

Formation of formaldehyde from limonene in scented household products

BRUSSELS / STUTTGART (29 January 2016) – In mid-January, BBC linked limonene in scented household products, including scented candles, to potential health hazards due to the formation of formaldehyde when the limonene reacts with ozone in their television program “Trust me I’m a Doctor”. The results of the underlying experiment were reported on BBC.com, and the story has been replicated on many websites inside and outside the U.K. since and unsettled consumers about the safe use of scented candles.

ECA would like to provide some perspective to address the misinterpretations contained in the programme and online article.

Limonene is a terpene (one of many) that occurs naturally and is used in fragrances both as a synthetically derived ingredient and also as part of many natural essential oils. The article suggested that scented cleaning products, air-fresheners and candles create undue levels of formaldehyde as a result of the emission of limonene and its subsequent reaction with ozone.

- Formaldehyde is generally present in indoor air as a background material (EU **average** figure of 22 µg/m³ or roughly 18 ppb).
- The highest found formaldehyde levels reported in the article are just shy of 60 ppb in a house where a high level of product usage was reported. This is **comfortably below the lowest safety level for formaldehyde** (80 ppb or 100 µg/m³) set by the WHO.

From a scientific point of view, the article left many questions unanswered. ECA therefore contacted Professor Alastair Lewis of the National Centre for Atmospheric Science (NCAS) at the University of York (U.K.) who supposedly performed the experiments for BBC. Prof. Lewis provided some helpful background information for a proper evaluation of the article:

- Prof. Lewis and his team only provided the measurements. The interpretation of the measurement results was made by the BBC journalists, i.e. **not by scientific experts** for such matters.
- Prof. Lewis made BBC aware that the study was far too small for any statements like those made in the article and not statistically significant, but BBC did not include this information. **Formaldehyde measurements were made in only three homes.**
- The experiment **did not include any control measurements** of formaldehyde in the homes **without the use of scented household products**. This would have been an essential element of any scientifically sound study. This means that the formaldehyde could just as well have been emitted by typical sources, like furniture or floor coverings for example, and might not have been a secondary product of limonene at all.

- The specific connection made between very high limonene levels found in some homes and scented candles was also made by BBC, not by Prof. Lewis. He finds it **most probable** that **room fragrances and domestic cleaners were much larger sources of monoterpenes, not candles**. Furthermore, citrus fruit typically contain a high percentage of limonene, too. The oil in orange peels for example typically contains more than 90% limonene, i.e. eating oranges can make a significant contribution to the limonene level in indoor air.

In **conclusion**, the BBC programme and article (and the numerous follow-ups on other websites) are just some other **scare-mongering stories with frighteningly little significance** that willingly sacrifice sound science for getting higher ratings.

The safety of scented candles and their ingredients is of utmost importance to the European candle industry and has been part of decades of scientific research. Strict legal requirements and voluntary commitment on top of that make sure that **consumers can use scented candles safely**.

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About the European Candle Association

The European Candle Association ASBL (ECA) is the trade association representing the leading candle manufacturers in Europe. Authorities and NGOs recognise it as the leading technical authority on candle manufacturing, science and safety. For more information, visit www.eca-candles.eu.