Acid-Catalyzed Tandem Hydrolysis–Esterification of Acetylsalicylic Acid from Commerical Asprin Tablets to Form Methyl Salicylate

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Abstract

This is an example document for creating LaTeX submissions to the American Chemical Society (ACS) for publication. As ACS does not use LaTeX for typesetting accepted manuscripts, this template does not seek to reproduce the appearance of a published paper.

Introduction

Acetylsalicylic acid (ASA), $C_9H_8O_4$, is a synthetic organic derivative of salicylic acid and is commonly known as aspirin.

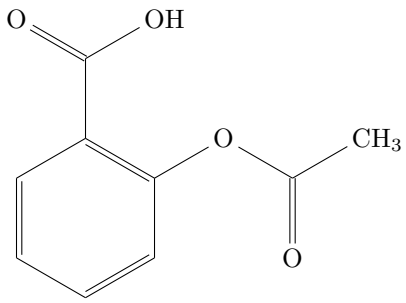

Figure 1: Chemical structure of ASA

Commercial aspirin is commonly synthesized from salicylic acid through Eq 1, and the two molecules differ by an ester group ($-OCOCH_3$).

$$C_7H_6O_3 + C_4H_6O_3 \xrightarrow{H_2SO_4} C_9H_8O_4 + CH_3COOH \tag{1}$$

Another common derivative product of salicylic acid is methyl salicylate, $C_8H_8O_3$, commonly referred to as wintergreen oil. Methyl salicylate is commonly used in edibles (e.g. gum, mints), perfumes, and pain-relief ointments (e.g. Icy Hot, BenGay). Methyl salicylate also differs with salicylic acid by a single ester group and has simply been esterified differently than ASA.

Due to the similarity between the two molecules, ASA can be reacted to synthesize methyl salicylate. The purpose of this experiment was to convert acetylsalicylic acid obtained from commercial aspirin tablets into methyl salicylate through acid-catalyzed esterification in methanol under reflux conditions.

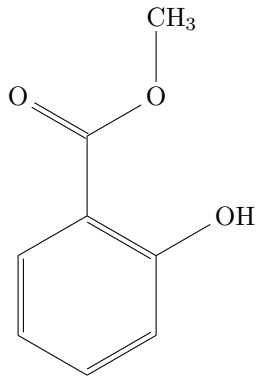

Figure 2: Chemical structure of methyl salicylate

Results and discussion

Outline

The document layout should follow the style of the journal concerned. Where appropriate, sections and subsections should be added in the normal way.

References

References should be given in the normal way in LaTeX. If you are using biblatex (as recommended) then you can use the full range of citation commands it provides. If you choose to use classical BibTeX, the natbib package will be loaded and you can use it's commands.

Floats

New float types are set up in the preamble. The means graphics are included as follows (Scheme 1). As illustrated, the float is "here" if possible.

Your scheme graphic would go here: PDF graphics are recommended.

Scheme 1: An example scheme

The use of the different floating environments is not required, but it is intended to make document preparation easier for authors. In general, you should place your graphics where they make logical sense; the production process will move them if needed.

Math

If packages such as amsmath are required, they should be loaded in the preamble. However, the basic LaTeX math(s) input should work correctly without this. Some inline material $1 + 1 = 2$ followed by some display.

$$A = \pi r^2$$

It is possible to label equations in the usual way (Eq. 2).

$$\frac{\mathrm{d}}{\mathrm{d}x} r^2 = 2r \tag{2}$$

Table 1: An example table

Header one	Header two
Entry one	Entry two
Entry three	Entry four
Entry five	Entry five
Entry seven	Entry eight

Table 2: A table with notes

Header one	Header two
Entry one[a]	Entry two
Entry three[b]	Entry four

[a] Some text; [b] Some more text.

This can also be used to have equations containing graphical content. To align the equation number with the middle of the graphic, rather than the bottom, a minipage may be used.

$$\begin{minipage}{0.5\textwidth}\centering As illustrated here, the width of the minipage needs to allow some space for the number to fit in to.\end{minipage} \tag{3}$$

Experimental

The usual experimental details should appear here. This could include a table, which can be referenced as Table 1. Notice that the caption is positioned at the top of the table.

Adding notes to tables can be complicated. Perhaps the easiest method is to generate these using the basic `\textsuperscript` and `\emph` macros, as illustrated (Table 2).

The example file also loads the optional chemformula and mhchem packages, so that formulas are easy to input: `\ce{H2SO4}` gives H_2SO_4. The two have similar syntax but authors may prefer one or the other.

The use of new commands should be limited to simple things which will not interfere with the production process. For example, `\mycommand` has been defined in this example, to give italic, mono-spaced text: *`some text`*.

Acknowledgements

Please use "The authors thank ..." rather than "The authors would like to thank ...".

Supporting information

A listing of the contents of each file supplied as Supporting Information should be included. For instructions on what should be included in the Supporting Information as well as how to prepare this material for publications, refer to the journal's Instructions for Authors.

The following files are available free of charge.

- Filename-1: brief description
- Filename-2: brief description

Some journals require a graphical entry for the Table of Contents. This should be laid out "print ready" so that the sizing of the text is correct.

The space available depends on the journal: J. Am. Chem. Soc. allows 3.25 in by 1.75 in and requires sanserif text. Some journals want different sizes: you can easily adjust here.

The two rules either side of the content are there to help judge the height of your material: they may be deleted once not required.