

Chemical compounds in indoor dust

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Introduction

Ordinary dust with adsorbed chemical compounds has been shown to have a negative influence on indoor air quality. Therefore the purpose of this study was to map chemical compounds in indoor dust from different locations and to compare different analytical methods for chemical compounds in indoor dust.

Materials and methods

Floor dusts were collected with a vacuum cleaner and then sieved (<1 mm) and mixed to increase homogeneity, dust samples from surfaces from above floor level (shelf dust) were taken as wipe samples. Dust samples were extracted with four different solvents and thermally desorbed at two different temperatures, extracted and desorbed chemical compounds were then analysed by GC-MS. All samples were taken from different sites and none were pooled.

Results

Up to 149 chemical compounds were identified using liquid extraction of dust with methanol (M), toluene (T), dichloromethane (Cl) or a combination of methanol and dichloromethane and up to 159 chemical compounds were identified using thermal desorption of dust at 120°C and 150°C. Common compounds were phthalates such as di(2-ethylhexyl) phthalate on floor dust and organic acids such as hexadecanoic acid in shelf dust.

Discussion

Some differences between floor dust and shelf dust were seen in the study, there were more phthalates and methyl esters with carbon chains up to 16 or 18 carbon atoms and more nicotine and 2-ethylhexanol on floor dust while there were more organic acids with carbon chains

with up to ten carbon atoms on shelf dust. There were large differences in quantifications of chemical compounds in indoor dust depending on which solvent was used for liquid extraction and at which temperature the thermal desorption was made (Table 1). In general, the different solvents for liquid extraction complemented each other while desorption at 150°C was found to be advantageous compared to 120°C. Nicotine were found in all floor dust samples and in a majority of shelf dust samples indicating that a new method for assessing exposure to second hand smoke is available through chemical analysis of indoor dust.

Table 1. Examples of quantifications of a few chemical compounds in one indoor floor dust sample. Amounts are expressed as µg/g dust.

Compound	M	T	Cl	150	120
BBzP	94	100	260	-	-
DEHP	960	2700	2600	-	-
Ethylhexanol	-	3	-	120	52
Hexanal	-	-	-	140	53
Nicotine	83	14	10	140	48
Nonanal	-	11	-	190	69
TBP	-	-	5	110	52
TPP	63	110	78	-	-

“-“ below detection limit or unanalysable.

Conclusions

The results of this study show that a large number of chemical compounds are present in indoor dust and that the amounts of chemical compounds found on indoor dust are dependent on the analytical method and location of dust collection. In order to be able to compare results with previous work it is therefore important that a comparable method is used for future researchers.