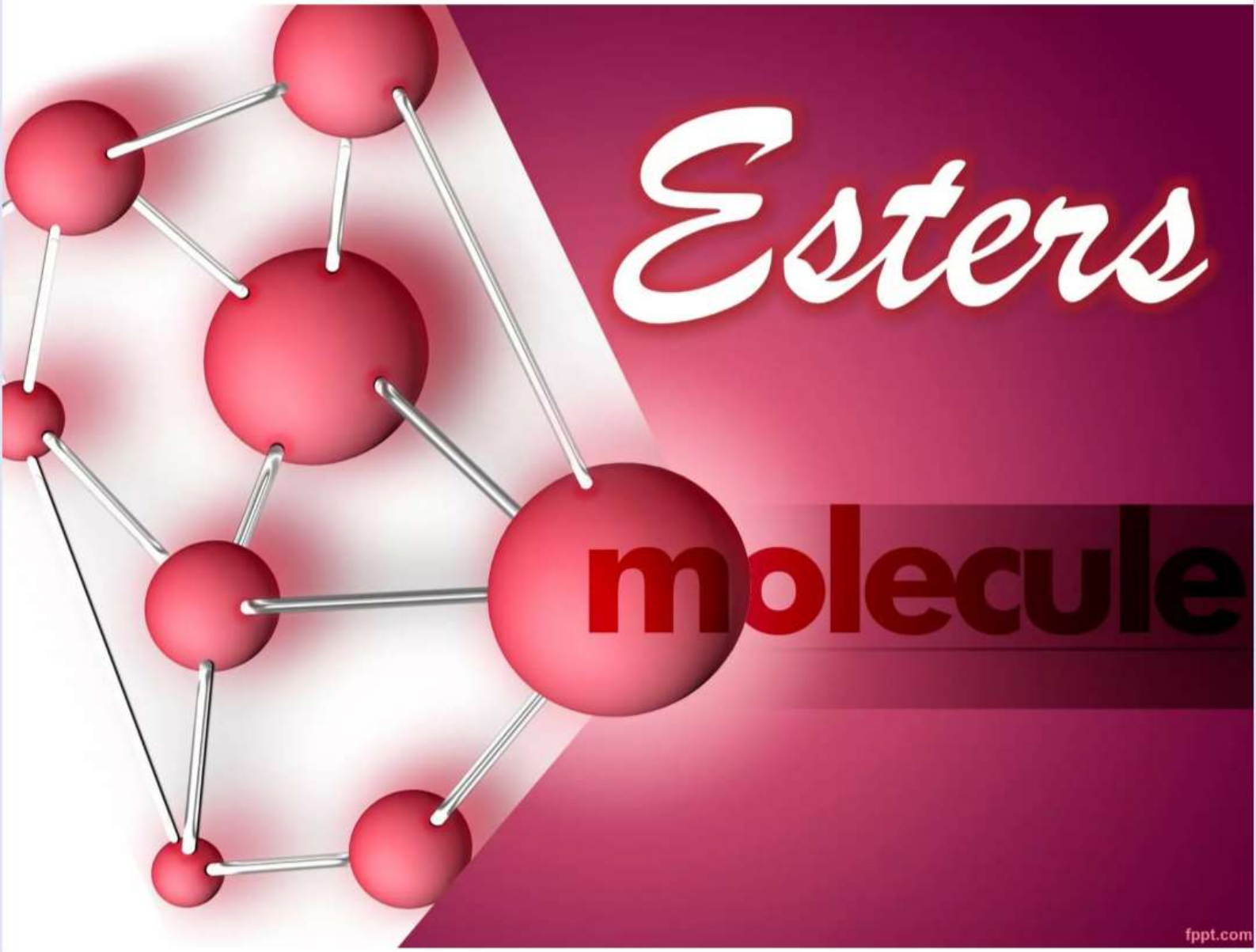
Esters
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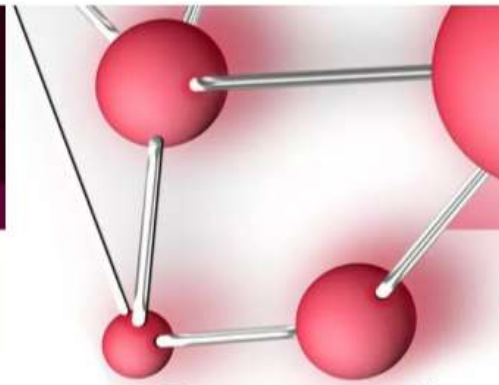

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KEY POINTS

- Esters are a functional group commonly encountered in organic chemistry. They are characterized by a carbon bound to three other atoms: a single bond to a carbon, a double bond to an oxygen, and a single bond to an oxygen. The singly bound oxygen is bound to another carbon.
- Ester names are derived from the parent alcohol and the parent acid. While simple esters are often called by their common names, all esters can be named using the systematic IUPAC name, based on the name for the acid followed by the suffix "-oate."

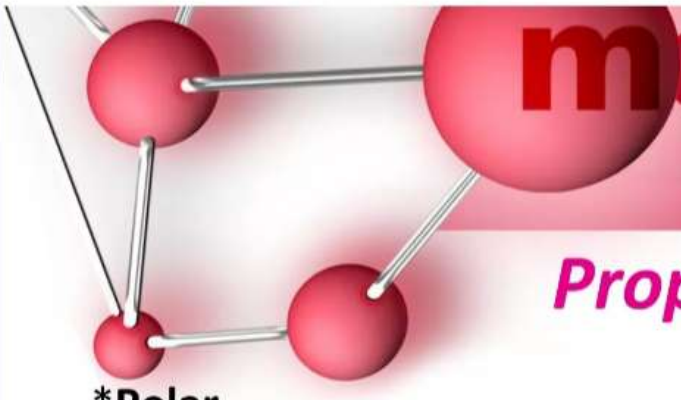
molecule

Nomenclature

The word "ester" was coined in 1848 by German chemist Leopold Gmelin, probably as a contraction of the German Essigäther, meaning acetic ether.

Ester names are derived from the parent alcohol and acid.

In the case of esters formed from common carboxylic acids, more colloquial terms are sometimes used. For example, ethanoic acid is more commonly known as acetic acid, and thus its esters contain "acetate" instead of "ethanoate" in their names. Other such substitutions include "formate" instead of "methanoate," "propionate" instead of "propanoate," and "butyrate" instead of "butanoate."



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Properties of Esters

***Polar**

-Less than alcohols, carboxylic acids

-Soluble in water

***Smell Fruity**

***Can form Polymers**

Esters are more polar than ethers, but less so than alcohols. They participate inhydrogen bonds as hydrogen bond acceptors, but cannot act as hydrogen bond donors, unlike their parent alcohols and carboxylic acids. This ability to participate in hydrogen bonding confers some water-solubility, depending on the length of the alkyl chains attached. Since they have no hydrogens bonded to oxygens, as alcohols and carboxylic acids do, esters do not self-associate. Consequently, esters are more volatile than carboxylic acids of similar molecular weight.

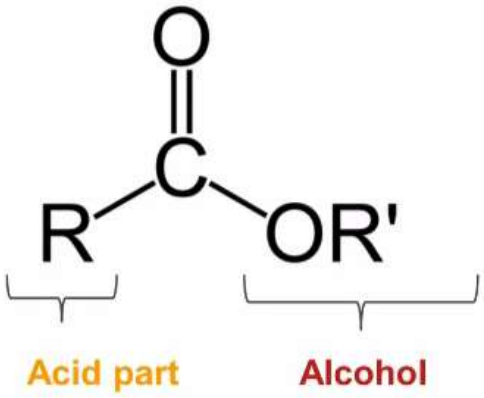
Condensed Structural Formula	Name	Melting Point (°C)	Boiling Point (°C)	Aroma
$HCOOCH_3$	methyl formate	−99	32	
$HCOOCH_2CH_3$	ethyl formate	−80	54	rum
CH_3COOCH_3	methyl acetate	−98	57	
$CH_3COOCH_2CH_3$	ethyl acetate	−84	77	
$CH_3CH_2CH_2COOCH_3$	methyl butyrate	−85	102	apple
$CH_3CH_2CH_2COOCH_2CH_3$	ethyl butyrate	−101	121	pineapple
$CH_3COO(CH_2)_4CH_3$	pentyl acetate	−71	148	pear
$CH_3COOCH_2C_6H_5$	isopentyl acetate	−79	142	banana
$CH_3CH_2CH_2COO(CH_2)_4CH_3$	benzyl acetate	−51	215	jasmine
$CH_3CH_2CH_2COOCH_4CH_3$	pentyl	−73	185	apricot

STRUCTURE OF ESTERS

- Carboxylic acid derivatives in which the hydroxy group (-OH) is replaced by an alkoxy group (-OR).
- General formula:

- Esters have pleasant odors such as smell like fruits (apples or bananas) and flower, especially those with low molecular weight.

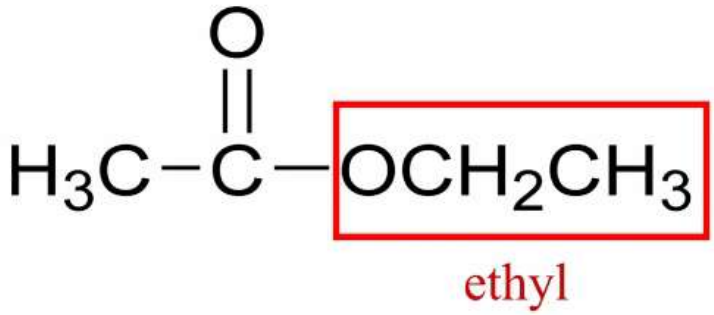
NOMENCLATURE



1. Name the **alcohol** part 1st. R as an alkyl group.
2. Name the **acid** part by changing the '-ic acid' to '-ate'.

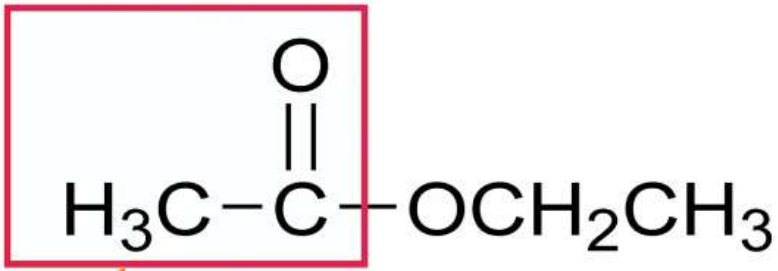
NOMENCLATURE

- According to the IUPAC system the alcohol part of the ester (R′) is named first.



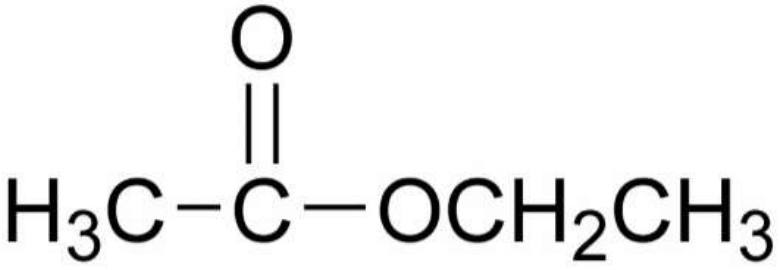
ethyl

- This is followed by the name of the acid where the *–ic* ending of the acid has been changed to *–ate*.

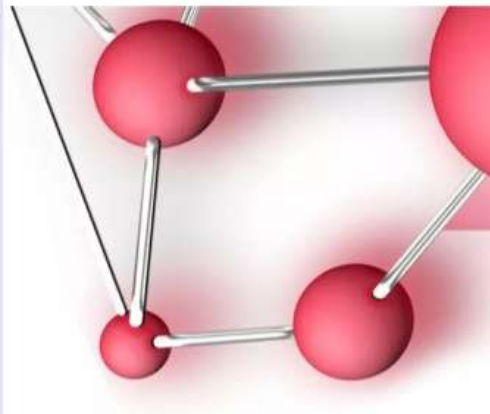


ethanoate

NOMENCLATURE



ethyl ethanoate



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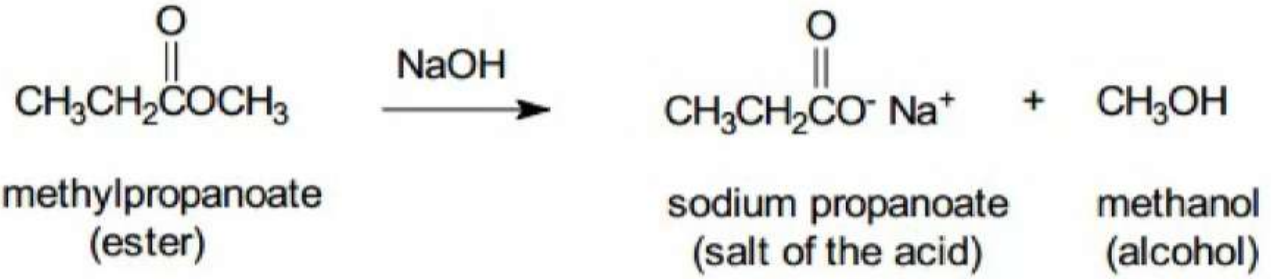
Saponification

This is the process by which an ester is hydrolyzed in the presence of a base. The products of this reaction are the alcohol and the salt of the carboxylic acid used to create the ester. An example of this reaction is presented below:




Thank you...