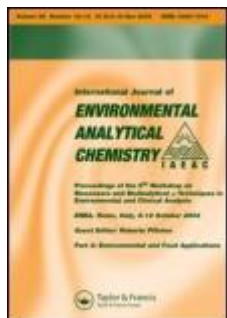


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## Determination and evaluation of selected organic chemical tracers for wood smoke in airborne particulate matter

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### Abstract

PM<sub>2.5</sub> is released during combustion reactions and industrial processes. The chemical composition of PM can be a strong indicator of its origin, or source. A method was developed for the determination of selected chemical tracers for wood smoke in particulate matter using solvent extraction and GCMS analysis. The chosen tracers were levoglucosan, dehydroabietic acid, abietic acid, vanillin, acetovanillone, guaiacol, and 4-ethylguaiacol. Deuterated compounds of similar structure to the chosen tracers were employed as standards in the procedure to eliminate the possible effects of incomplete extraction from the filters and other fluctuations throughout

the analysis period. The method had recoveries of  $105 \pm 7.7\%$  for levoglucosan,  $64 \pm 3.5\%$  for dehydroabietic acid,  $60 \pm 3.6\%$  for abietic acid,  $98 \pm 2.2\%$  for vanillin,  $102 \pm 3.8\%$  for acetovanillone,  $104 \pm 4.9\%$  for guaiacol and  $116 \pm 4.7\%$  for 4-ethylguaiacol. The developed analytical method was applied to ambient particulate matter samples collected in Libby, MT. Libby has been designated as a non-attainment area for current USEPA  $PM_{2.5}$  standards, and a recent study showed that 82% of the  $PM_{2.5}$  in Libby resulted from residential wood smoke. The concentrations of levoglucosan, dehydroabietic acid, and abietic acid were found to be strongly correlated with total  $PM_{2.5}$  levels in Libby, while the methoxyphenols did not show a correlation to  $PM_{2.5}$  levels. Levoglucosan, dehydroabietic acid, and abietic acid were found to be suitable tracers for wood smoke in particulate matter.