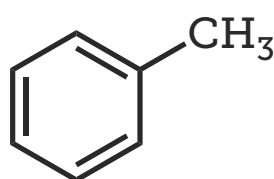


# The Aroma of Books

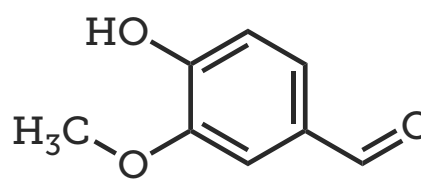
Books, both old and new, give off hundreds of volatile organic compounds (VOCs) with a variety of origins. Some are products of degradation, while others originate from the type of paper, binding adhesive and printing ink used in the book's manufacture.

## OLD BOOKS



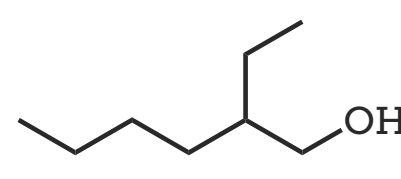
**Toluene**

Sweet, pungent



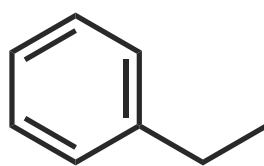
**Vanillin**

Vanilla-like



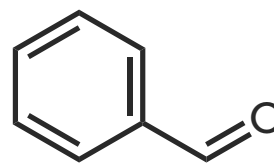
**2-ethylhexanol**

Slightly floral



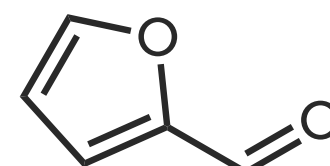
**Ethyl benzene**

Sweet



**Benzaldehyde**

Almond-like



**Furfural**

Almond-like

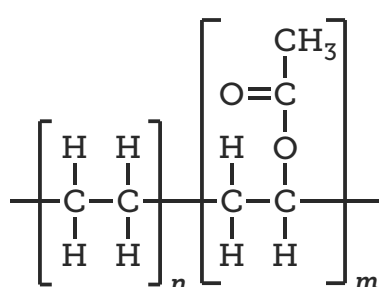
Gradual breakdown of cellulose and lignin in paper produces a large number of compounds. Paper type and the age of the book affect the compounds produced and their concentrations; for instance, very old books contain more lignin than modern books.

## NEW BOOKS



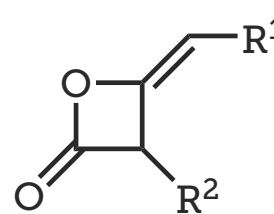
The compounds causing the aroma of new books originate from the adhesive, ink, and the chemicals used for paper treatment.

### Adhesives



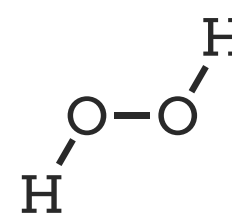
**Vinyl acetate ethylene**

### Paper and inks



**Alkyl ketene dimer**

Aids water resistance

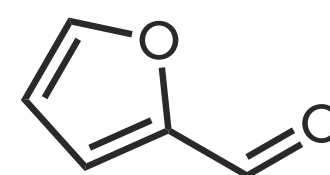


**Hydrogen peroxide**

Bleaching agent

In the paper-making process, paper is treated with chemicals to achieve desired properties. Some of these chemicals are odourless themselves but they can react and contribute to the release of VOCs. Petrochemicals used as solvents for inks also contribute.

In short, no single chemical causes the odour of books. It's a result of a complex mix of volatile compounds produced by chemicals used in their manufacture, as well as the gradual breakdown of the chemicals within the paper. Some of the compounds produced, such as furfural, can even be used to gauge the age and condition of the book in question.



**Furfural**