

Information Sheet: Alice Ball (1891- 1916)

This information sheet is designed for teachers only.

Alice Ball was an African American scientist known for discovering the 'Ball Method'. She extracted the ethyl esters from chaulmoogra oil and chemically modified them, making them water-soluble and therefore easily absorbed by the bloodstream. Initially, she wasn't given any credit for her discovery as it was stolen and published by her colleague. However, she later earned the rightful credit and is now an inspirational woman to the younger generation.

In the KS5 curriculum, it states 'organic synthesis, including characteristic reactions of alkanes, alkenes, halogenoalkanes, alcohols, arenes, aldehydes, ketones, carboxylic acids, esters, amines, amino acids, and amides.' Alice Ball's work links to the curriculum, as she was able to extract ethyl esters from oil and further modify it. In addition, since esters are formed by condensation polymerisation, Alice Ball's work would also link to 'reactions classified as... condensation polymerisation.'

Alice Ball's work shows a clear link to the national curriculum and her contributions could be incorporated without difficulty.

Alice Ball (1891-1916)

Alice Ball was born in Seattle in 1891. From a young age, Alice ball was intrigued by chemistry. She would see her father complete several chemical processes as he was one of the first black daguerreotypists (a person who would develop a photograph by exposing it to mercury vapour). She graduated with two bachelor's degrees in pharmaceutical chemistry and science of pharmacy from the University of Washington. In 1914, she published an article, "[Benzoylations in Ether Solution](#)", alongside her pharmacy instructor in *the Journal of the American Chemical Society*. As a black woman being a co-author on a paper was an incredible achievement.



Picture credit: New Scientist



Hydnocarpus wightianus tree from which chaulmoogra oil is extracted.

Picture credit: Nutroo

Alice Ball was the first African American woman to receive a masters from the University of Hawaii and was also the university's first female and African American chemistry professor. During her masters, Alice focused on researching the chemical properties of chaulmoogra oil. Her research led her to develop the 'Ball Method', which was the best treatment for leprosy until the 1940s. She was able to isolate the ethyl esters from chaulmoogra oil, further modifying them to create a water-soluble injection, meaning that it could be easily absorbed by the bloodstream.

Alice Ball passed away at the young age of 24, before she could publish her treatment for leprosy. The President of the College of Hawaii, Arthur Dean, continued her research and published it without giving any credit to Alice Ball. He also renamed the method the 'Dean Method'. Soon after, Harry Hollmann, who Alice Ball worked with, and was also an assistant surgeon in the hospital where leprosy patients were treated, published a paper giving Alice Ball the credit she deserved for her revolutionary discovery.

In Hawaii, every four years February 29th is celebrated as 'Alice Ball Day' to highlight her achievements and honour the fact that she saved the lives of thousands of patients. On November 6, 2020, a satellite, "Alice", named after Alice Ball, was launched into space by NASA.

References:

<https://www.newscientist.com/people/alice-ball/>

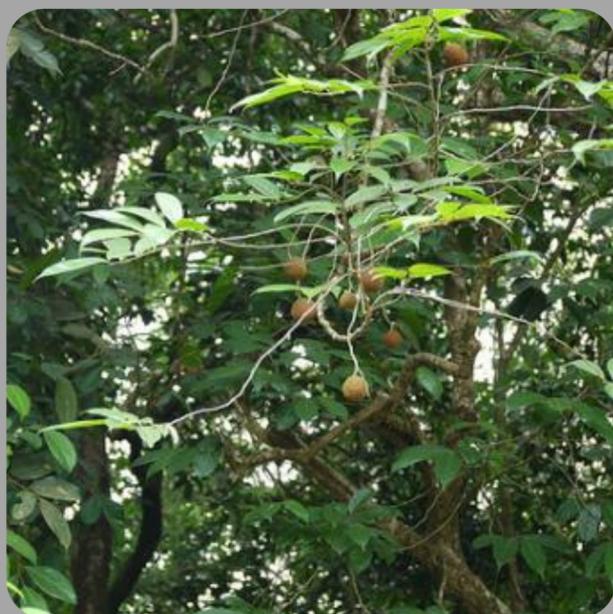
<https://scientificwomen.net/women/ball-alice-121>

Alice Ball

Discovered the most effective treatment for leprosy until the 1940s

ABOUT

Alice Ball was born in Seattle in 1891. She was an African American scientist, known for developing the 'Ball Method', for treating leprosy. Alice Ball graduated with two degrees from the University of Washington in pharmaceutical chemistry and science of pharmacy. Her most notable research involved extracting the ethyl esters of chaulmoogra oil and modifying them to be water-soluble, and so easily injectable and absorbed by the body. Alice Ball's drug was the best treatment for leprosy until the 1940s. Initially, she wasn't given any credit, as her colleague published her work. However, later she earned the rightful credit and is now an inspiration to all.



The figure shows the *Hydnocarpus wightianus* tree from which chaulmoogra oil is extracted.

Did you know?

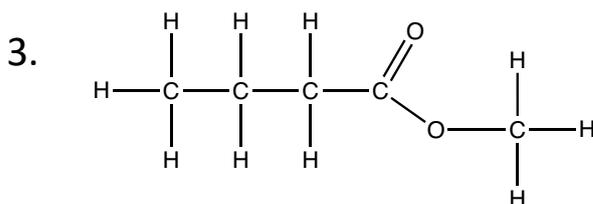
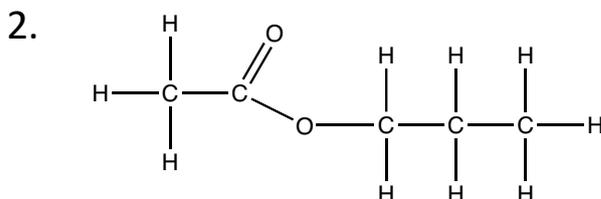
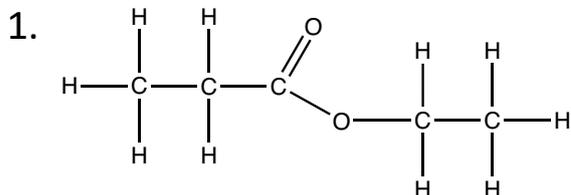
In 1915, Alice Ball was co-author to a paper published in the Journal of the American Chemical Society. This was a fantastic achievement for an African American woman.

In Hawaii, February 29th is celebrated every four years as 'Alice Ball Day' to highlight her achievements and to honour the fact that she saved the lives of thousands of patients.

On November 6, 2020, a satellite, "Alice", named after Alice Ball, was launched into space by NASA.

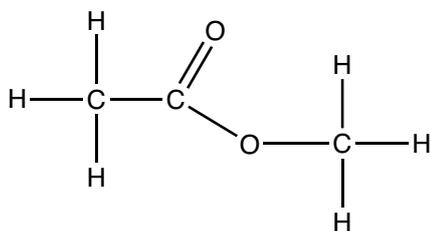
Naming Ester Activity (easy/medium)

Name the following esters:

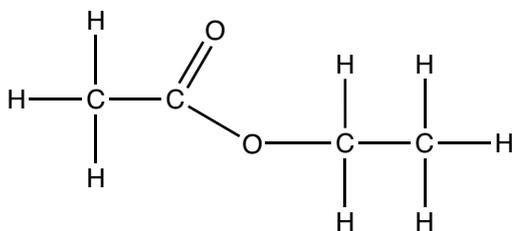


Naming Ester Activity Continued (easy/medium)

4.



5.



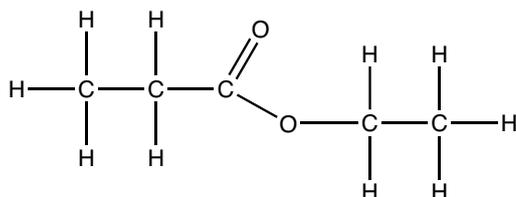
Alice Ball (1891-1916) was an African American scientist who is known for the discovering the 'Ball Method', the best treatment for leprosy until the 1940s. She extracted the ethyl esters of the Chaulmoogra oil and modified it chemically, so it became water soluble and therefore easily absorbed by the body. Initially, she wasn't given any credit for her technique as it was published under her colleague's name. However, later she earned the rightful credit and is now an inspiration to others.



Naming Ester Activity Answers (easy/medium)

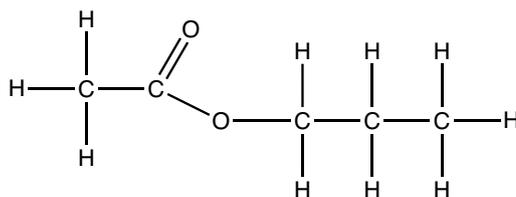
Name the following esters:

1.



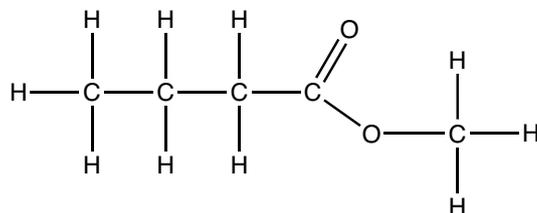
ethyl propanoate

2.

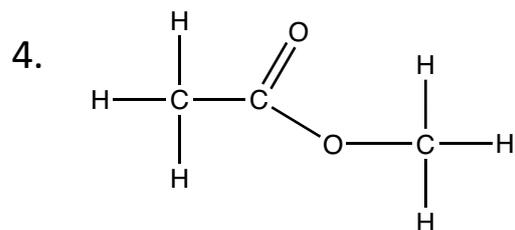


propyl ethanoate

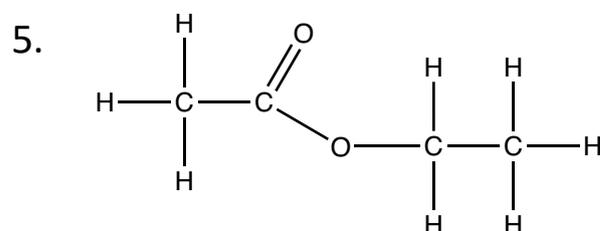
3.



methyl butanoate



methyl ethanoate

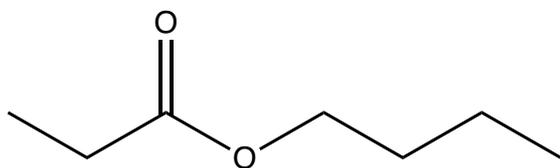


ethyl ethanoate

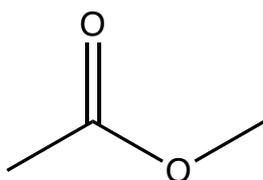
Naming Ester Activity (hard)

Name the following esters:

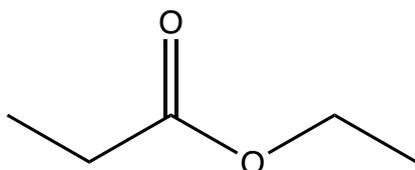
1.



2.

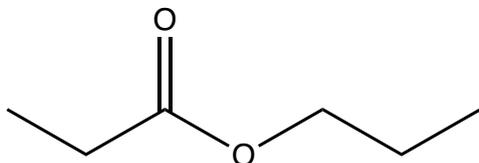


3.

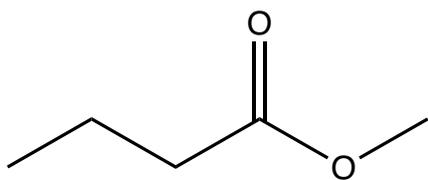


Naming Ester Activity Continued (hard)

4.



5.



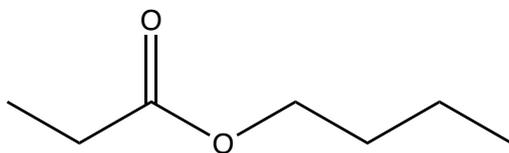
Alice Ball (1891-1916) was an African American scientist who is known for discovering the 'Ball Method', the best treatment for leprosy until the 1940s. She extracted the ethyl esters of the Chaulmoogra oil and modified it chemically, so it became water soluble and therefore easily absorbed by the body. Initially, she wasn't given any credit for her technique as it was published under her colleague's name. However, later she earned the rightful credit and is now an inspiration to others.



Naming Ester Activity Answers (hard)

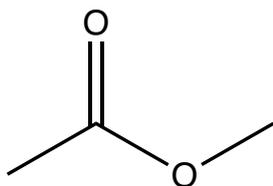
Name the following esters:

1.



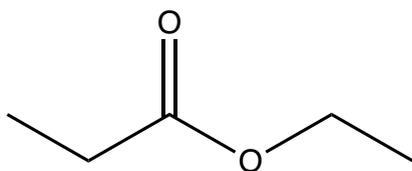
butyl propanoate

2.



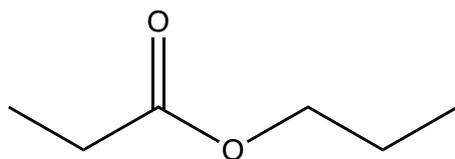
methyl ethanoate

3.



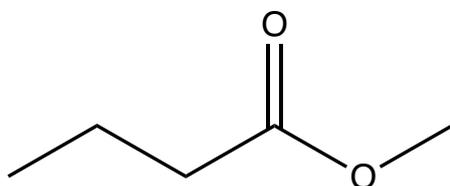
ethyl propanoate

4.



propyl propanoate

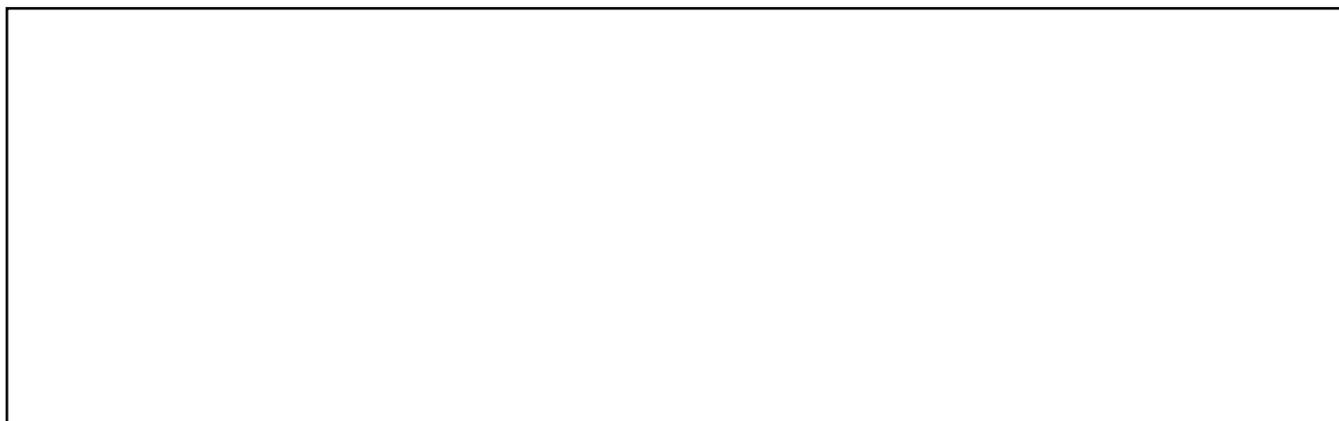
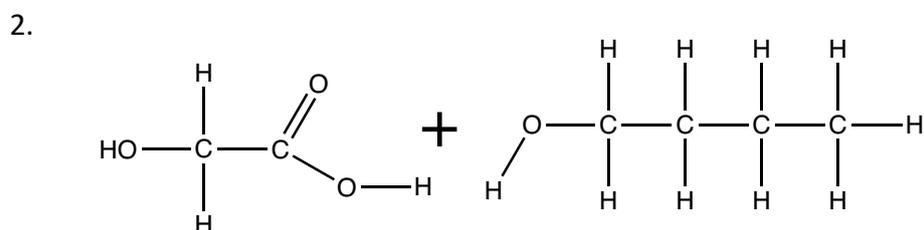
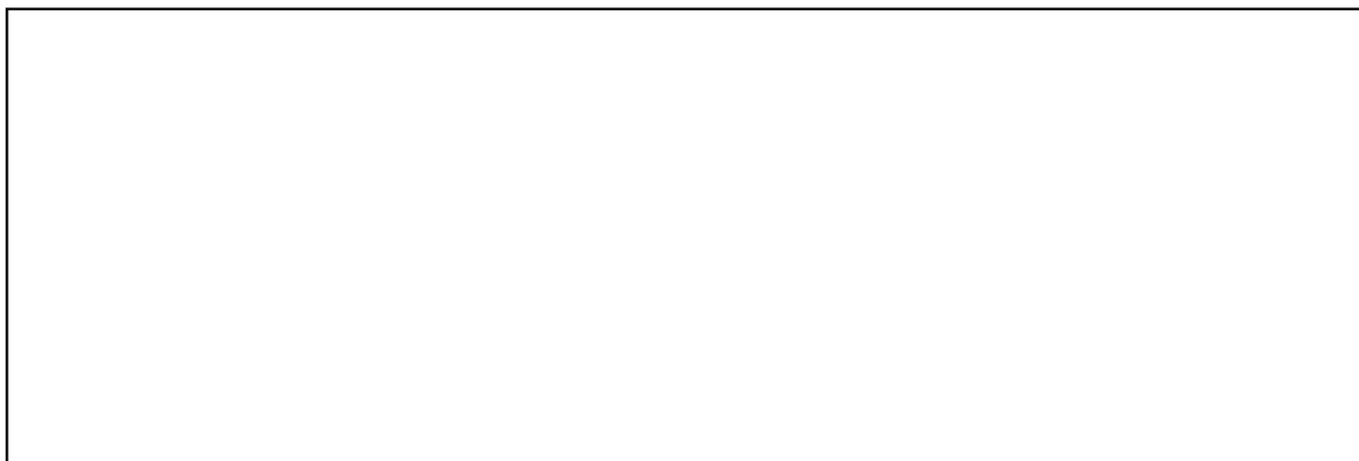
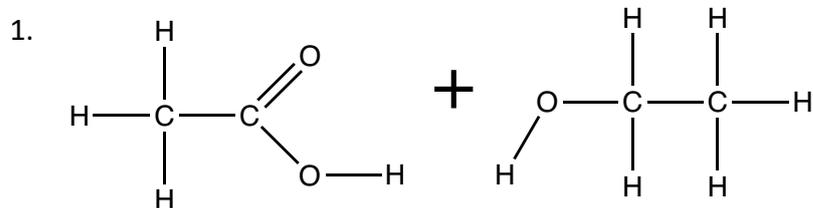
5.



methyl butanoate

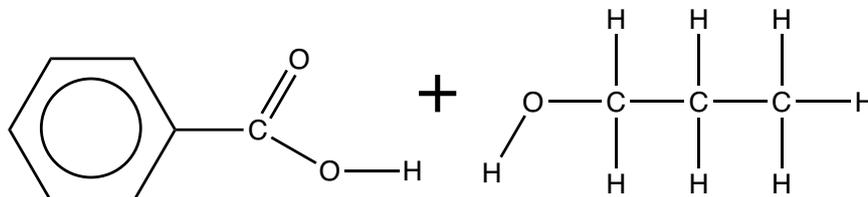
Formation of Esters (hard)

Draw the ester products of the following reactions:



Formation of Esters Continued (hard)

3.



Alice Ball (1891-1916) was an African American scientist who is known for the discovering the 'Ball Method', the best treatment for leprosy until the 1940s. She extracted the ethyl esters of the Chaulmoogra oil and modified it chemically, so it became water soluble and therefore easily absorbed by the body. Initially, she wasn't given any credit for her technique as it was published under her colleague's name. However, later she earned the rightful credit and is now an inspiration to others.



Formation of Esters Answers

