Removal of Indoor Volatile Organic Compounds by Air Cleaner equipped with Titanic Oxide Photocatalyst

Yasauki MORI 1, Yuichi FUSHIWAKI 1, Setsuko SETSUDA 1, Sumio GOTO 2, Sukie ONODERA 3 and Hidetsuru MATSUSHITA 4

[Received Jan 19, 2000] [Accepted Aug 1, 2000]

Abstract
To obtain information on harmful volatile organic compounds (VOC) in indoor air of houses, their concentrations were determined by means of solid phase extraction and GC/MS. The removal rate in indoor air were examined by using three kinds of air cleaners equipped with titanic oxide photocatalysts.

The daily variation of VOC concentrations was 14.6% for six days under a sealed condition in a new house. Similar variations (within 20%) were observed for toluene, xylene and trimethylbenzene.

The removal efficiency for total VOC (T-VOC) in indoor air under the sealed condition was dependent on the type of air cleaners, ranging from 36% to 74% per day. In indoor air of an occupied house, the elimination of p-dichlorobenzene (DCB), an insecticide, was also examined by using an air cleaner, which was fitted with a pre-filter and a photocatalytic filter, at a flow rate of 190 ~ 310 m³/hr. DCB was eliminated by 41% per day, but the removal rate was lower than that of toluene and xylene.

The cytotoxicity of photo-decomposed products collected from the indoor air by solid phase extraction was also examined, but the rate of cell growth during the air cleaner operation was the same as that of blanks, and therefore no cytotoxic effect was found.

Key words: indoor air, volatile organic compound, p-dichlorobenzene, air cleaner, titanic oxide photo-catalyst, cytotoxic test.

1 岩本幸弘 生活環境研究所 生活環境課 〒241-0815 横浜市中区中尾 1-1-1
Kanagawa Prefectural Public Health Laboratory, 1-1-1, Nakaoka, Yokohama 241-0815, Japan

2 横浜市公衆衛生検査所 医療環境衛生部 〒108-0071 東京都港区南青山台4-4-1
National Institute of Public Health, 4-6-1, Shirokane-dai, Minato-ku, Tokyo 108-0071, Japan

3 東京理科大学薬学科 〒162-0826 東京都新宿区市ヶ谷船橋町12
Science University of Tokyo, Faculty of Pharmaceutical Sciences, 12 Ichigaya Funagawaramachi, Shinjuku-ku, Tokyo 162-0826, Japan

4 富士薬学大学 〒417-0801 静岡県富士市大関, 325
Fuji University, 325, Osbiuchi, Fuji, Shizuoka, 417-0801, Japan.