VAPORIZATION OF CHLORINATED PHENOLS IN DWELLINGS

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Concern with the long term environmental effects of the use of pentachlorophenol as a wood preservative has provoked considerable research activity to develop analytical methods (1-4) for determining the level of atmospheric pentachlorophenol existing in treating plants (5, 6) and in habitable structures (7-16) containing pentachlorophenol treated wood. These studies have investigated the effects of such factors as temperature, relative humidity, and treatment level on airborne pentachlorophenol concentration. All of these factors have been determined to effect the volatilization of pentachlorophenol (8, 9, 11, 15, 16).

In this present study summarized here, the scope of the earlier research has been extended to the development of a practicable field sampling system to enable sampling and analysis of airborne pentachlorophenol inside habitable structures.

Air within buildings constructed with pentachlorophenol treated wood was sampled to determine the airborne pentachlorophenol concentration. A variety of buildings were surveyed in which pentachlorophenol wood treatments represented several solvent types. Building ages and treated wood surface to air volume ratios varied considerably.

Previously devised laboratory sampling techniques involving the trapping of airborne pentachlorophenol as the water soluble potassium salt were adopted and modified to give a practical field sampling system. Modification included the addition of an inlet filter to simulate the function of the human respiratory tract in blocking out non-respirable particles.

Sample collection apparatus included the inlet filter, two 250 ml gas washing bottles with coarse porosity frits filled with 200 ml of 0.1 N KOH solution, and connected in series, vapor trap, flow metering valve and a vacuum pump. This system was operated at an air flow rate of 1.5-2.0 1/m. Air flow accuracy was maintained with $\pm$ 5%. Multiple sampling systems were run simultaneously within a sample area to reduce collection time. Their contents were combined for analysis. The volume of sample collected varied from 6-15 m^3, depending on the expected concentration of pentachlorophenol vapor. Optimum analytical precision was obtained when a minimum of 2 g of pentachlorophenol was available for GC/MS analysis.

The efficiency of the sample collection system, the effect of inlet filter pore size, and the effect of dust accumulation on the inlet filter were determined in repeated experiments.

Concentrations of pentachlorophenol from 0.09 to 38.0 g/m^3 were detected in structures sampled. The effect of solvent, age and temperature were insignificant compared to that of ventilation. In this study the clorinated phenols detected did not reach the OSHA Threshold Limit Value (TLV) of 500 $\mu g/m^3$ in any building regardless of ventilation conditions.

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