

Lab #1. Synthesis of Aspirin

In this synthesis, methyl salicylate (oil of wintergreen) is treated with a 6 M sodium hydroxide solution (NaOH) followed by acid workup to produce salicylic acid. This product is recrystallized in water.

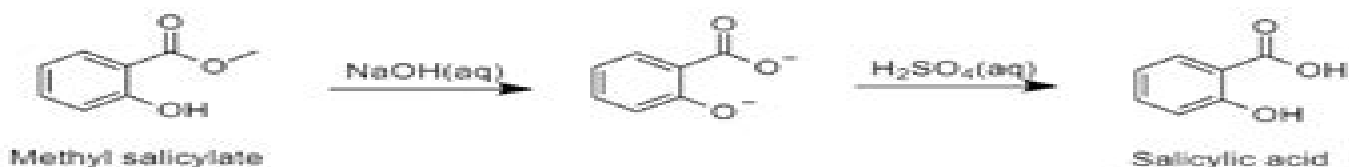


Figure 1. Synthesis of salicylic acid from methyl salicylate

This set of reaction steps leads to the replacement of the **methyl group** (-CH₃) with a hydrogen atom, which results in a structure that contains two acidic functional groups: the **phenol group** and the **carboxylic acid group**. These groups make salicylic acid an irritating substance that burns the sensitive linings of the mouth, throat, esophagus, and stomach.

When salicylic acid is reacted with acetic anhydride, the resulting compound retains the analgesic properties but the irritation of mucous membranes is reduced. This new compound is acetylsalicylic acid. In the 1890's, the Bayer Company obtained a patent on acetylsalicylic acid and coined the name aspirin for the new product.

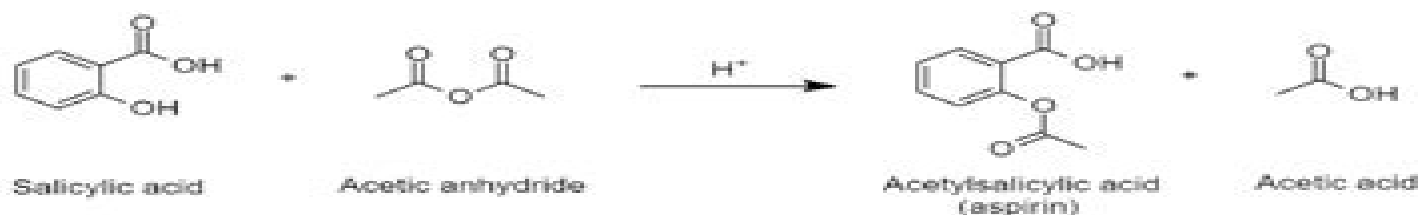


Figure 2. Synthesis of aspirin from salicylic acid and acetic anhydride

The aspirin product is isolated and recrystallized in ethanol and water. The purity of salicylic acid, crude aspirin, and recrystallized aspirin is determined by melting point tests and by chemical reaction tests. The chemical reaction test involves addition of a dilute FeCl₃ solution. If a phenol group is present, the reaction produces a purple color.

Aspirin Synthesis Lab Manuals

John Henry Secrist



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