :



7) reagira s $\text{KMnO}_4 \rightarrow$ alkoholi, ~~diopi~~ multiple vezi, fenoli
reakcija s Br_2 s $\text{Cl}_4 \rightarrow$ multiple vezi, alkoholi, aldehidi
dodatek acetilklorida \rightarrow fenol, dolg alkohol ali fenol



9) vsebuje dušik
topna s vodi \rightarrow več kot 5C atomov
topna s $\text{NaOH} \rightarrow$ ni fenol, kislina
topna s $\text{HCl} \rightarrow$ ni amin
topna s vroči $\text{H}_2\text{SO}_4 \rightarrow$ šibka baza



10) R voda se ne meša \rightarrow več kot 5C atomov ali popolnoma nep.
tvoja od vode \rightarrow vsebuje halogenid
po segrevanju reagira s $\text{AgNO}_3 \rightarrow \text{RCH}_2\text{Cl}, \text{RCH}_2\text{Br}, \text{R}_2\text{CHCl}$
in s NaI s acetoni $\rightarrow \text{RCH}_2\text{Cl}, \text{R}_2\text{CHCl}, \text{R}_2\text{CHBr}$

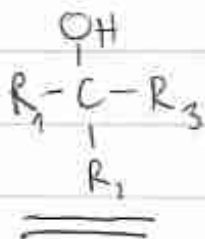
pre sa $R-CH_2Cl$ < neč kot 5 C atomi

- 11) topna v vodi \rightarrow do 5 C atomov
test z $Br_2 \rightarrow$ alkohol, aldehid, multiple vezi \leftarrow me vsebuje!
fenilhidrazin \rightarrow karbonylna skupina \rightarrow aldehid

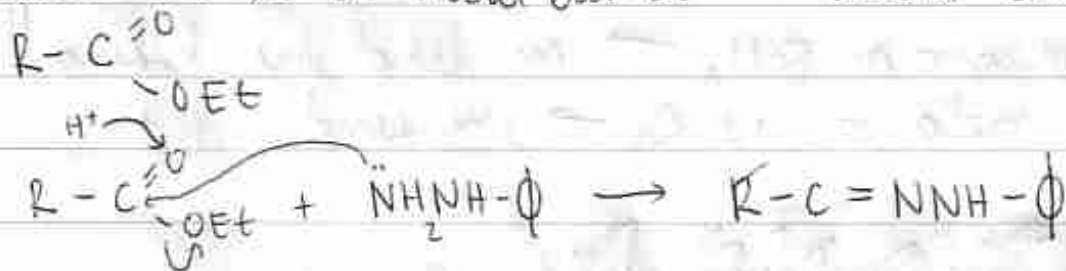
pre sa aldehid \leftarrow do ^{oklino} 5 C atomov

- 12) test z acetilkloridom \rightarrow amini, fenol, alkoholi
ne reagira z kromovo kislino \rightarrow ni fenol, alkohol (prim.) ali sekund.

pozitiven Lucasov test \rightarrow terciarni alkohol



- 13) nevtralna spojina! \rightarrow ni kislina ali amin, niti fenol
reakcija z fenilhidrazinom \rightarrow ester, karbonylna skupina
eliminira se in nastane etanol \rightarrow etilni ester



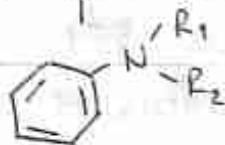
- 14) bazična spojina - amin

ne reagira z $\text{SO}_2\text{Cl}_2 \rightarrow$ terciarni amin

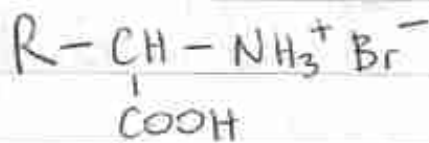
reakcija z $\text{HNO}_2 \rightarrow$ nitroziranje

signal pri $1550 \text{ cm}^{-1} \rightarrow$ nitro, nitroso

POGLEJ!



(15) rsebuje N in Br
 metopma \rightarrow metopma \rightarrow etou - se rol, aminokislina
 kiska acetopina \rightarrow aminokislina

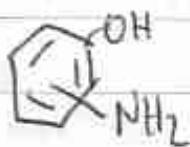


(16) rsebuje CHNO

topma \rightarrow NaOH \rightarrow fenol, kislina

topma \rightarrow HCl \rightarrow amino skupina

metopma \rightarrow NaHCO₃ \rightarrow ni fenol, ni kislina
 & EN skupina



(17) ne rsebuje N, S, X

metopma \rightarrow H₂O \rightarrow več kot 5C atomov

topma \rightarrow NaOH \rightarrow fenol & ~~alkohol~~ skupina, kislina

ne reagira s FeCl₃ \rightarrow ni fenol, ni kislina !!

ne razbarva KMnO₄ \rightarrow ni fenol

~~AA' OH' napredna~~

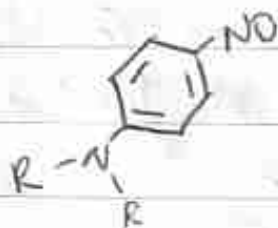
(21) R-CH₂Cl, ne gre za vinil ali aril klorid!

(22) reagira z acetilkloridom \rightarrow alkohol
 ne z fenilhidrazinom \rightarrow ni ester, nima karb. skupine, ni kislina

alkohol

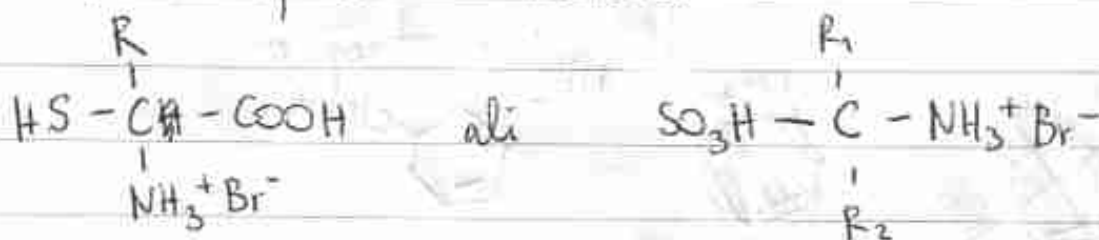
23) vsebuje N

ne reagira z acilkloridom \rightarrow ni prim. ali sek. amin
reagira s $\text{HNO}_2 \rightarrow$ obarvanje pomeni dodatno skupino



24) vsebuje N, S in Br

je vezitna sol \leftarrow netopna v etru, topna v vodi
kislota rastopna \rightarrow kislina



25) jedofornski $\text{R}-\text{CH}-\text{OH}$

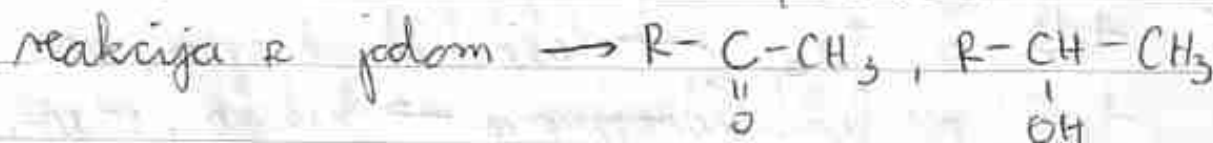
Lucaror: primarni, sekundarni, terciarni



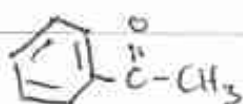
26) več kot 5C atomov

vibracije pri 690 in $716 \text{ cm}^{-1} \rightarrow$ monosubst. benzen

oborina R DNPH \rightarrow keton, aldehyd

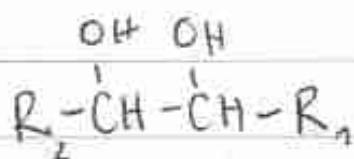


ne reagira s kromovo kislino \rightarrow ni primarni ali sekundarni alkohol, nitri aldehyd

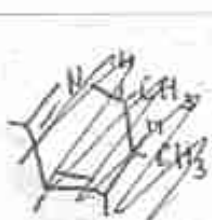


(27) reakcija s acetilkloridom: alkohol, fenol
 ne reagira s fenilhidrazinom \rightarrow ni kislina ali
 njen derivat

reakcija s $\text{HI} \text{O}_4 \rightarrow$ cepitev 1,2 diketonov, glikolov
 produkt reagira s fenilhidrazinom \rightarrow kislina, ^{derivat}
 ne reagira s acetilkloridom \rightarrow ni neč alkoholne
 ali fenilne skupine



(28) $\text{C}_8\text{H}_7\text{N} \rightarrow$ hidrogeniranje $\text{C}_8\text{H}_{11}\text{N} \rightarrow$
 spojina A vsebuje dve dvojni vezi
 ali - mo trajno



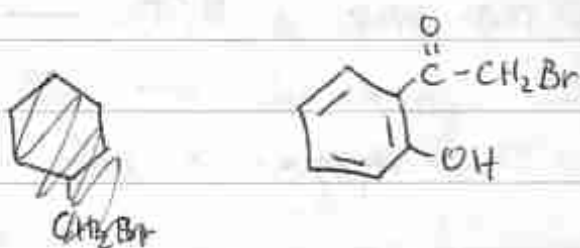
(29) reakcija s kromovo kislino

primarni ali sekundarni alkohol s manj kot
 6 C atomi ali aldehid s manj kot 6 C atomi

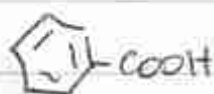
(30) topna v vodi \rightarrow do 6 C atomov, sladkorji
 test s $\text{Br}_2 \rightarrow$ aldehid, dvojna vez
 test s fenilhidrazinom \rightarrow kislina, ester, aldehid,
 keton

sladkor \rightarrow glukoza

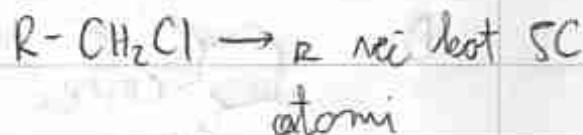
- 31) metopma u vodi \rightarrow već kot 6C atomov
 metopma u HCl \rightarrow ni ovinim
 topma u NaOH \rightarrow fenol ali kislina
 reakcija s KCN \rightarrow reagirajo lecarb. spojine in
 konjugirani ketoni
 reakcija s $\text{AgNO}_3 \rightarrow$ brom ali uo



- 32) Topma u NaOH \rightarrow fenol, benz. kislina
 ne reagira s $\text{Br}_2 \rightarrow$ ni fenol

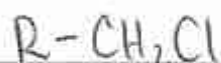


- 33) u vodi se ne meša \rightarrow već kot 5C atomov
 lažja od vode \rightarrow ne vsebuje halogenov ne halogenov
 ali lažje halogene

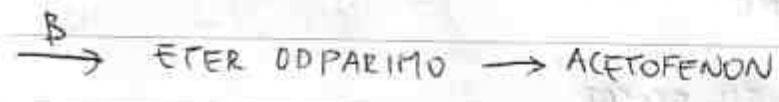
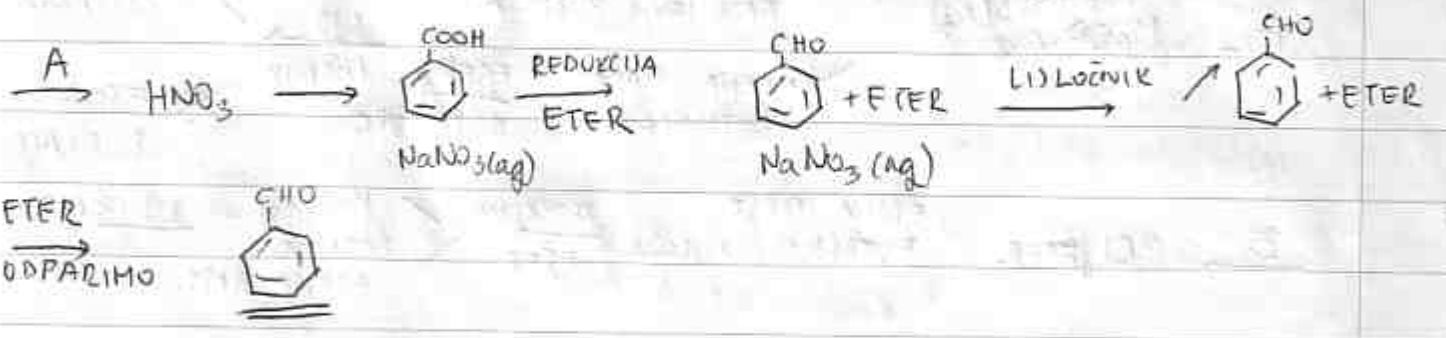
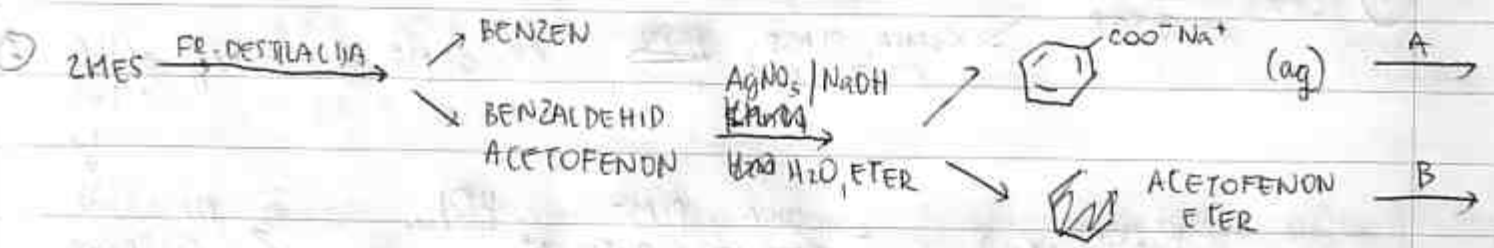
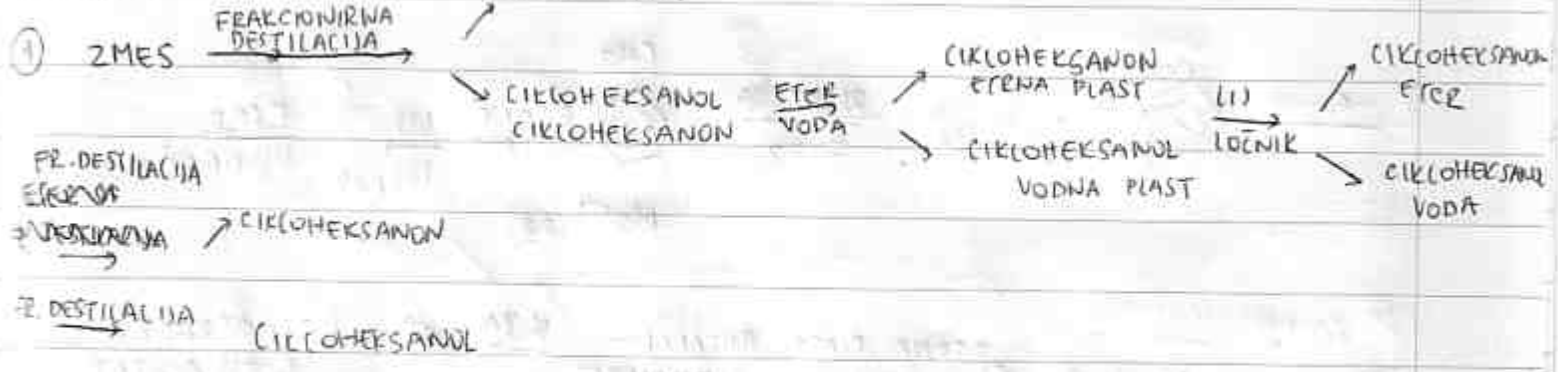


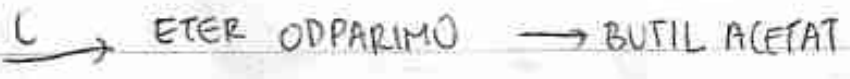
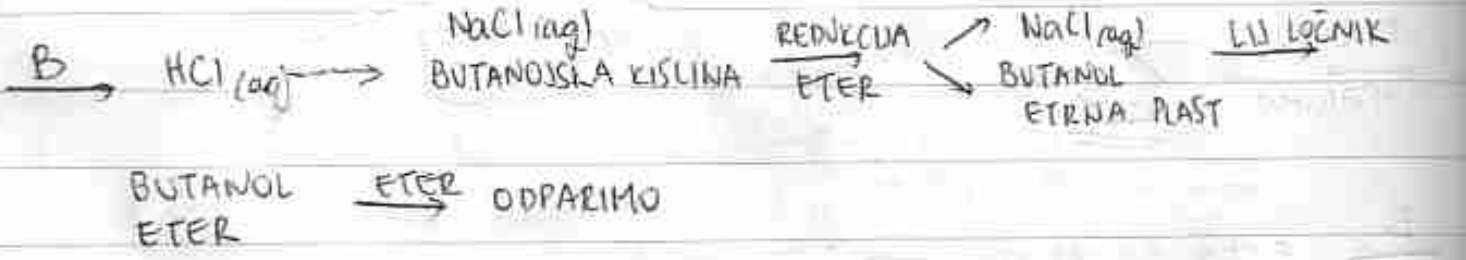
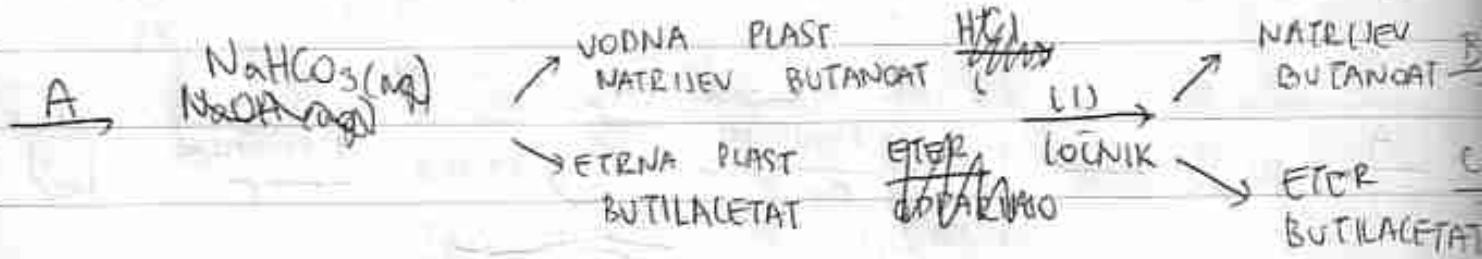
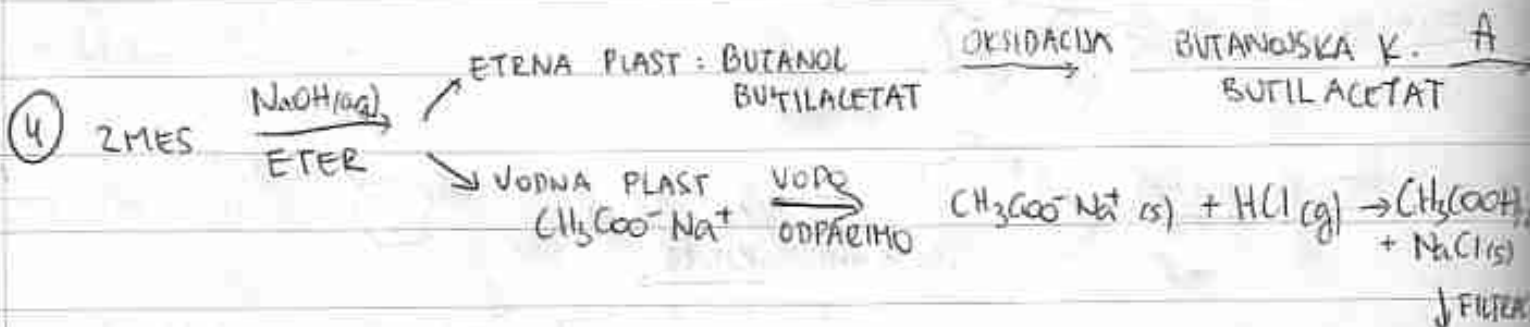
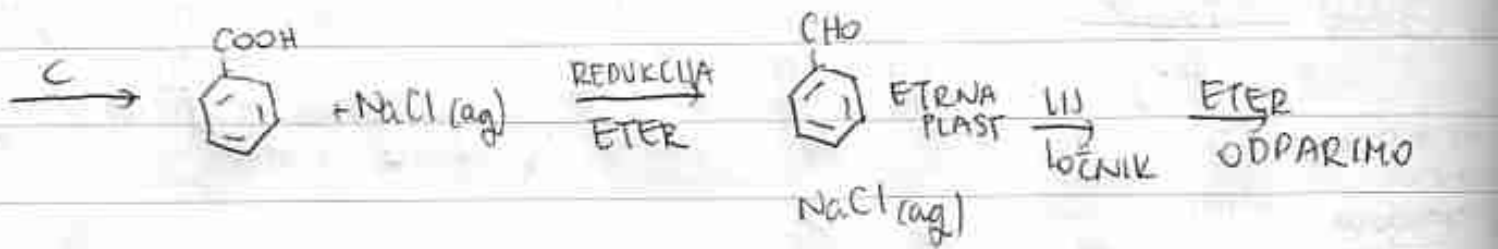
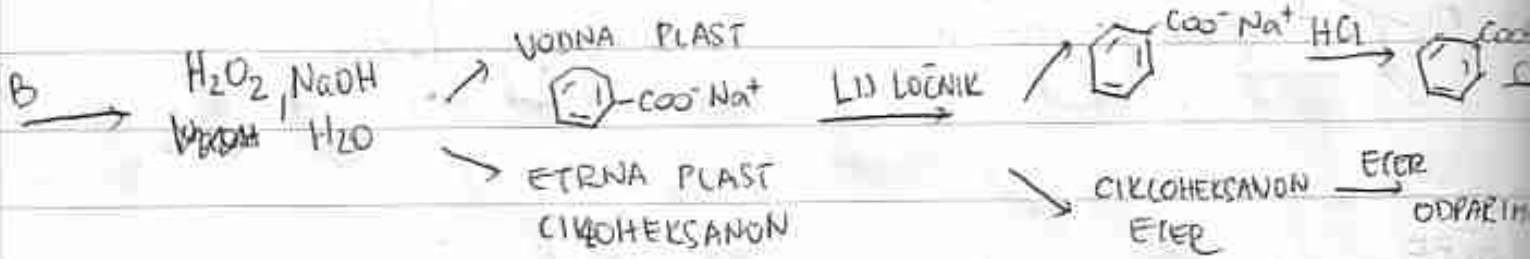
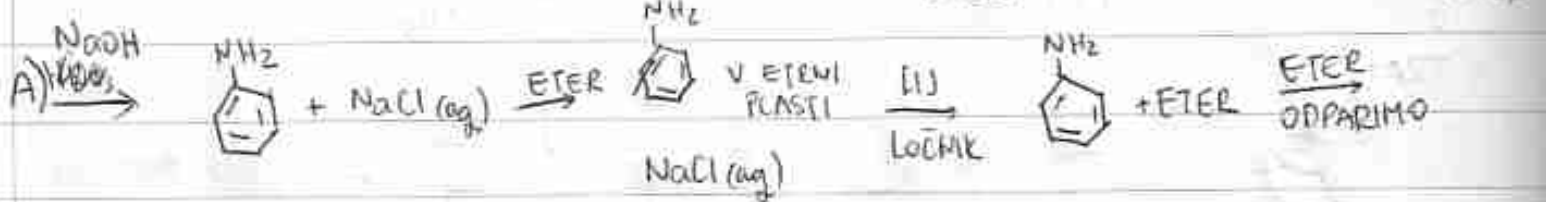
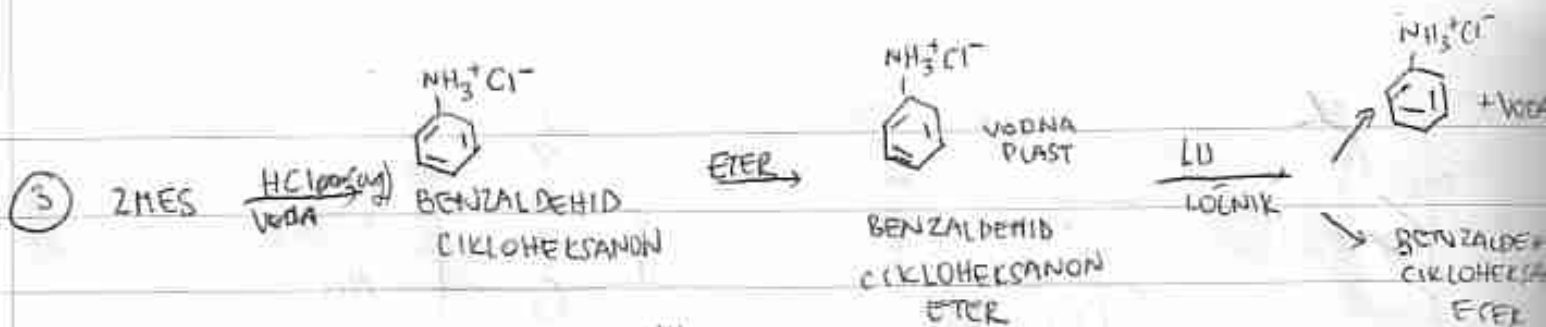
- 34) u sladkor \rightarrow glukoza

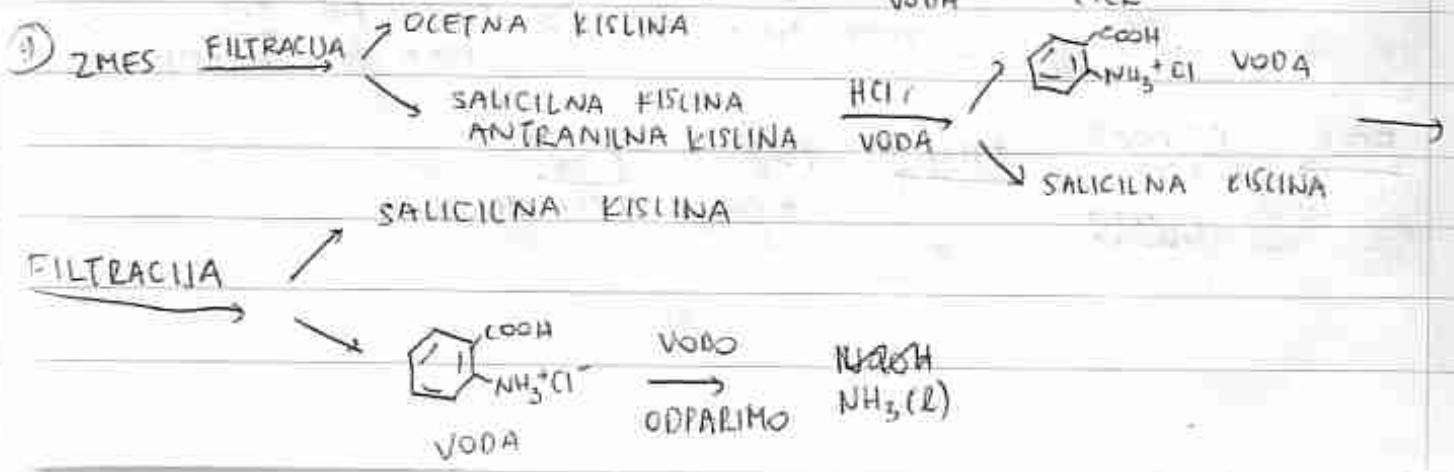
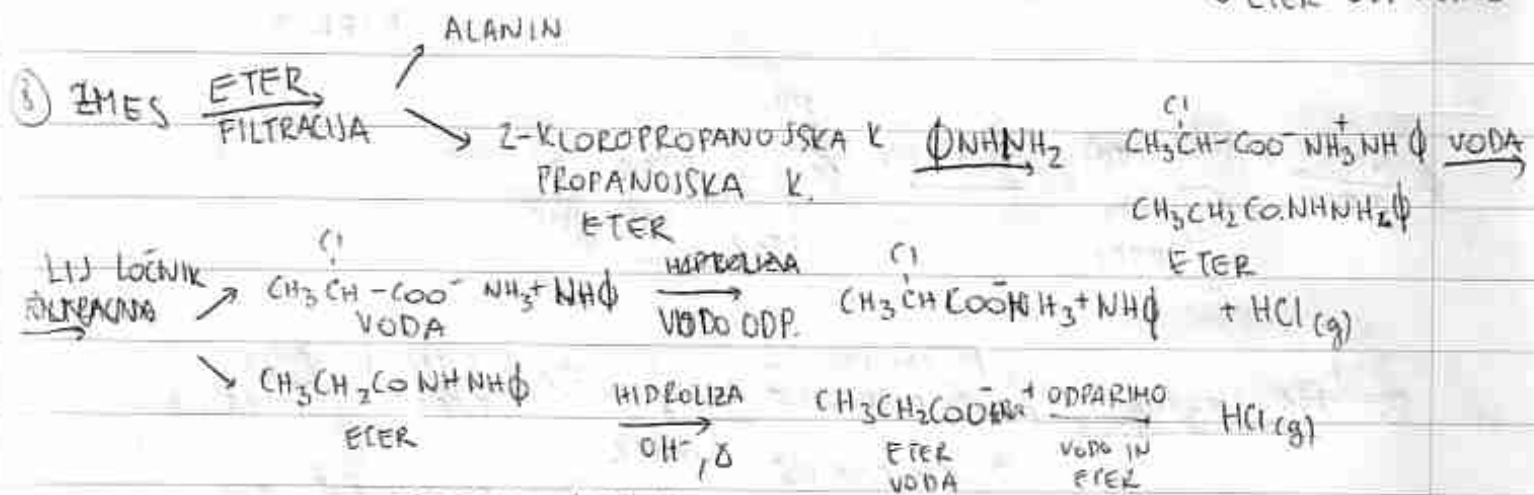
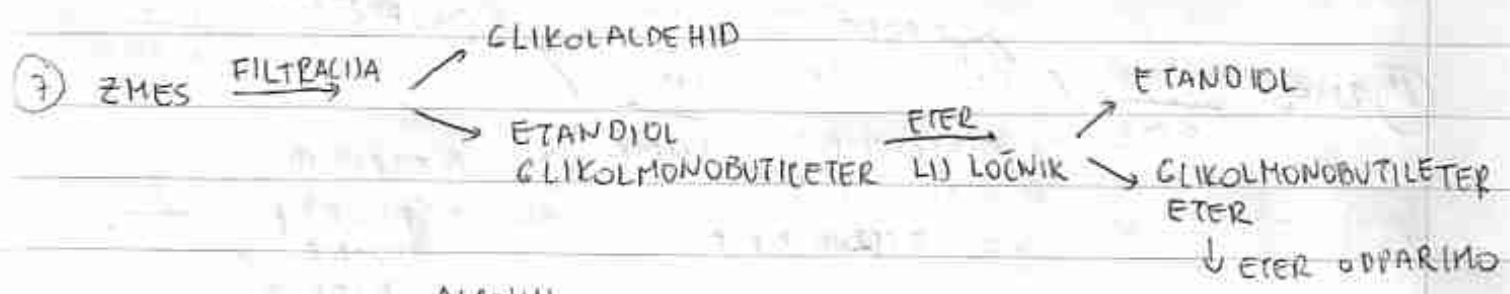
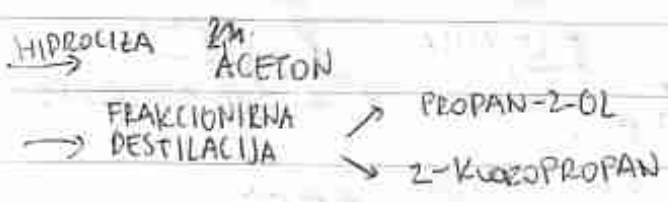
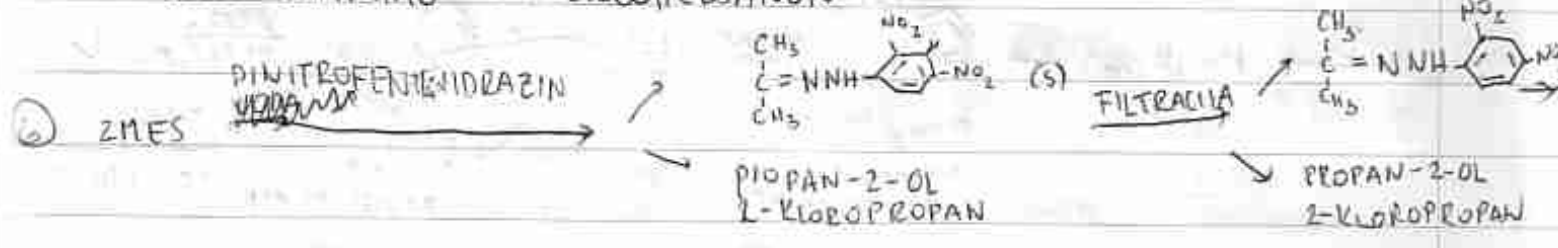
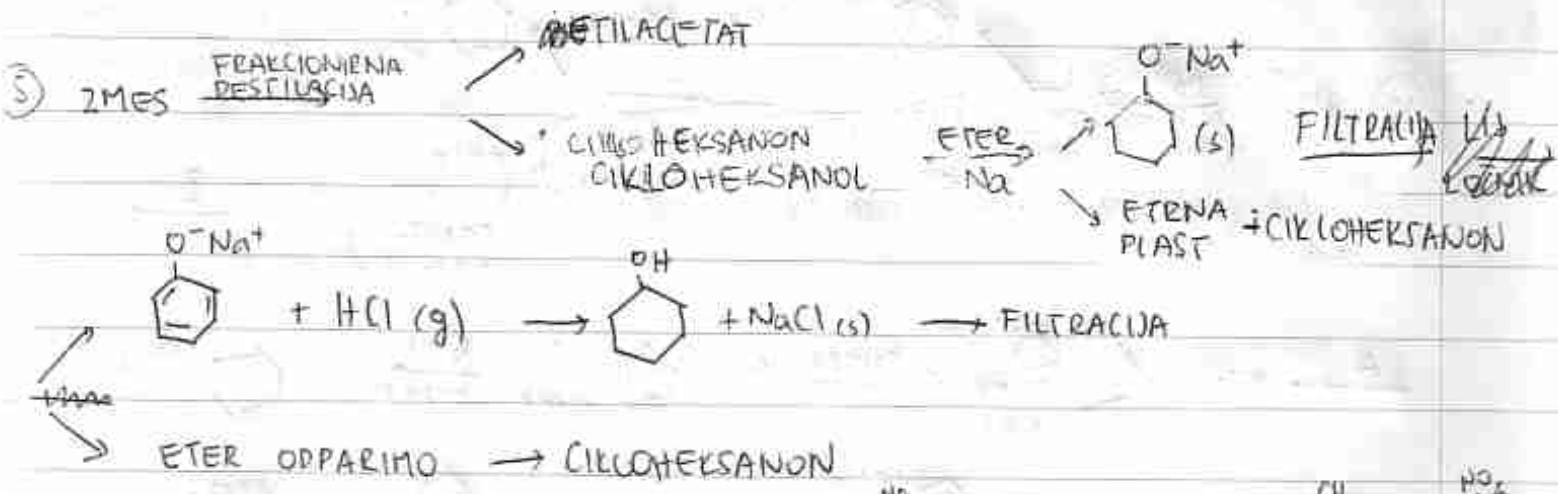
- 35) gori s plamenom \rightarrow vsebuje Cl, Br ali I

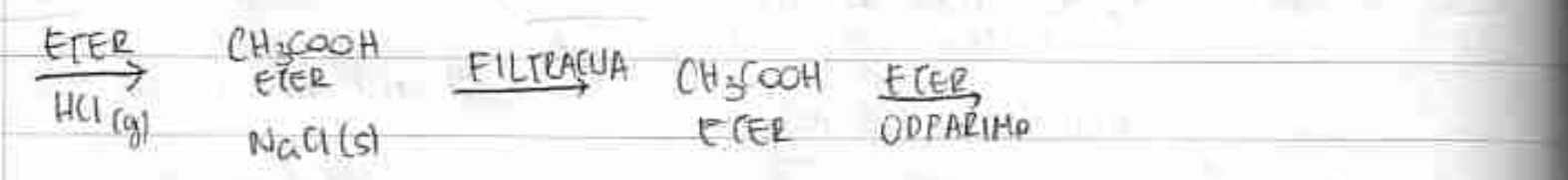
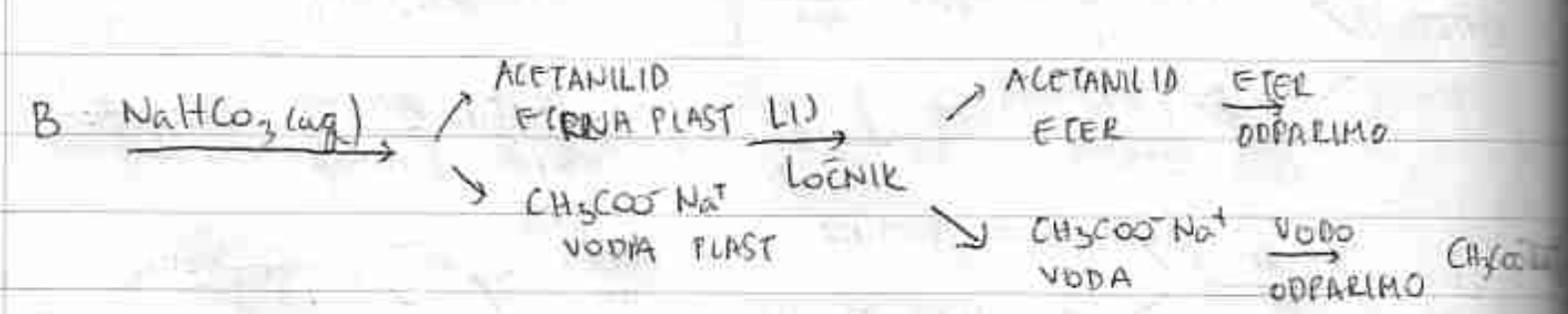
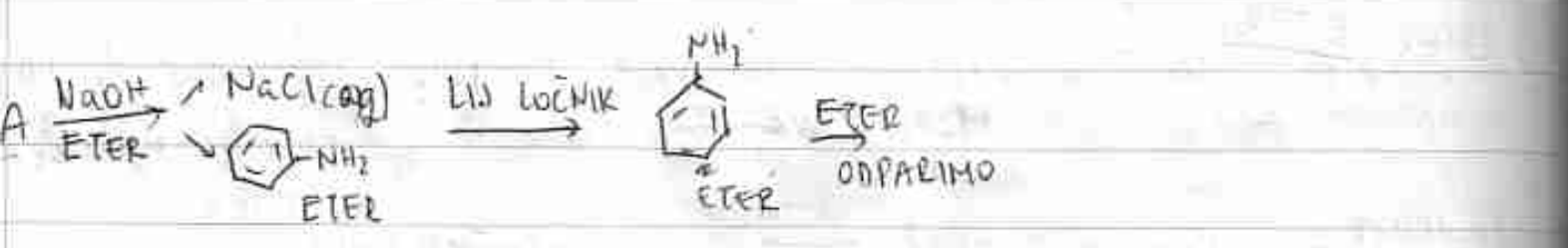
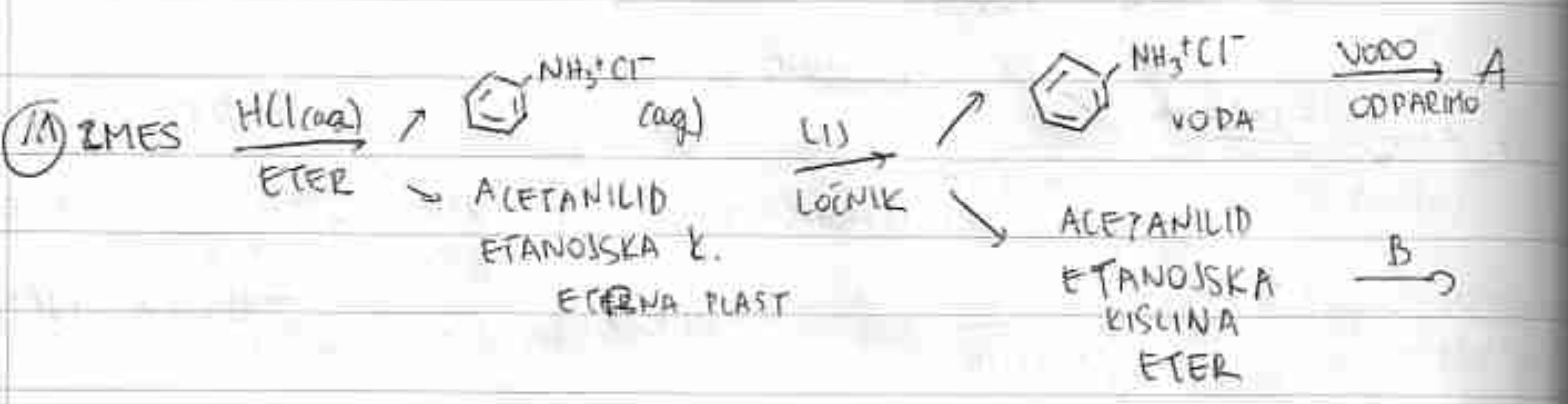
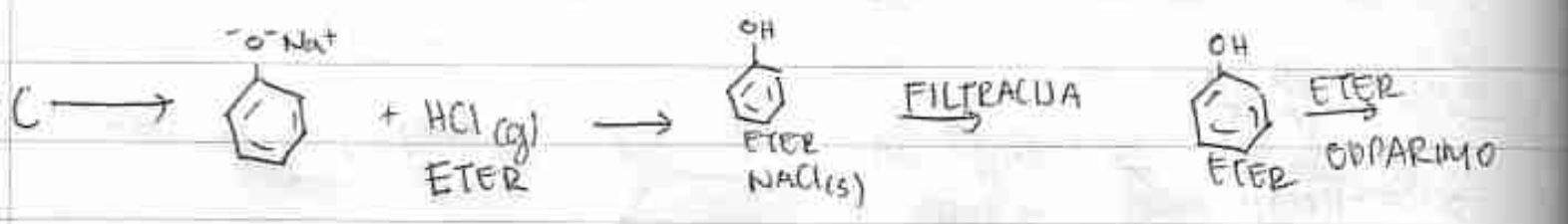
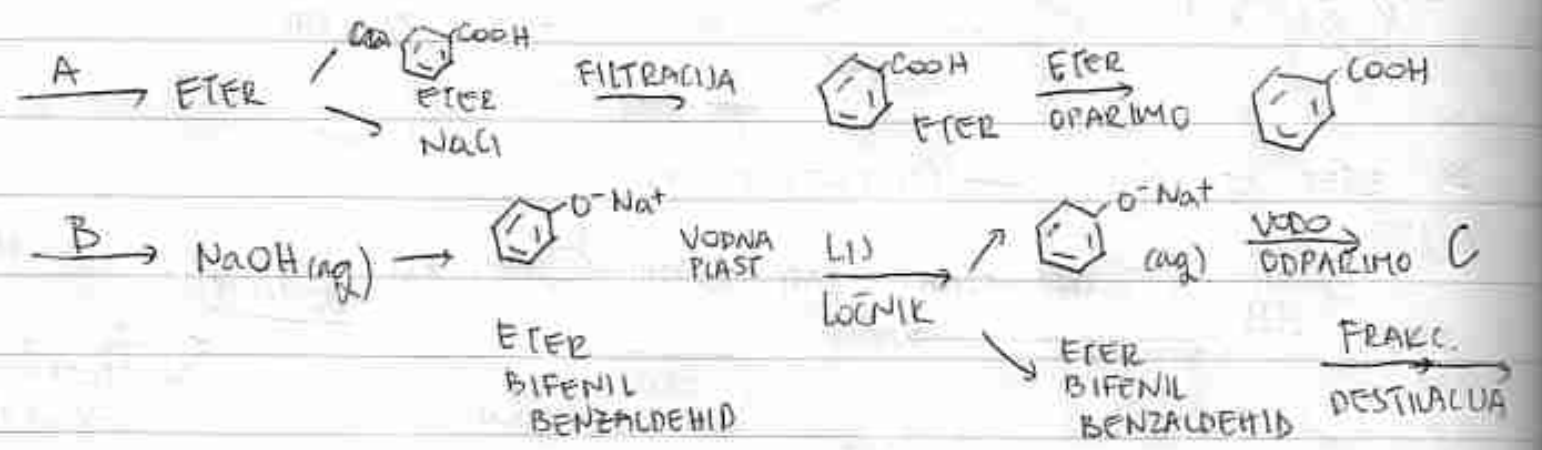
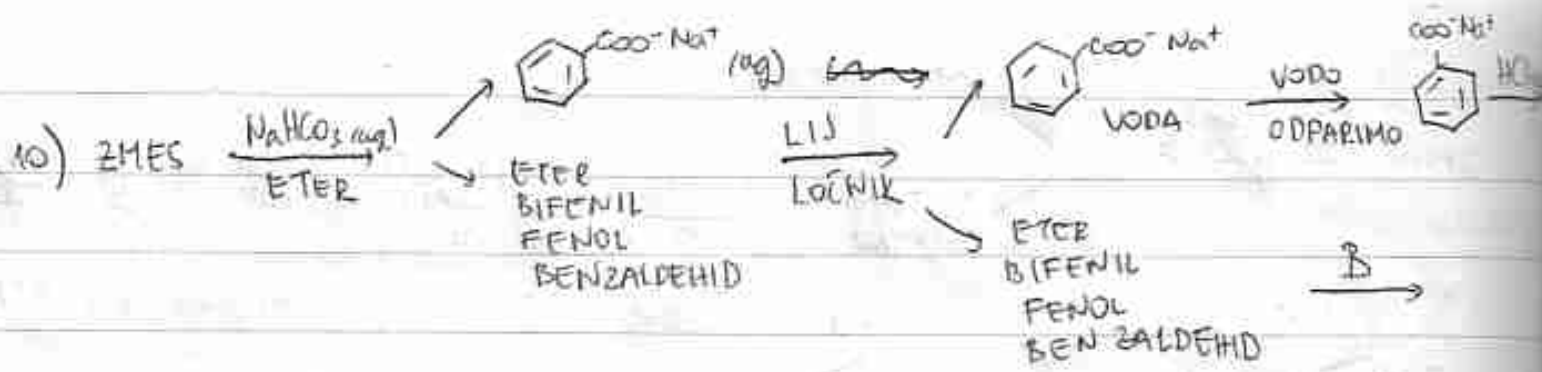


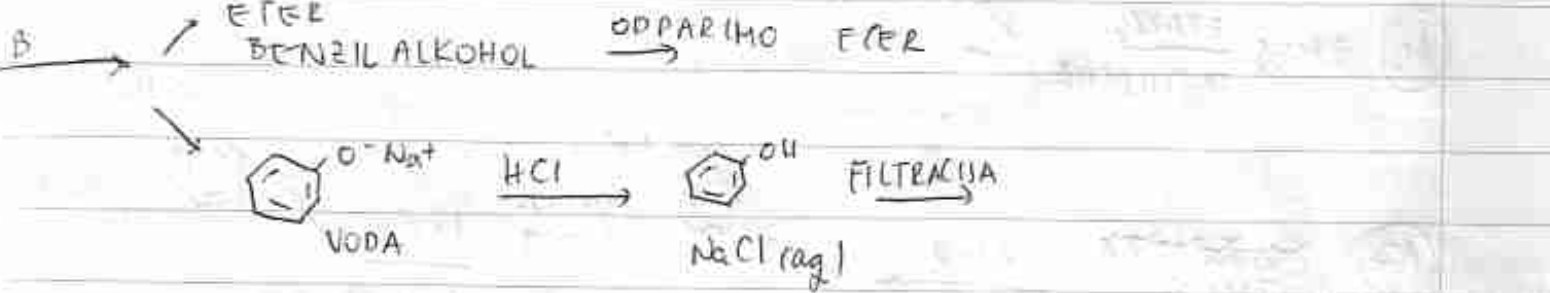
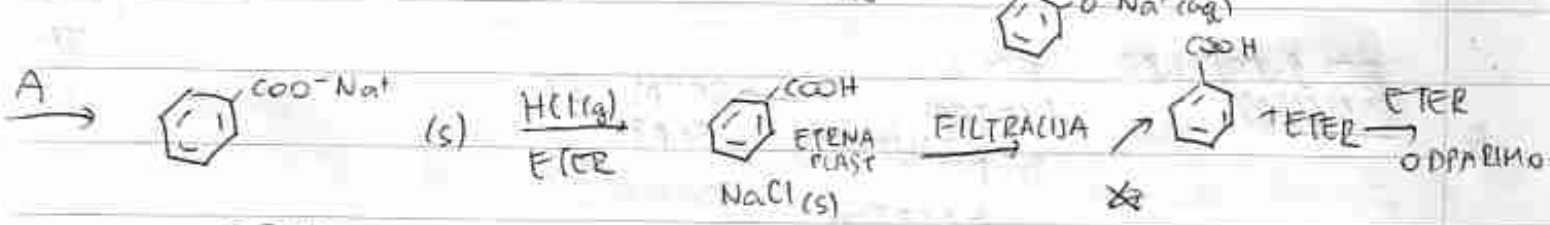
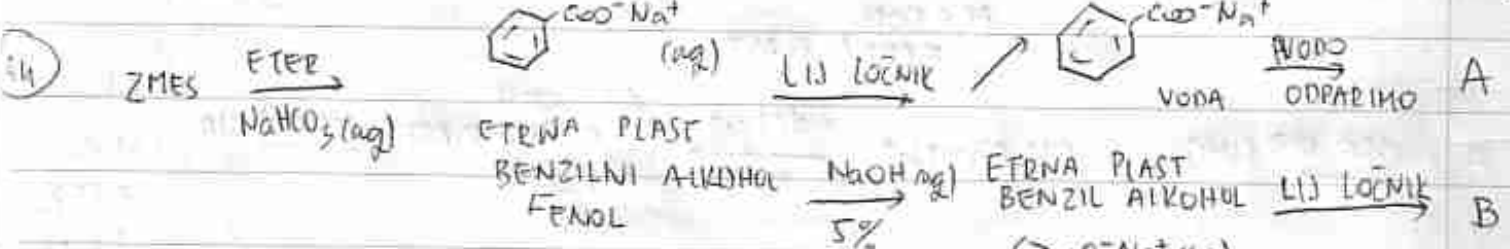
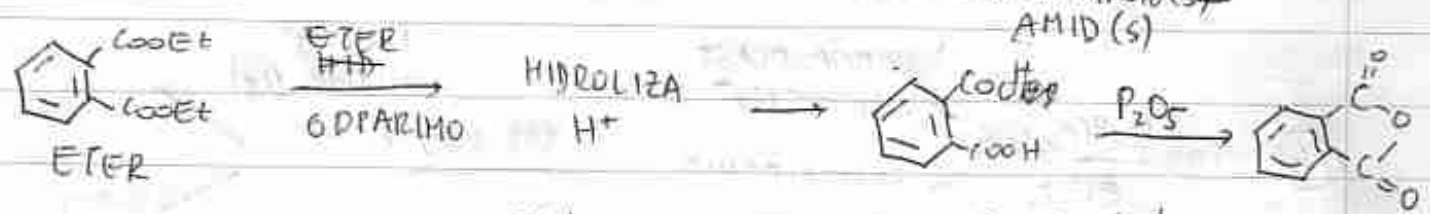
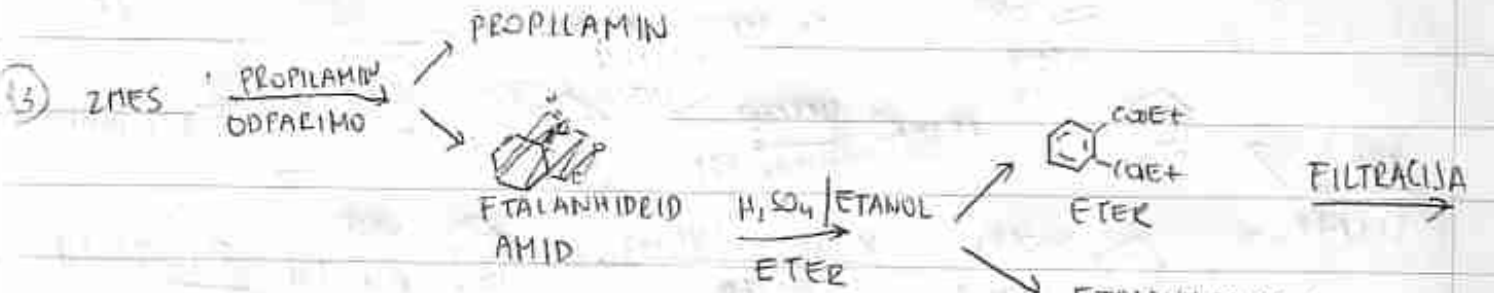
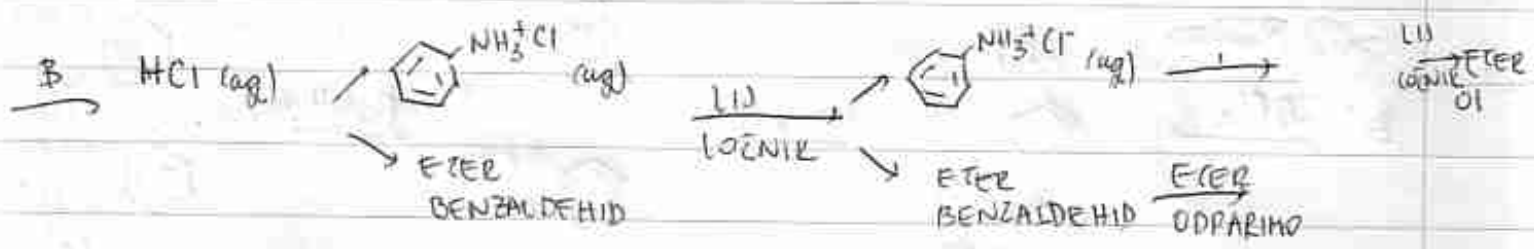
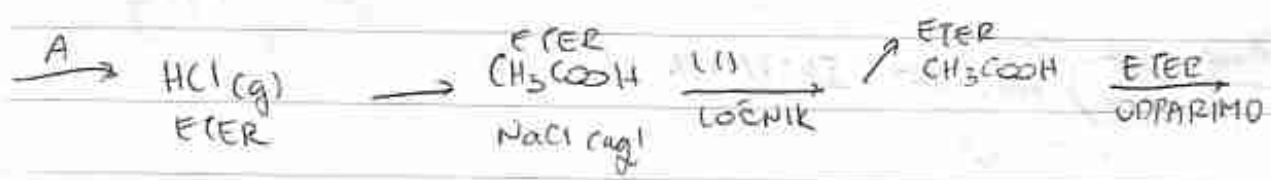
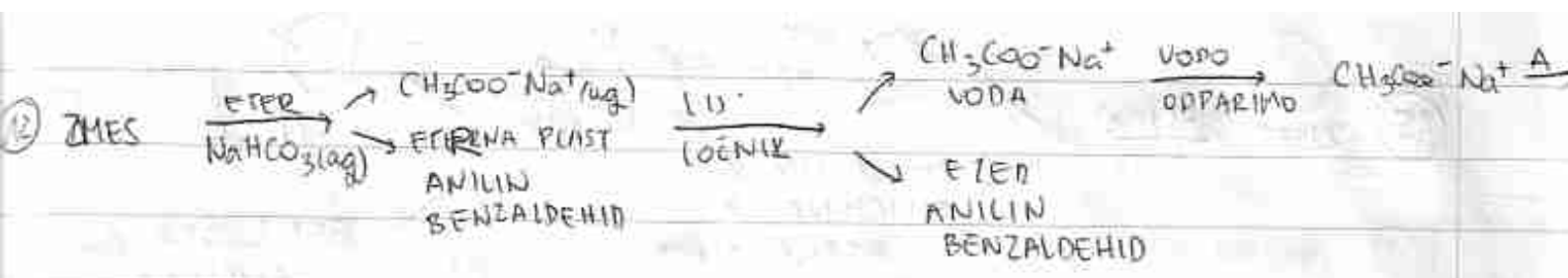
LOČBE:

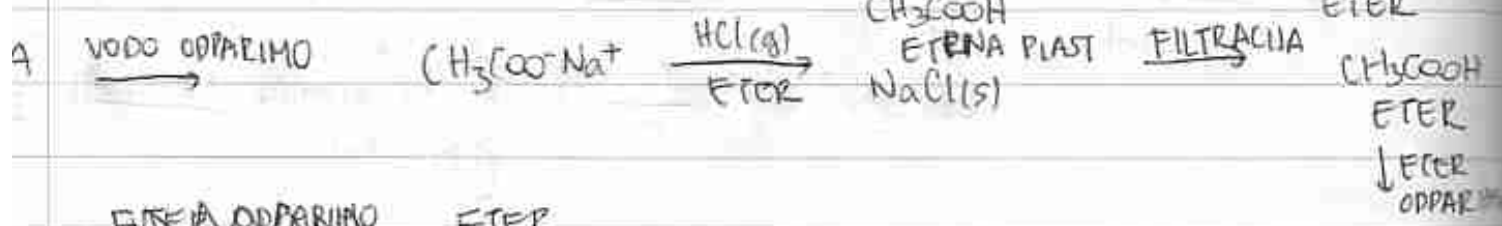
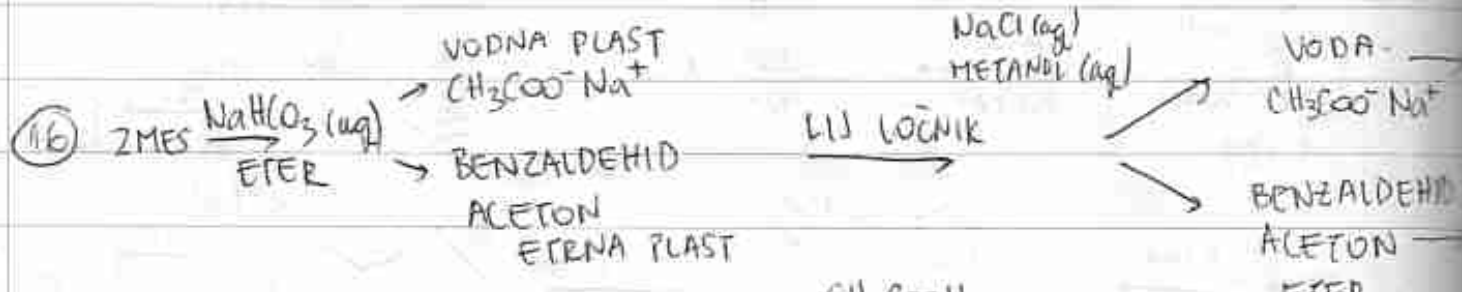
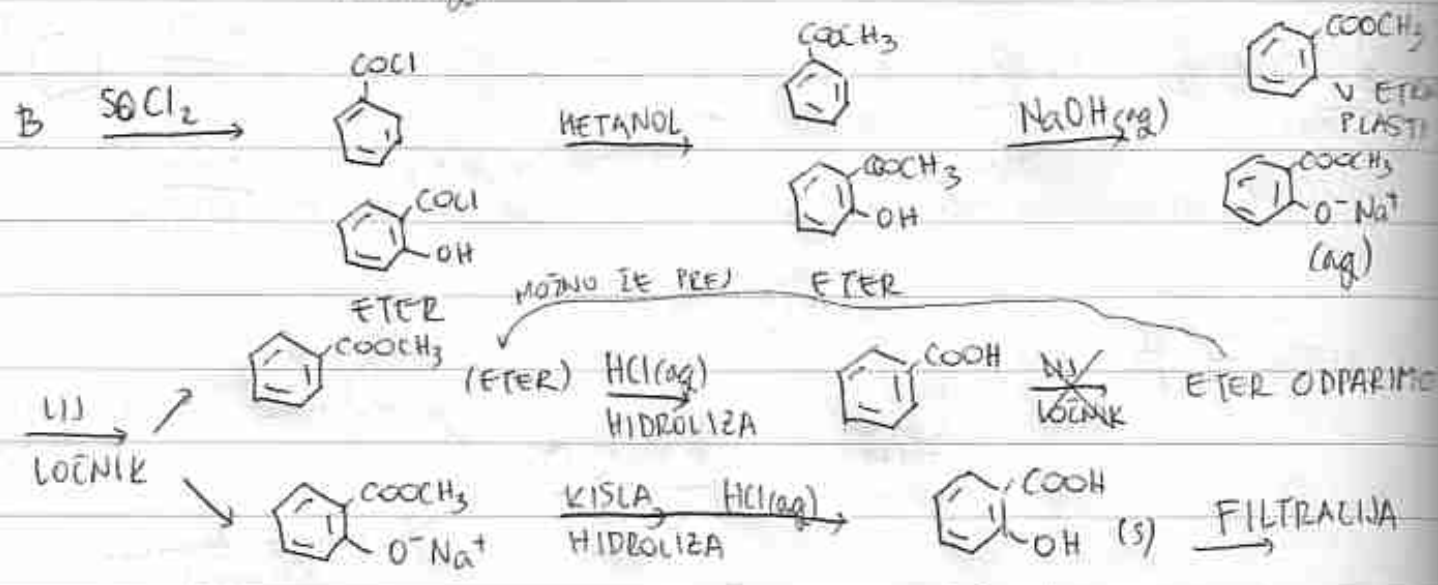
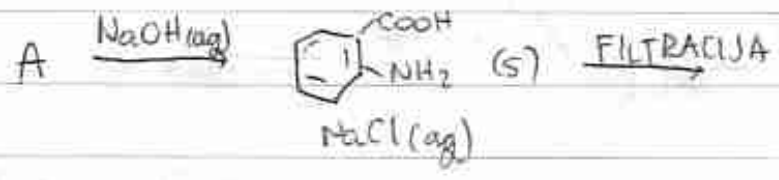
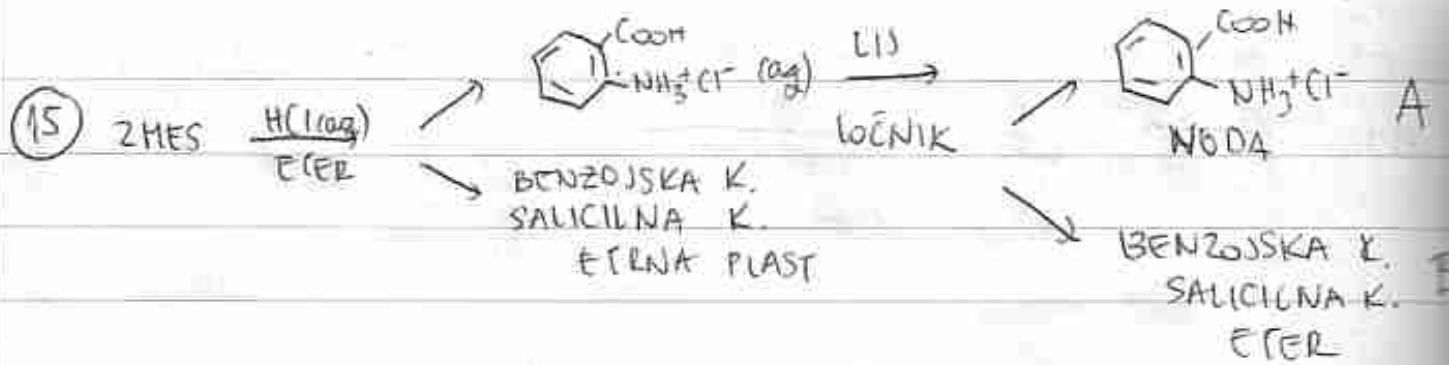




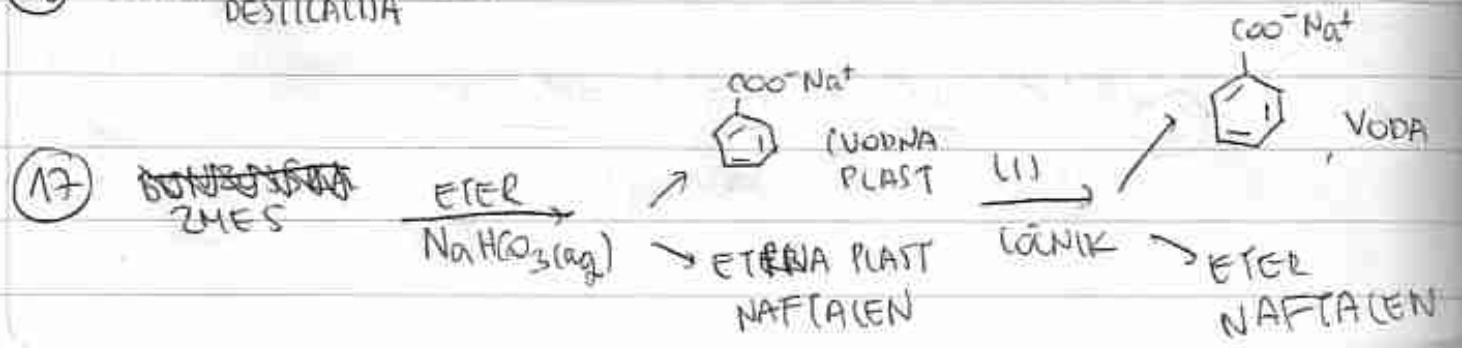
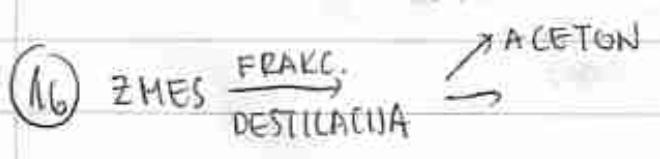


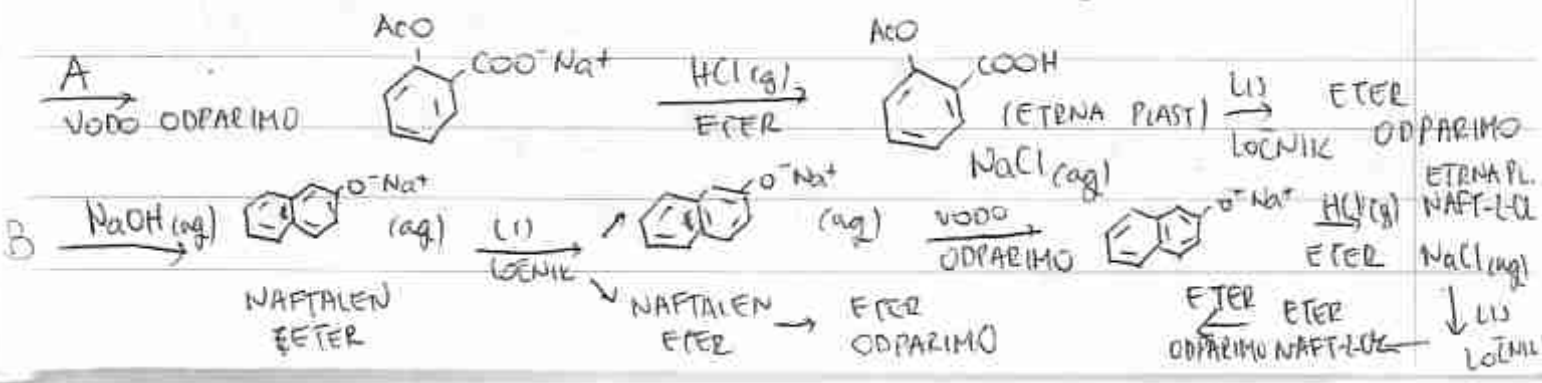
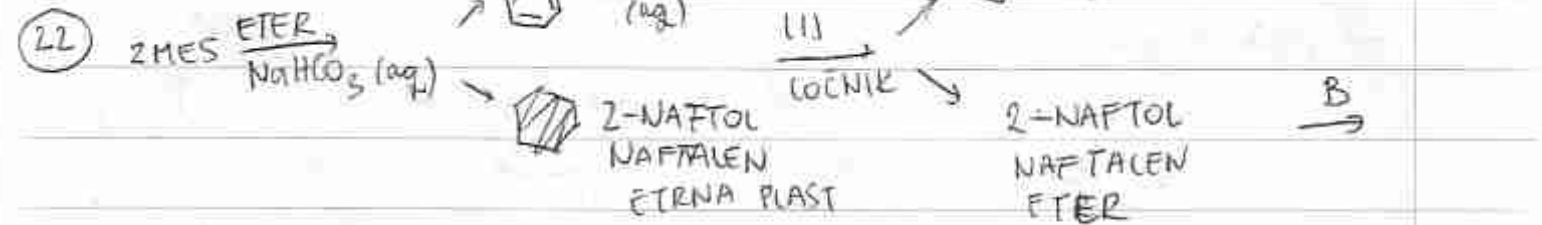
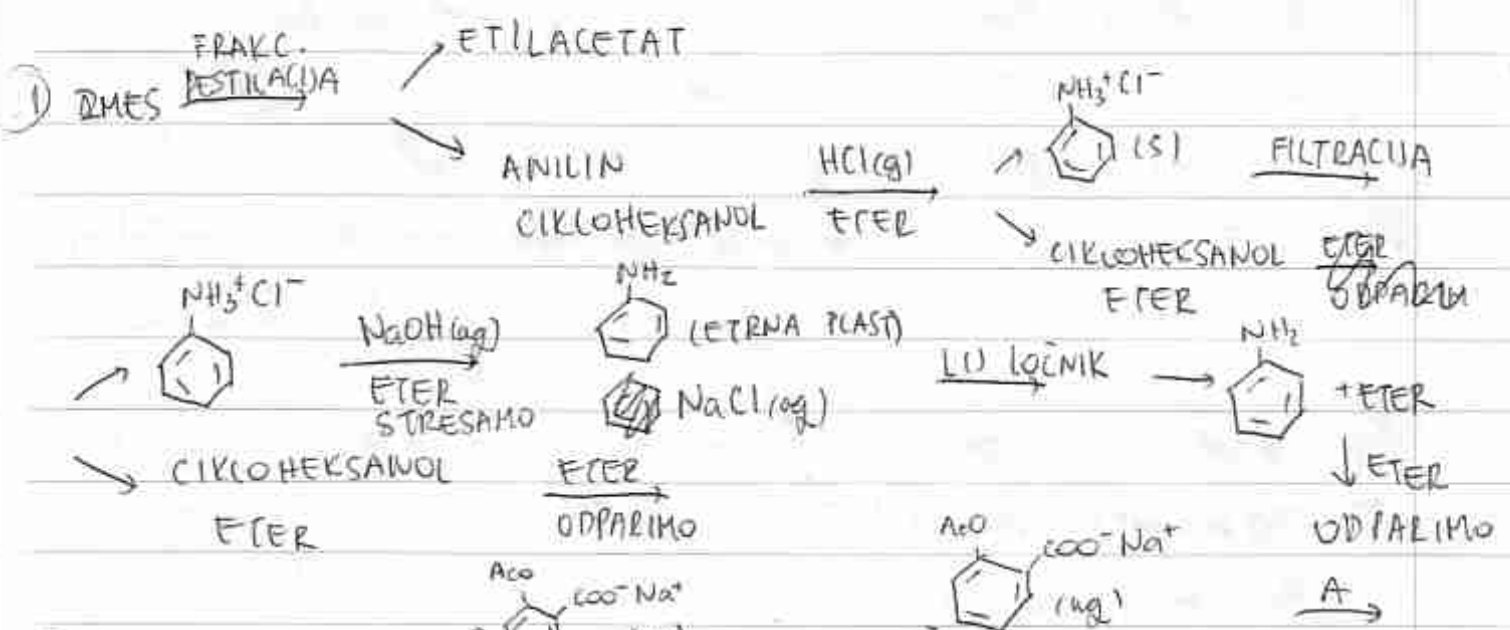
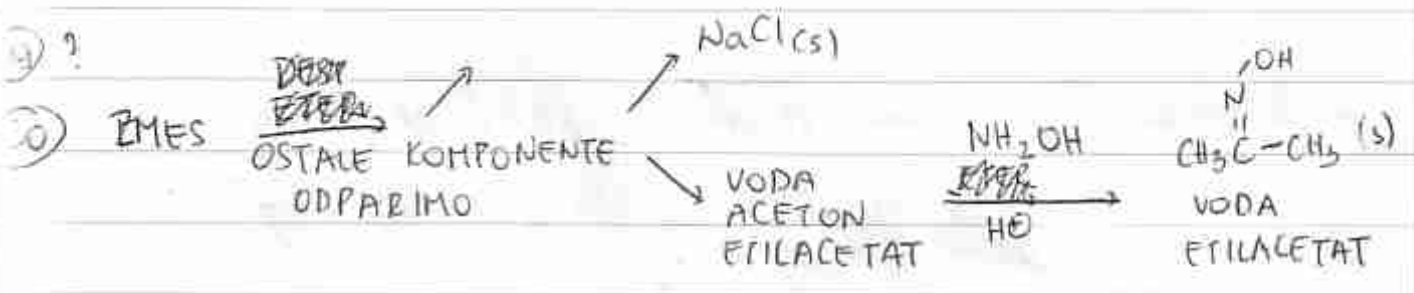
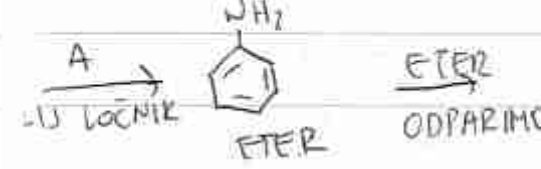
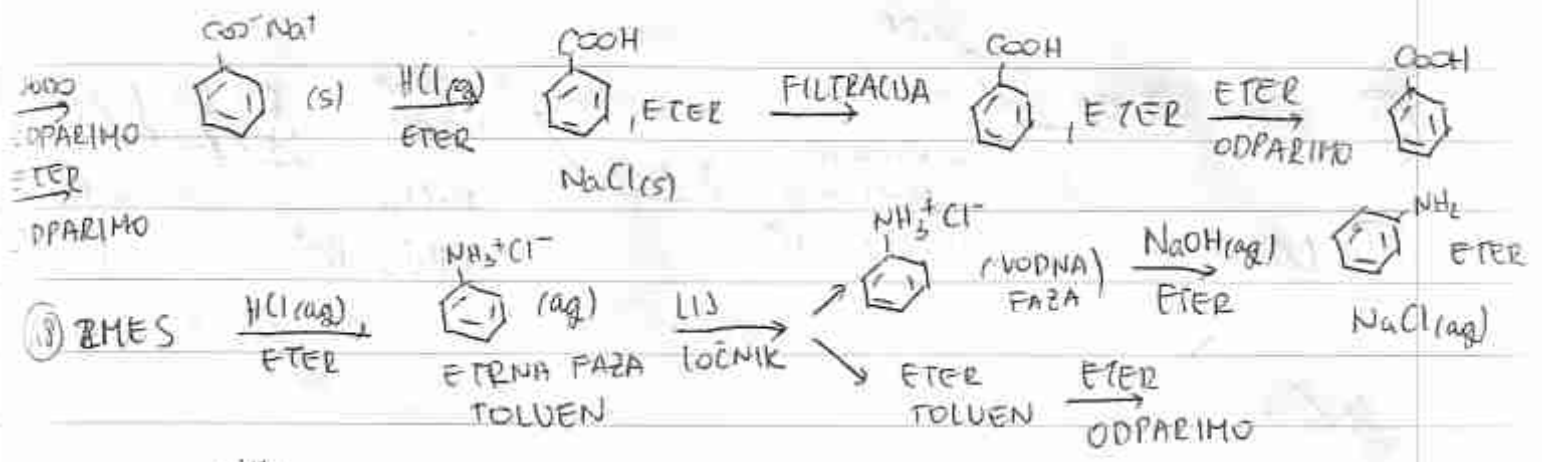






ETERA ODPARIMO FRAKC. DEST. \rightarrow ACETON, ACETON, BENZALDEHID \rightarrow DOVA SLABO = (





STRUKTURNE NALOGE

①

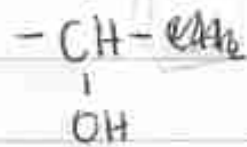
A: $C_{10}H_{20}O \rightarrow$ kompleksen spekter \rightarrow max. molekula

^{13}C : $3 \times CH_3, 4 \times CH, 3 \times CH_2$

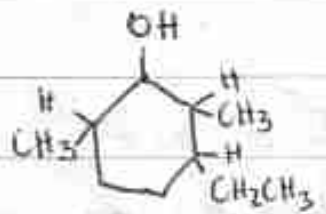
očitno je spojina alkohol (test z Na potrdjuje)

reagiruje s $H_2SO_4 \rightarrow$ eliminacija vode B in C

spojina vsebuje



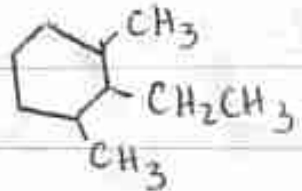
hidrogeniranje \rightarrow D



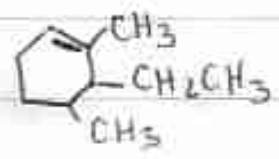
CH_2CH_3
 $2 \times CH_3$

ne more biti, ker potem D nima ravnine simetrije

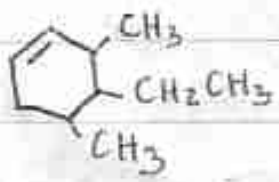
D:



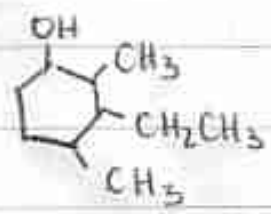
B:



C:

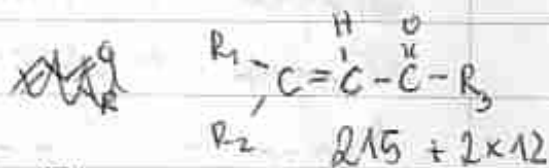


A:

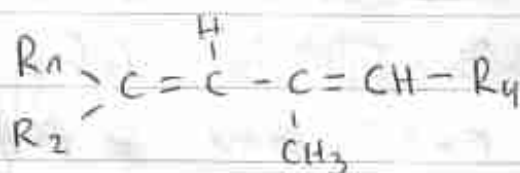


① $C_{11}H_{16}O \rightarrow$ zelo nenasičena \rightarrow 4 dvojne vezi? ^{maksimalni}
 vrh pri $1683\text{ cm}^{-1} \rightarrow$ karbonylna skupina, konjugirana
 (keton, aldehyd)

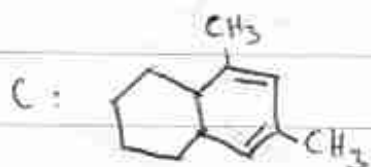
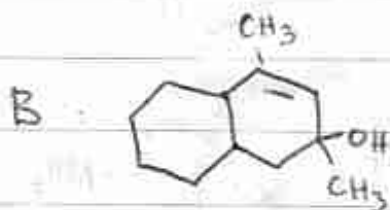
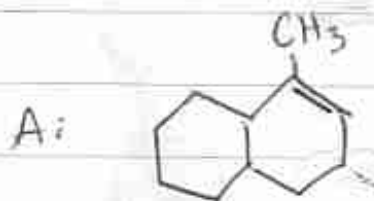
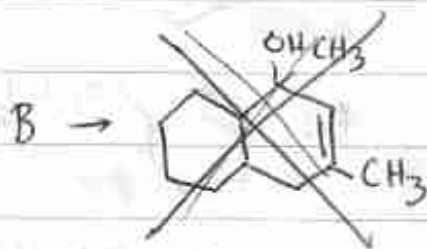
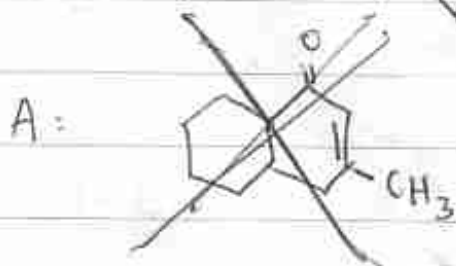
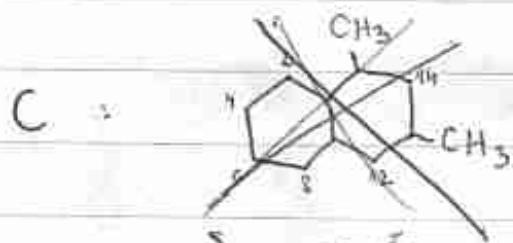
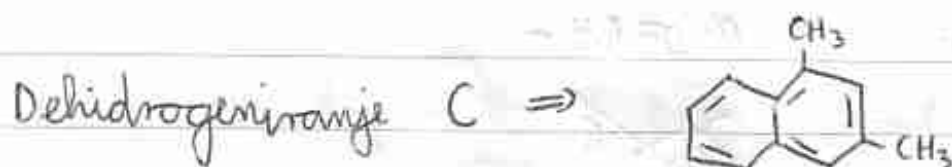
Maksimum: 239 nm



regrevanje in prisotnosti $\text{H}_2\text{SO}_4 \rightarrow$ eliminacija vode



$283 = 214 + 69$



$\Rightarrow \text{VV} \rightarrow 253 + 20 = 2 \times 5 + 253$

③ ~~metoprolol~~ vsebuje dušik, je metoprolol v vodi → več kot 5C atomov, ni pol

metoprolol v NaOH → ni kislina ali fenol

metoprolol v HCl → ni amin

toprolol v vroči konc. H_2SO_4 → zelo šibka baza (amid)

→ S_N1 klorid v HCl → nitril v amin

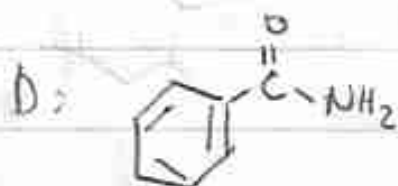
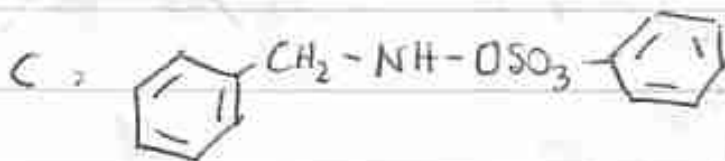
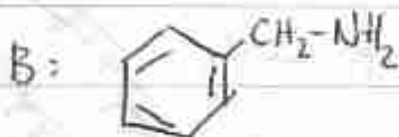
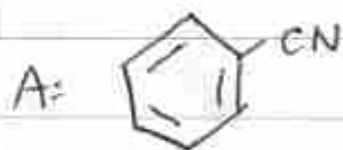
B reagira s sulforil kloridom in v toprolol v NaOH → primarni amin!

signali: 6,44 in 6,6 ppm → binolni protoni, lahko tudi "aromatski"
pri $\delta = 3,32$ ppm je singlet aminska skupina

B:



B: H_7N



① A: $C_9H_{18}O \rightarrow$ lahko ciklični alkohol ali razen alkohol z dvojnimi vezmi

IR: 3570cm^{-1} - alkoholni vrh OH

1620cm^{-1} - dvojnica vez konjugirana

800cm^{-1} - trimstituiran alken

oksidacija s $CrO_3 \rightarrow$ keton A je sekundarni alk
vrh pri $1700\text{cm}^{-1} \rightarrow$ konjugiran keton

UV $\rightarrow 239\text{nm} \rightarrow 215\text{nm} + 24 (2 \times 12)$

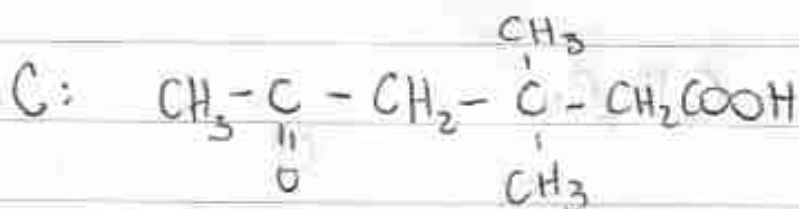
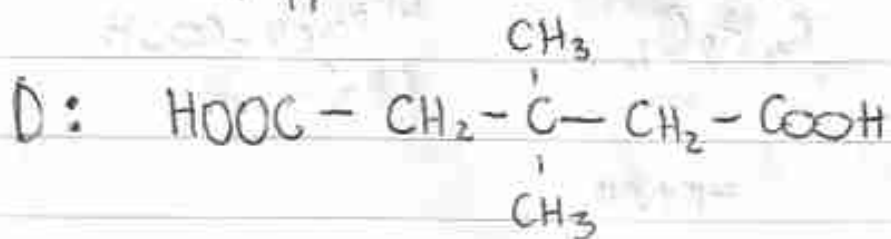
3 subst.

Ozonoliza \rightarrow ketokislina C

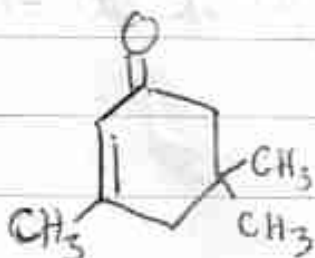
D: $^1H: 10, 8\text{ppm} \rightarrow$ protona karboksilne kisline

$\delta: 2, 2\text{ppm} \rightarrow 2 \times CH_2$ skupini ob $-C-O$

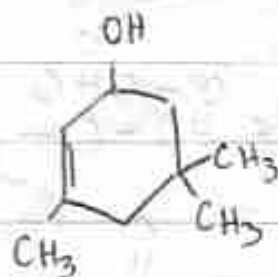
$\delta: 1, 1\text{ppm} \rightarrow 2 \times CH_3$ skupini $\parallel O$



B:



A:



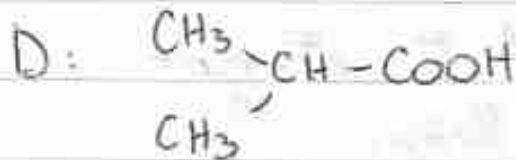
A: optično aktivna

traka pri 1682 cm^{-1} (konjugiran keton), 1624 cm^{-1} (konjugirana dvojna vez)

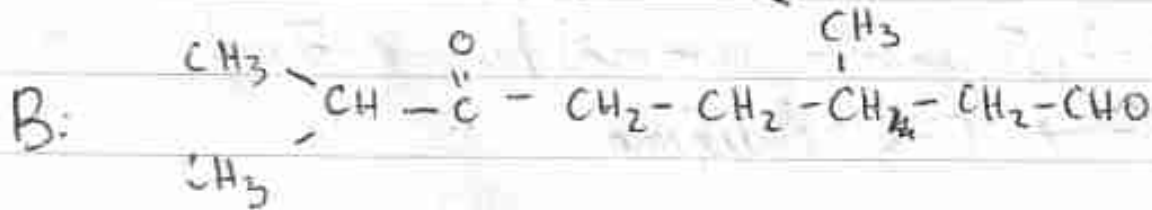
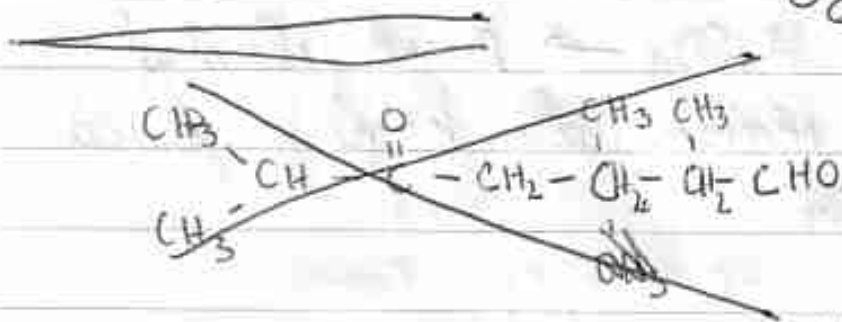
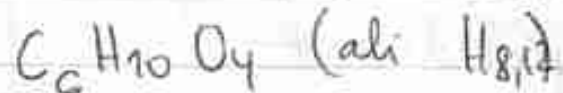
UV $\rightarrow 215 + 10 + 12$
 α -subst. $\rightarrow \beta$ subst.

pri ozonolizi daje le eno spojino \rightarrow ciklična

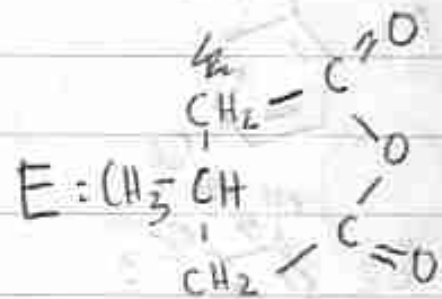
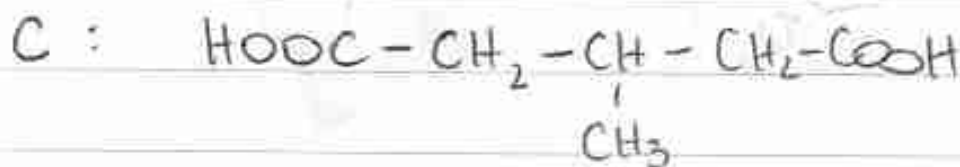
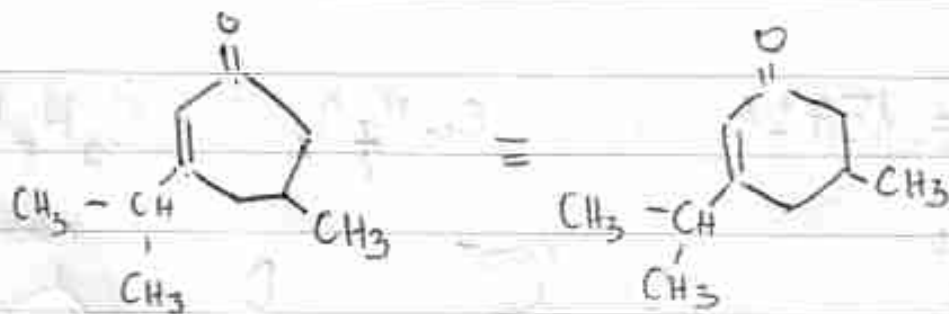
B: trake pri $1710 \text{ cm}^{-1} \rightarrow$ keton, $1726 \text{ cm}^{-1} \rightarrow$ aldehid



C: dikarboksilna kislina



A:



⑥ C_6H_8 - ~~aromatska~~ nenasićena 3 dvojni vezi
 reakcija s $H_2 \rightarrow$ s spojini sta 2 dvojni vezi
 triplet \rightarrow 2x CH_2 skupina
 dublet \rightarrow ~~2x~~ CH skupina

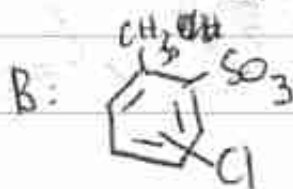
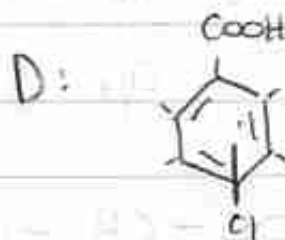
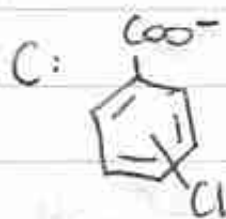
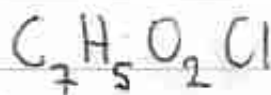


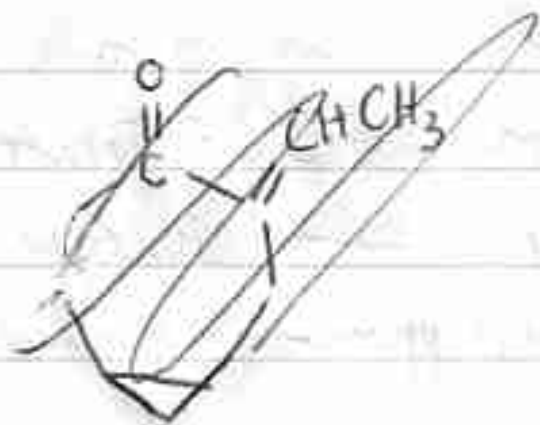
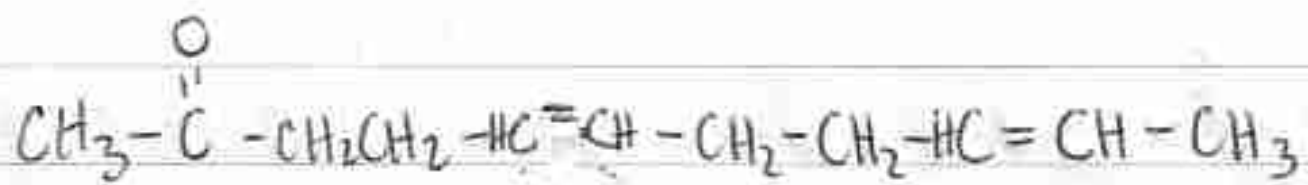
⑦ metopna je s vodi - već kot 5C atomov
 s kislini \rightarrow ni močnejša baza
 topna s kadeči $H_2SO_4 \rightarrow$ ~~acid~~ alkohol
 ne daje oborine \rightarrow nikelni ali kadmni klorid

⑧ A reagira s $KMnO_4$

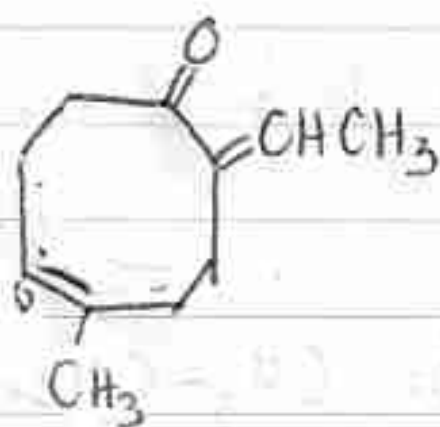
1H : 7,0-7,35 ppm - aromatski protoni
 2,37 \rightarrow CH_3 skupina

$$D: \frac{M}{N} = 157 \pm 1$$

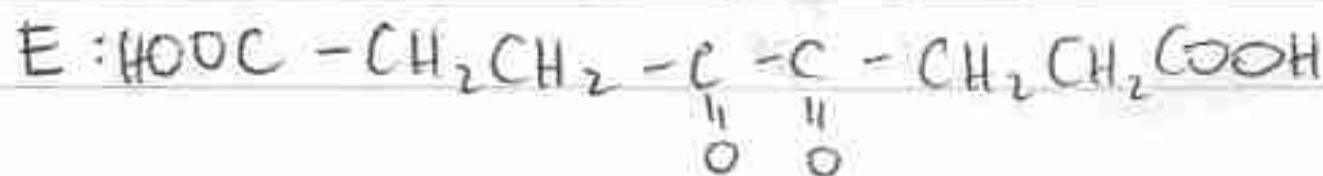
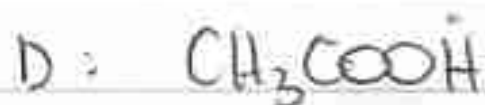
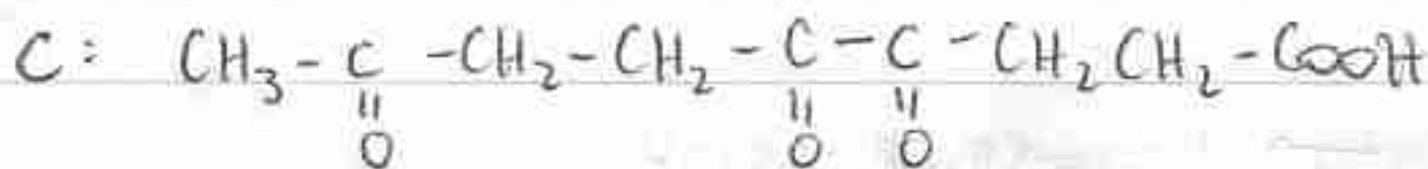
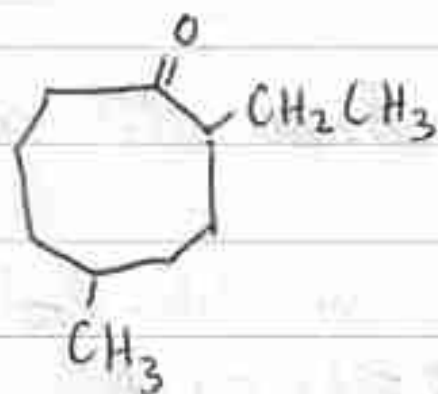




A:



B:

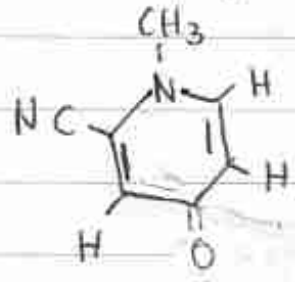
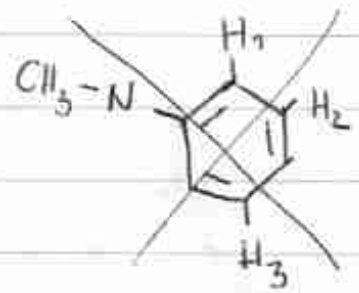


9) $B_6 A: C_7H_6N_2O$

IR: $2200\text{ cm}^{-1} \rightarrow$ nitrilna skupina
 $1670\text{ cm}^{-1} \rightarrow$ konjugiran keton
 $1605\text{ cm}^{-1} \rightarrow$ aromatski vrh?

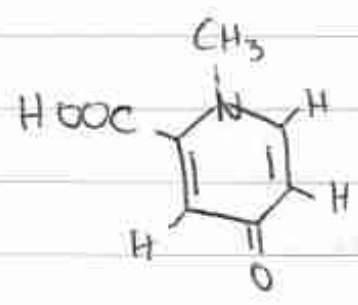


$^1H: 3,57$ 3H \rightarrow CH_3 skupina orto
 $H_1: 6,55$ 1H \rightarrow arom. proton \rightarrow sklopiljen
 $H_2: 7,34$ 1H \rightarrow aromatski proton \rightarrow sklopiljen orto in meta
 $H_3: 7,55$ 1H \rightarrow meta sklopiljen



$254 = 215 + 39$

maksanje \rightarrow B - kislina



B: 3020 cm^{-1} kislina
 1695 cm^{-1}

