Organic Rxn

1. a) $CH_2(OH)-CH_2-CH_3 \xrightarrow{H_2SO_4} CH_2=CH-CH_3 + H_2O$

b) 1-propanol $\xrightarrow{H_2SO_4}$ propene + water

2. a) ethanol + oxygen → carbon dioxide + water

$C_2H_5OH + 3\,O_2 \longrightarrow 2\,CO_2 + 3\,H_2O$

b) 2-propanol + oxygen → carbon dioxide + water

$C_3H_7OH + \frac{9}{2}\,O_2 \longrightarrow 3\,CO_2 + 4\,H_2O$

3a) ethene + water → ethanol

$C=C + H_2O \xrightarrow{H_2SO_4} H-C(H)(H)-C(OH)(H)-H$ addition

b) 2-butanol → 1-butene + 2-butene + water

$CH_3-CH(OH)-CH_2-CH_3 \xrightarrow{H_2SO_4} CH_2=CH-CH_2-CH_3 + CH_3-CH=CH-CH_3 + H_2O$

minor

elimination

c) ethoxyethane + oxygen → carbon dioxide + water

$CH_3-CH_2-O-CH_2-CH_3 + O_2 \longrightarrow CO_2 + H_2O$ combustion

d) ethene + hypochlorous acid (HOCl) → 2-chloroethanol

addition

e) methanol + oxygen → carbon dioxide + water

$CH_3-OH + O_2 \longrightarrow CO_2 + H_2O$

4. a) ethoxyethane

$CH_3-CH_2-O-CH_2-CH_3$

$C_4H_{10}O$

methoxypropane

$CH_3-O-CH_2-CH_2-CH_3$

$C_4H_{10}O$

* same molecular formula, different structural formula
∴ isomers

b) $CH_3-CH_2-O(H) + (HO)-CH_2-CH_3 \xrightarrow{H_2SO_4} CH_3-CH_2-O-CH_2-CH_3 + H_2O$

5. a)

$$CH_3-CH_2-CH_2-OH \xrightarrow[Cr_2O_7^{2-}]{H_2SO_4} CH_3-CH_2-\overset{O}{\overset{\|}{C}}-H + 2H^+$$

propanol — propanal

b) $CH_3-CH_2-CH_2-OH + \frac{9}{2}O=O \longrightarrow 3O=C=O + 4\,H_2O$

1-propanol + oxygen ⟶ carbon dioxide + water

(6). could take 3 alcohols and put them through an oxidation rxn w/ H_2SO_4 & $Cr_2O_7^{2-}$

- test for presence of aldehyde & ketone.

(7.) $$CH_3-CH=CH-CH_3 + H_2O \xrightarrow{H_2SO_4} CH_3-\overset{OH}{\overset{|}{C}}H-CH_2-CH_3$$

$$CH_3-\underset{OH}{\overset{|}{C}}H-CH_2-CH_3 + [O] \xrightarrow[H_2SO_4]{KMnO_4} CH_3-\overset{O}{\overset{\|}{C}}-CH_2-CH_3 + 2H^+$$

[O] = or oxidizing agent

(8)

$$CH_3-CH_2-CH_2-OH + [O] \xrightarrow[H_2SO_4]{KMnO_4} CH_3-CH_2-\overset{O}{\overset{\|}{C}}H + 2H^+$$

$$H_2O \xrightarrow[H_2SO_4]{KMnO_4} 2H^+ + CH_3-CH_2-\overset{O}{\overset{\|}{C}}-OH$$

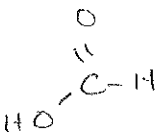
9. $CH_3-CH_2-OH \longrightarrow CH_3-CH=O \longrightarrow CH_3-C(=O)-OH$

ethanol over time will becom ethanal

ethanal will become ethanoic acid

vinegar is a dilute sol^{n} of ethanoic acid.

10. a)

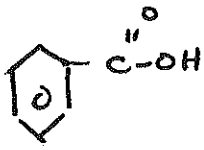
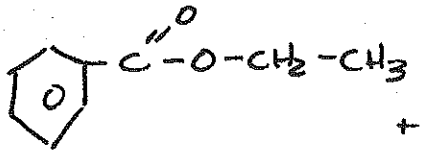
CH_3-CH_2-OH +  $\longrightarrow$ $CH_3-CH_2-O-C(=O)-H$ + H_2O

ethyl ethanoate

ethanol

methanoic acid

b) ethyl benzoate

CH_3-CH_2-OH +  $\longrightarrow$  + H_2O

ethanol

benzoic acid

ethyl benzoate

c) methy butanoate

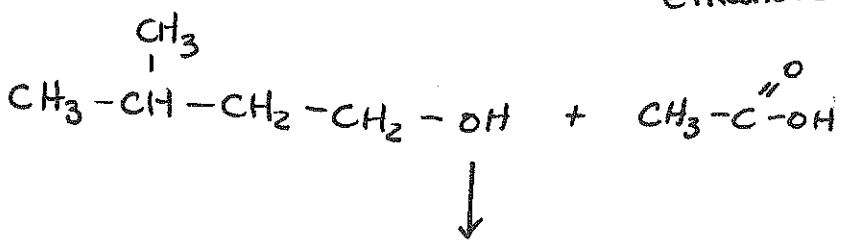
CH_3-OH + $CH_3-CH_2-CH_2-C(=O)-OH$ $\longrightarrow$ $CH_3-O-C(=O)-CH_2-CH_2-CH_3$ + H_2O

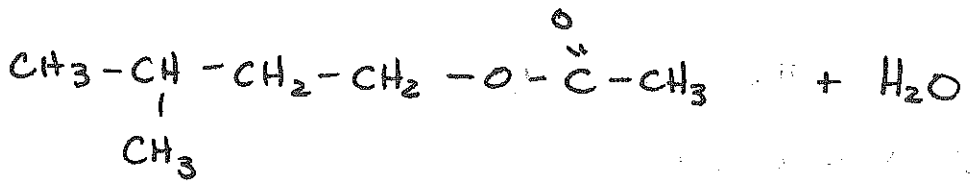
methanol

butanoic acid

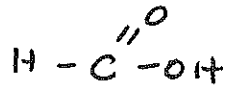
methy butanoate

10 d) 3-methyl butanol + ethanoic acid

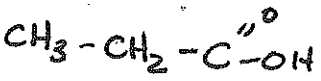




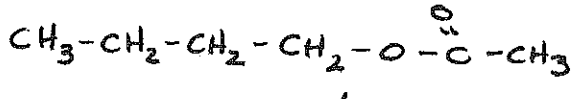
3-methyl butyl ethanoate

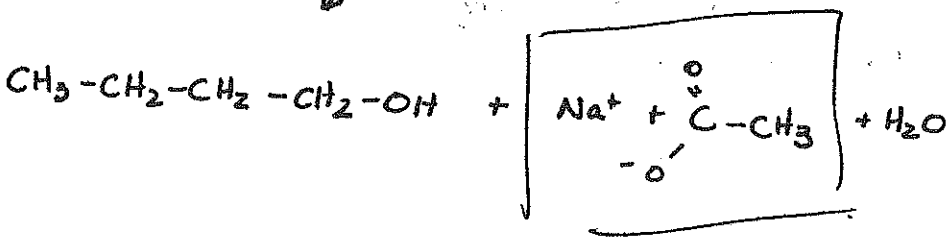
11. (a) 

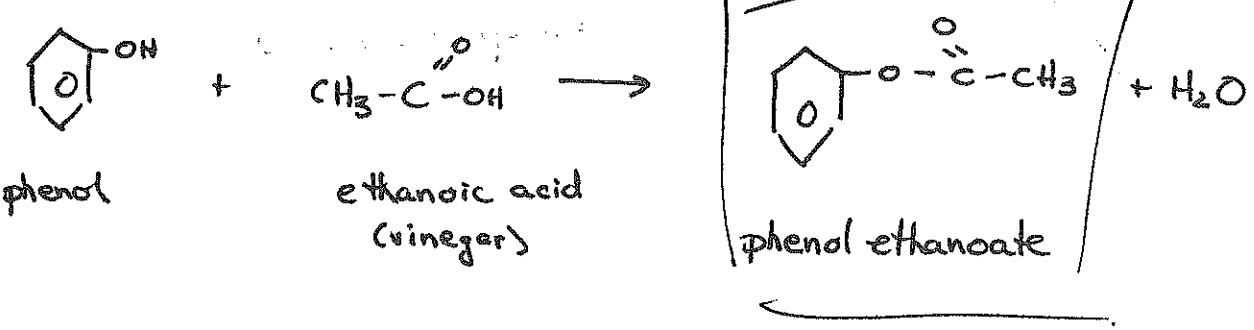
methanoic acid

(b) 

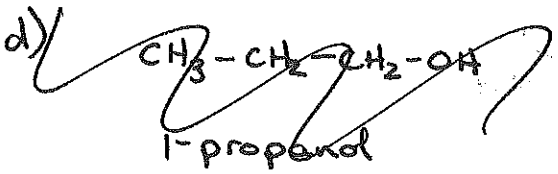
propanoic acid

(c)  ← soap! saponification is rxn of ester w NaOH

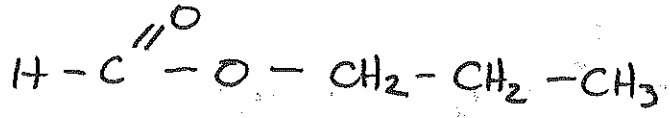


(e) 

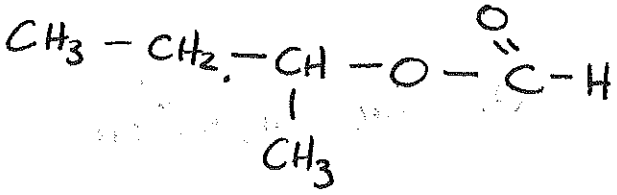
phenol + ethanoic acid (vinegar) → phenol ethanoate + H_2O

d) 

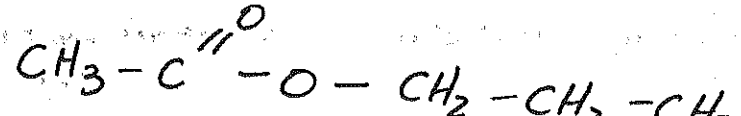
1-propanol

d) 

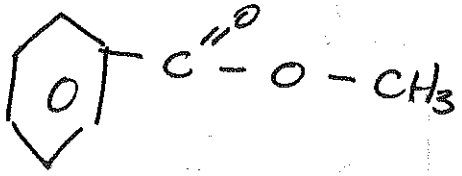
propyl methanoate

12. a) 

~~2-butyl~~ 2-butyl methanoate

b) 

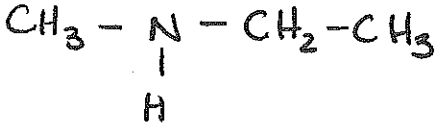
propyl ethanoate

c) 

methyl benzoate

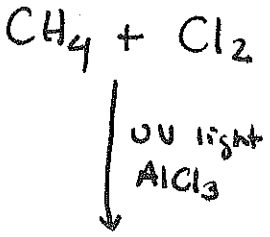
13. Produce H_2O as a by product.

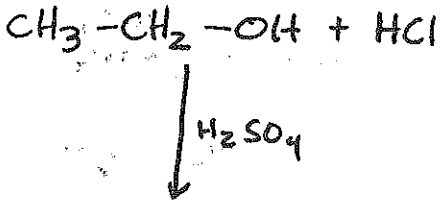
14. N-methy ethanamide

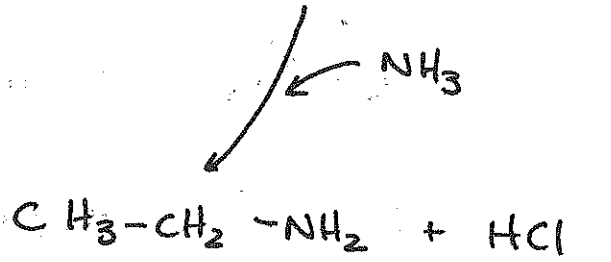


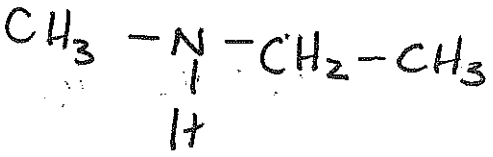
methane

ethanol









15.

16. (a) ethene + H_2O ⟶ ethanol ⟶ ethanal ⟶ ethanoic acid + pentanol ↓ pentyl ethanoate

$CH_2=CH_2 + H_2O$

↓ H_2SO_4

CH_3-CH_2-OH

↓ H_2SO_4, $KMnO_4$ ($2H^+$)

$CH_3-CH_2=O$

↓ H_2SO_4, $KMnO_4$

$CH_3-C(=O)-OH$ + $HO-CH_2-CH_2-CH_2-CH_2-CH_3$

↓ H_2SO_4

$CH_3-C(=O)-O-CH_2-CH_2-CH_2-CH_2-CH_3$