Investigation of the origin of environmental compounds from indoor air samples via accelerator mass spectrometry

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Many organic environmental compounds are potentially dangerous due to their allergic or carcinogen impact on humans. For an effective program to reduce their concentration in houses, their sources have to be detected. Our investigation is focussed on aldehyde compounds since their indoor concentration is relatively high and since they originate from biogenic or anthropogenic sources. Both types of sources can be distinguished by their different ^{14}C content which can be measured via accelerator mass spectrometry (AMS).

For the collection and separation of these gaseous substances they have to be converted into liquid or solid phase by derivatization. This leads to the incorporation of up to six additional carbon atoms into the derivatized sample and hence to a reduced ^{14}C content and to an increased uncertainty for the deduced ^{14}C concentration. To reduce the number of additional carbon atoms, different derivatization compounds and methods have been tested with acet- and formaldehyde of known ^{14}C content.

The Erlangen AMS facility, based on an EN tandem accelerator and a hybrid sputter ion source for solid and gaseous samples, is well suited for the measurement of isotope ratios ^{14}C / ^{12}C $\approx 10^{-12} - 10^{-15}$. The ^{14}C concentration of the calibration samples and from various indoor air samples have been determined by AMS, the corresponding results are discussed with regard to potential sources of aldehydes.