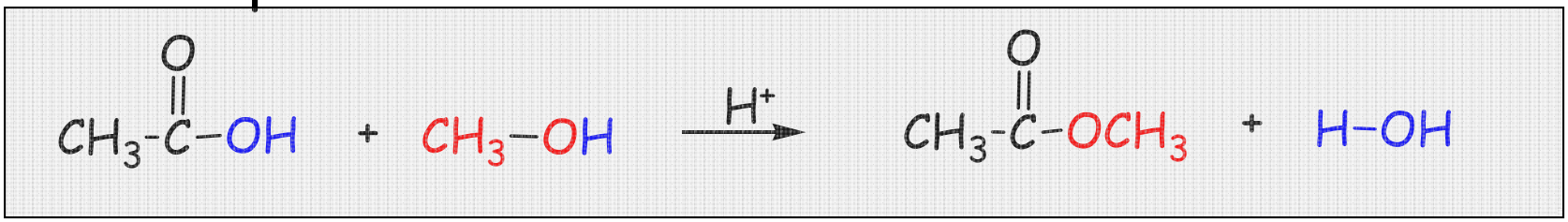
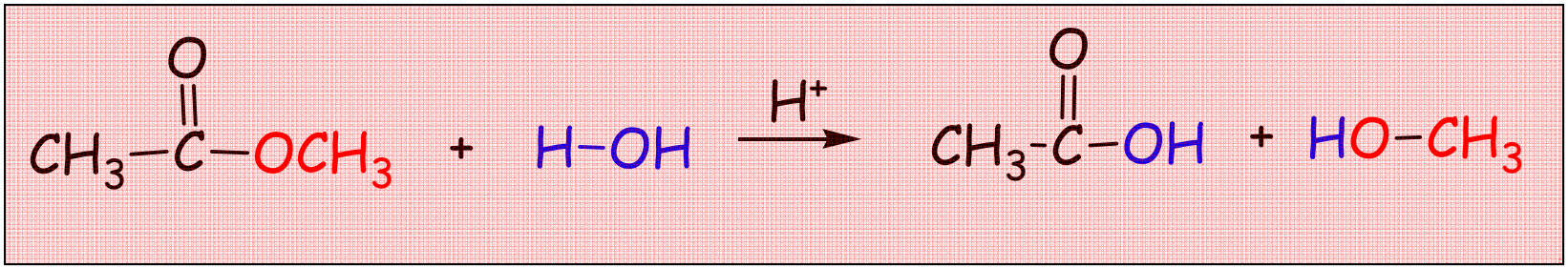
Ester Hydrolysis

A condensation between a carboxylic acid and an alcohol produces an ester.

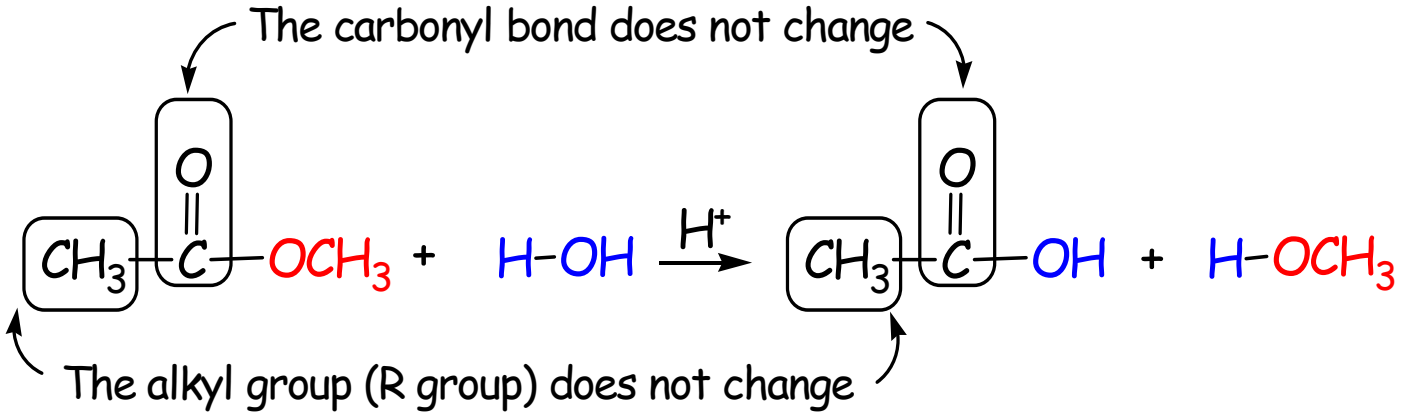


Hydrolysis of an ester is the reverse reaction:

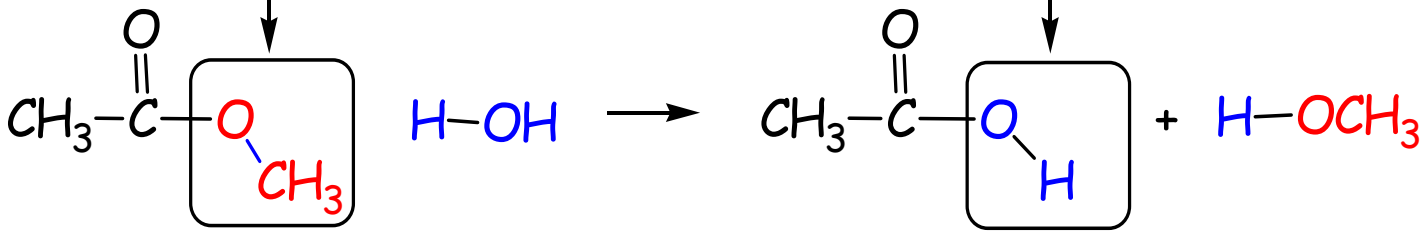
Hydrolysis of an ester produces a carboxylic acid and an alcohol.



Ester Hydrolysis



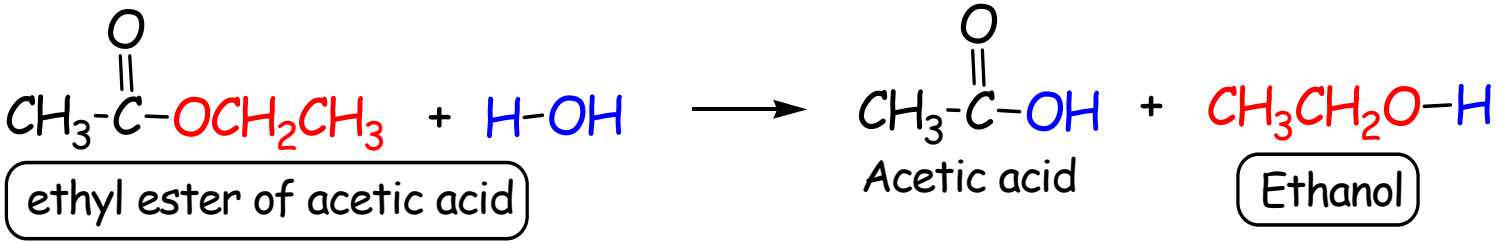
The only change is a substitution of OR by OH



Ester Hydrolysis

Different esters produce different alcohols …

1



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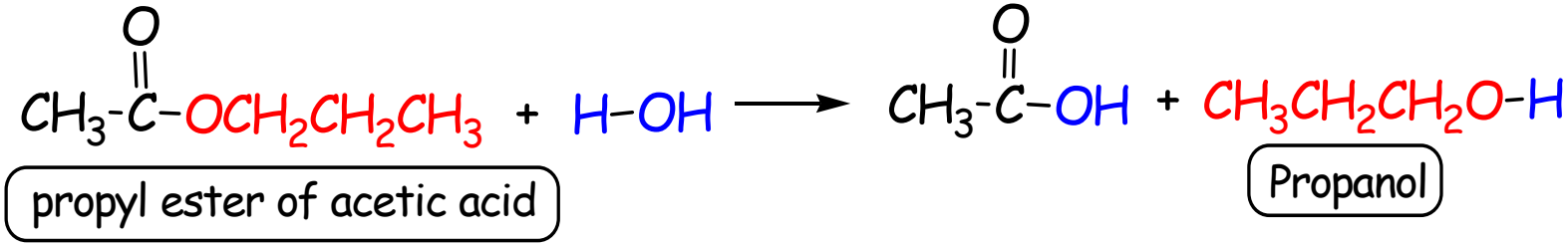
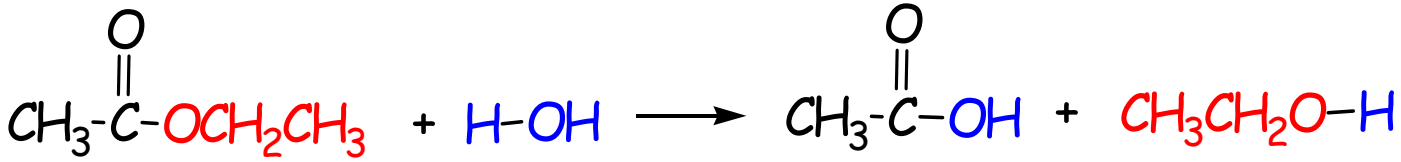
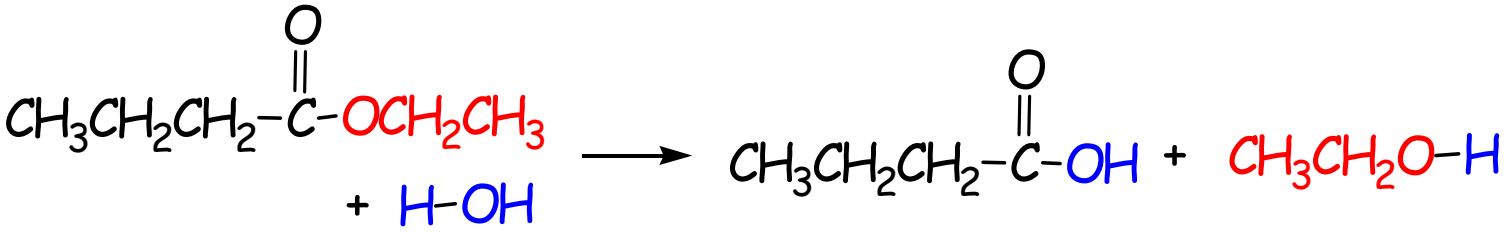
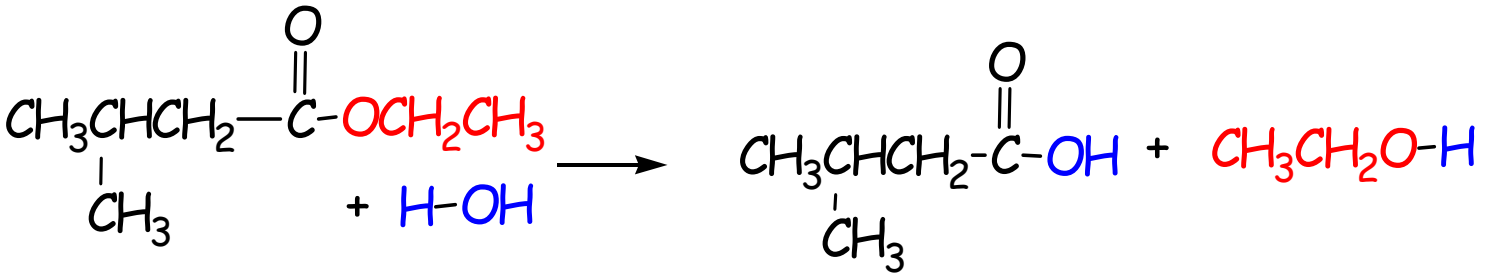


Ester Hydrolysis

Some examples of ester hydrolysis

1 

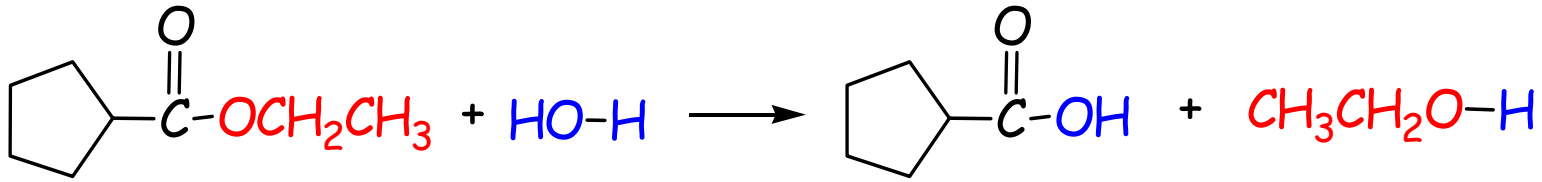
2 

3 

Ester Hydrolysis

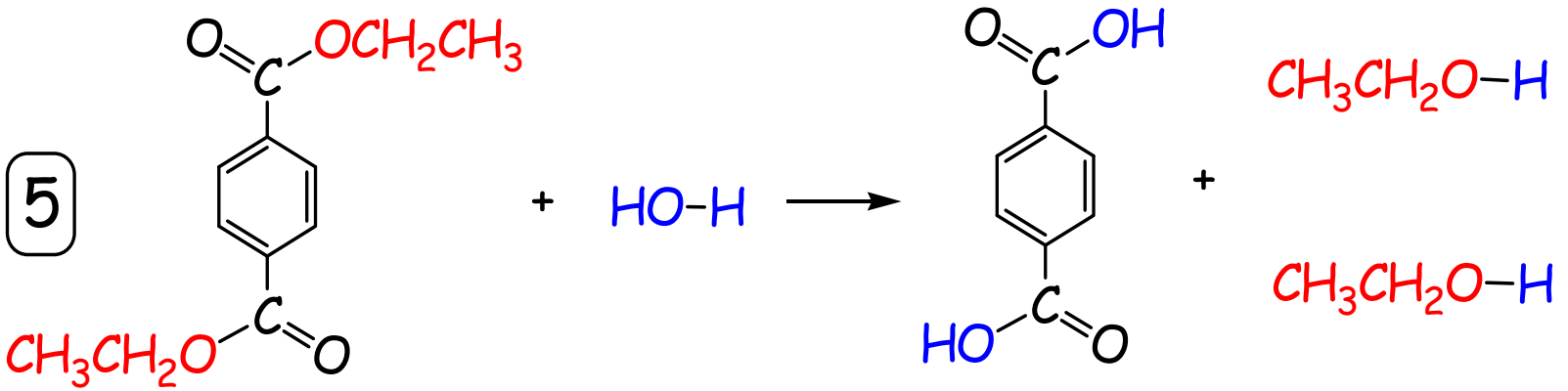
More examples of hydrolysis

4



(excess water is used to drive the hydrolysis)

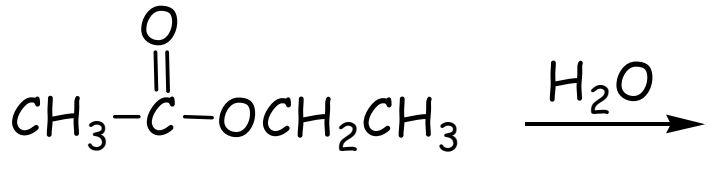
5

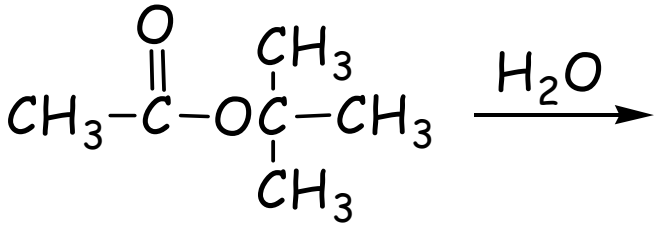


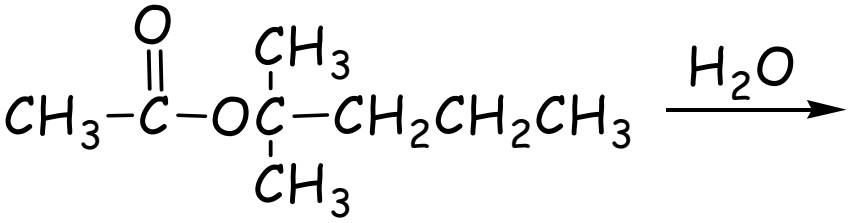
Notice the last example: both esters undergo hydrolysis; two equivalents of alcohol are formed.

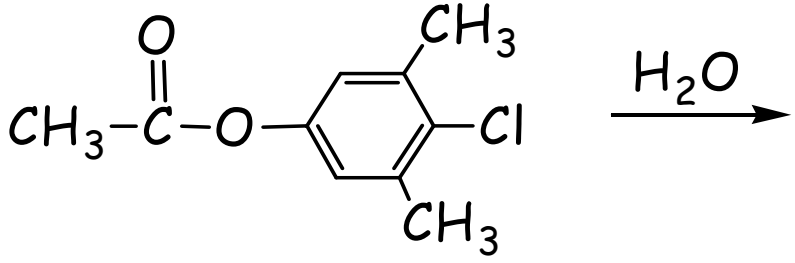
Ester Hydrolysis

Draw the products from each hydrolysis.

1 

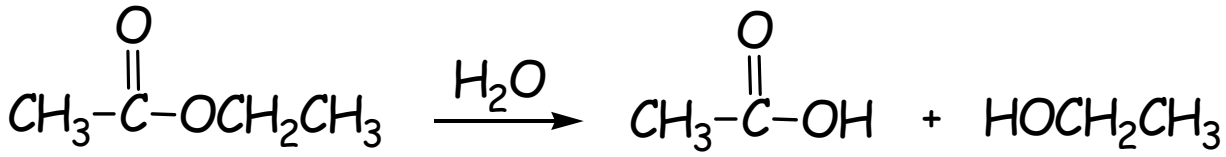
2 

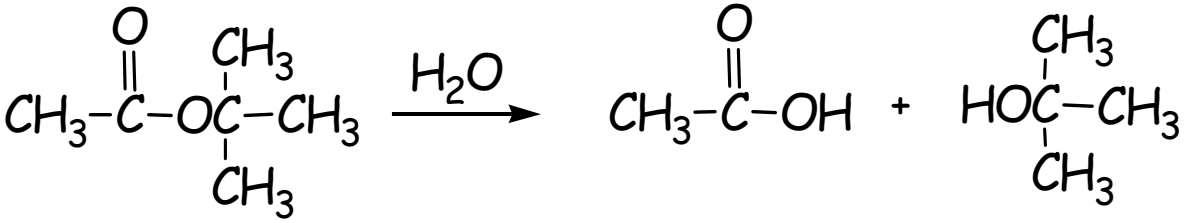
3 

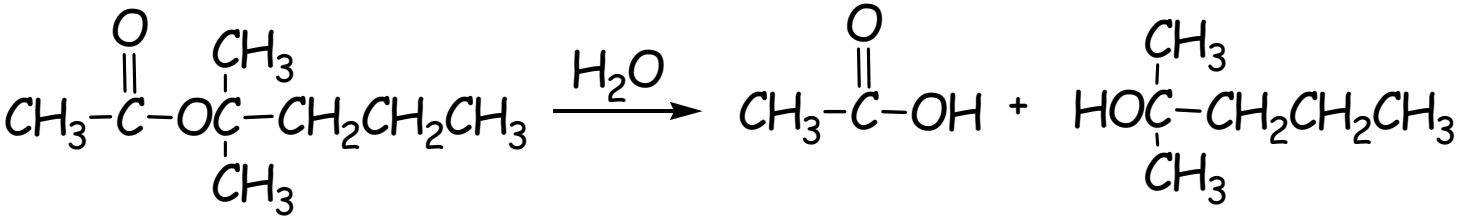
4 

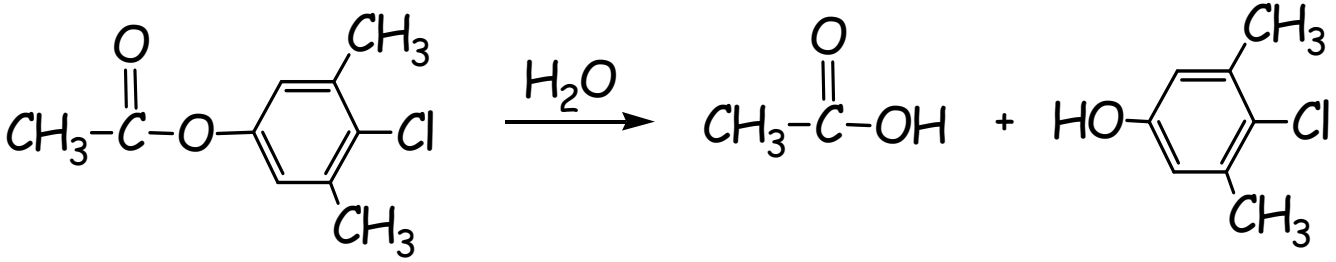
See next page for answers

Ester Hydrolysis

1 

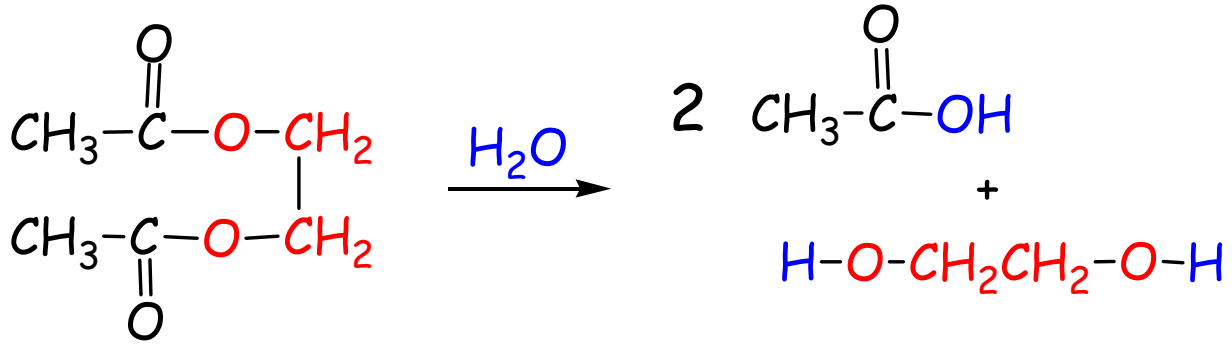
2 

3 

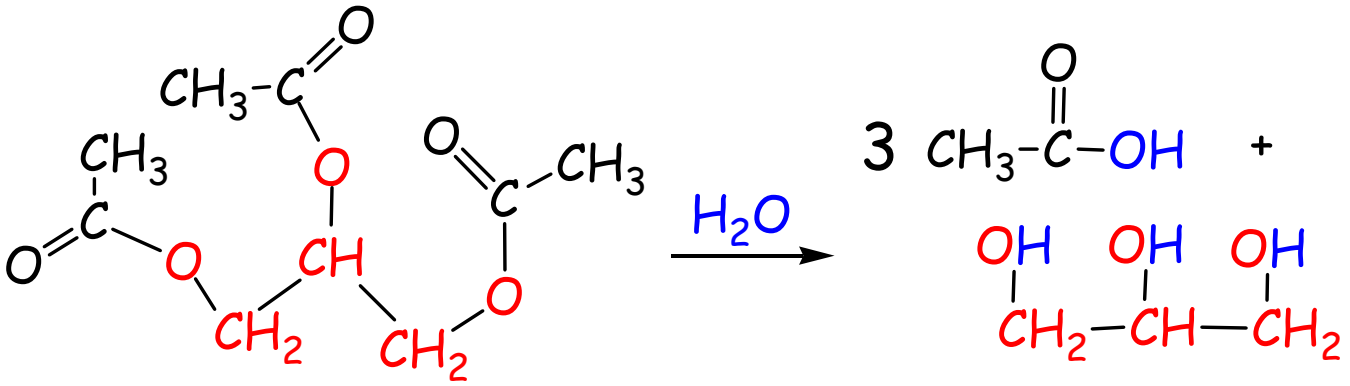
4 

Ester Hydrolysis

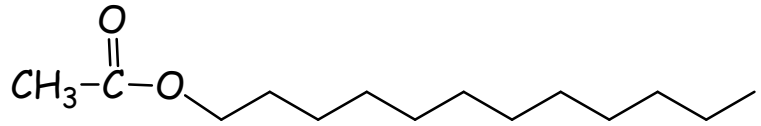
Diesters and polyesters produce one equivalent of acid for each ester bond that is hydrolyzed

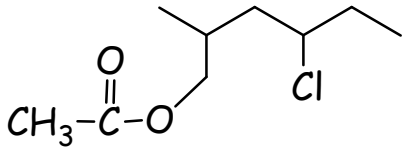


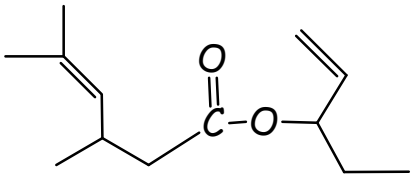
(excess water is used to drive the hydrolysis)

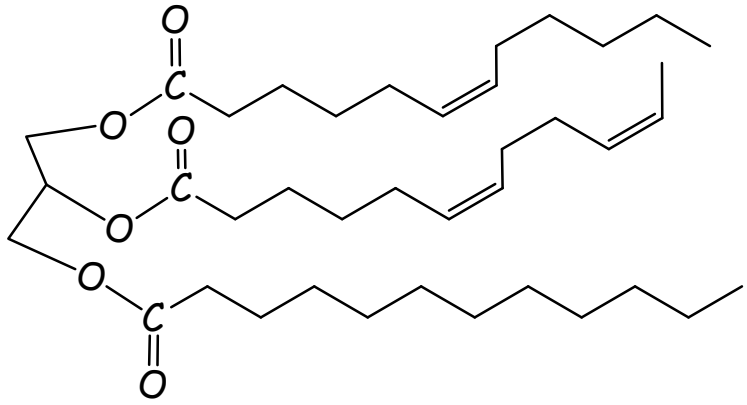


Ester Hydrolysis

1  H_2O ?

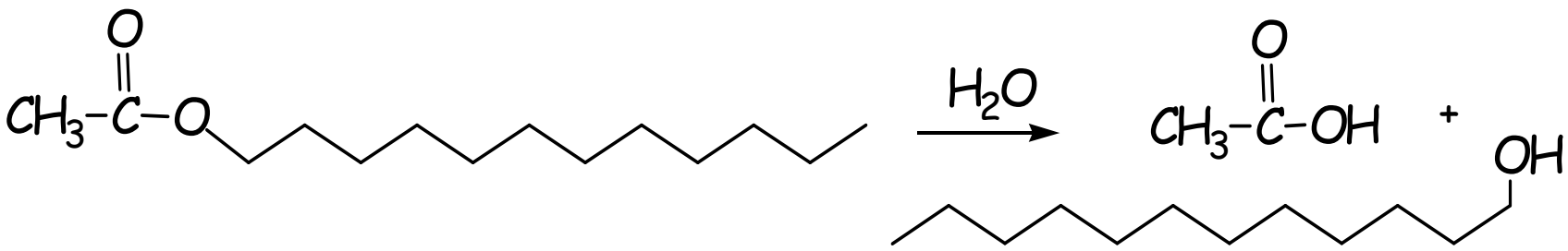
2  H_2O ?

3  H_2O ?

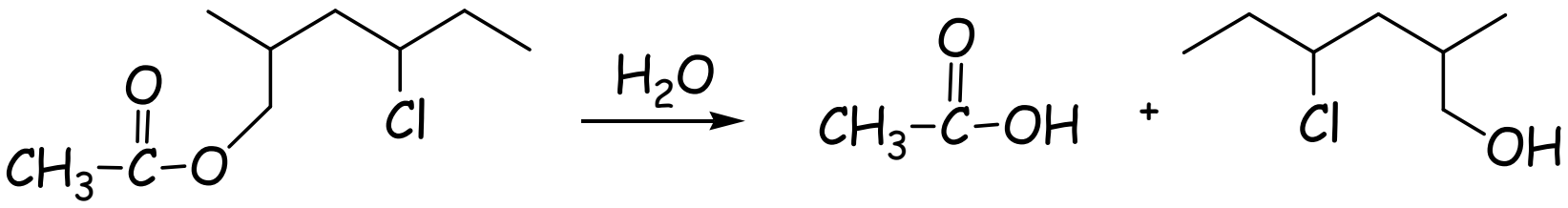
4  H_2O ?

Draw the major products. Assume acid catalysis for each hydrolysis.

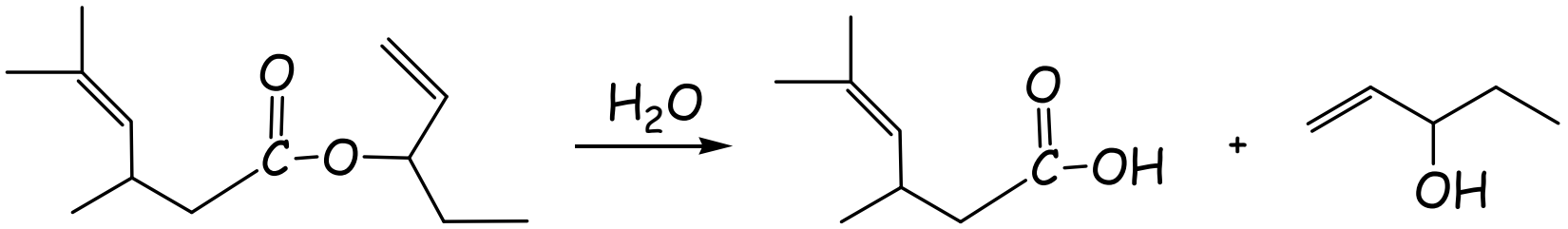
Hydrolysis problem # 1



Hydrolysis problem # 2



Hydrolysis problem # 3



Hydrolysis problem # 4