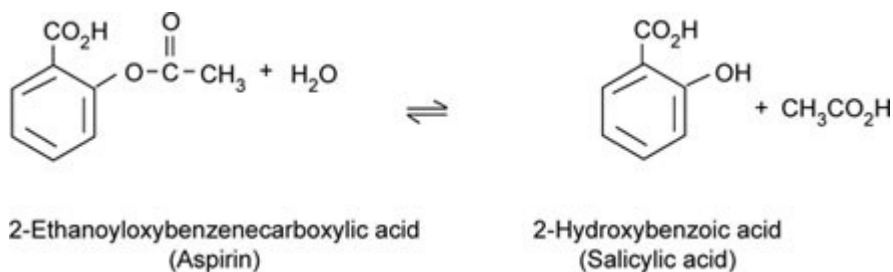


# The analysis of aspirin tablets

In this experiment you will be finding out how much 2-hydroxybenzoic acid (salicylic acid) is present in 2-ethanoyloxybenzenecarboxylic acid (aspirin) tablets. Students must wear eye protection.

2-Hydroxybenzoic acid (salicylic acid) is formed in the following reaction:



## Instructions

### Part A The preparation of standard solutions

In this part of the experiment you will be preparing a set of standard solutions with different colour intensities from the standard 2-hydroxybenzoic acid (salicylic acid) solution. You will be using these to match the intensity of the colour produced from the 2-ethanoyloxybenzenecarboxylic acid (aspirin) solution and so find out how much 2-hydroxybenzoic acid (salicylic acid) there is in your 2-ethanoyloxybenzenecarboxylic acid (aspirin) tablet.

Taking your 24-well plate, add drops of solutions as indicated below:

Well no	A1	A2	A3	A4	A5	A6
No. of drops of: 2-ethanoyloxybenzenecarboxylic acid (salicylic acid) soln.	5	15	25	35	45	50
Water	45	35	25	15	5	0
Iron(III) nitrate solution	5	5	5	5	5	5
Resulting mass (mg) of 2-hydroxybenzoic acid (salicylic acid) per 25 cm <sup>3</sup> solution	0.25	0.75	1.25	1.75	2.25	2.5

### Part B The analysis of 2-ethanoyloxybenzenecarboxylic acid (aspirin) tablets

1. Record the mass of a 2-ethanoyloxybenzenecarboxylic acid (aspirin) tablet and place it in a 100 cm<sup>3</sup> beaker.
2. Add 10 cm<sup>3</sup> of the 50% ethanol–water mixture (from a measuring cylinder) and swirl the mixture. The tablet will begin to disintegrate.
3. Using the microscale filtration method (p. 5), filter the mixture into a 25 cm<sup>3</sup> volumetric flask. Wash the beaker with a small quantity of the ethanol–water mixture and add to the flask. Make up to the mark, stopper and mix.

4. Add 50 drops of this 2-ethanoyloxybenzenecarboxylic acid (aspirin) solution to well B3 followed by five drops of the iron(III) nitrate solution.
5. Match the colour to that of one of the standard solutions.

## Calculations

Calculate the percentage of 2-hydroxybenzoic acid (salicylic acid) in the 2-ethanoyloxybenzenecarboxylic acid (aspirin) tablet as follows.

1. Identify the standard well that matches the colour intensity of the 2-ethanoyloxybenzenecarboxylic acid (aspirin) sample well.
2. The mass of 2-hydroxybenzoic acid (salicylic acid) (in 25 cm<sup>3</sup>) in the solution from this standard well is therefore the same as the mass of 2-hydroxybenzoic acid (salicylic acid) in the 25 cm<sup>3</sup> of solution of your 2-ethanoyloxybenzenecarboxylic acid (aspirin) tablet solution.
3. Divide this mass (mg) by the mass of your 2-ethanoyloxybenzenecarboxylic acid (aspirin) tablet (mg) and multiply this value by 100 to give a percentage by mass.

## Question

1. By considering the equation for the formation of 2-hydroxybenzoic acid (salicylic acid) from 2-ethanoyloxybenzenecarboxylic acid (aspirin), are there any differences in how much 2-hydroxybenzoic acid (salicylic acid) is present in both old and new bottles of 2-ethanoyloxybenzenecarboxylic acid (aspirin) tablets?

## Health & Safety

Advise students not to ingest the aspirin tablets.

Iron(III) nitrate, 0.2 mol dm<sup>-3</sup>, Fe(NO<sub>3</sub>)<sub>3</sub>.9H<sub>2</sub>O (aq) and 2-hydroxybenzoic acid (salicylic acid) solution (0.1% w/v) are of low hazard.

1:1 Ethanol/water mixture is FLAMMABLE.

## Credits

© Royal Society of Chemistry

*Health & safety checked May 2018*

Page last updated August 2018