| | | | | | |
|---|---|---|---|---|---|
| 제 목 | 국 문 | 물질수지식을 이용한 이산화질소 침착속도 예측 | | | |
| | 영 문 | Determination of Deposition Velocity for Nitrogen Dioxide in Residence Using Mass Balance Equation | | | |
| 저 자 및 소 속 | 국 문 | 양원호, 유승진, 배현주, 정문호<br>서울대학교 보건대학원 환경보건학과 | | | |
| | 영 문 | Wonho Yang, Sungjin Yoo, Hunjoo Bae and Moonho Chung<br>Department of Environmental Health, School of Public Health, Seoul National University | | | |
| 분 야 | 대기환경 | 발 표 자 | 양원호 | 발표 형식 | 포스트 |
| 진행 상황 | 연구완료( ), 연구중(O) → 완료 예정 시기 : 2001 년 5 월 | | | | |

## 1. 연구목적

Indoor air quality tends to be the dominant contributors to personal exposure, due to the large percentage of time most people spend typically inside their homes. Several Studies have shown that individuals in industrialized countries spend approximately 90% of their days indoors, with approximately two-thirds of the day spent inside the home. Nitrogen dioxide ($NO_2$) is a ubiquitous pollutant in urban environments. It is a by product of high-temperature fossil fuel combustion that can come from a variety of indoor and outdoor sources. Indoor $NO_2$ concentrations are influenced both outdoor levels and by indoor sources such as gas ranges, kerosene heaters, and cigarette smoke. In addition, indoor $NO_2$ concentrations are affected by such household variables as surface adsorption properties, ventilation of combustion appliances, and ventilation of the indoor environment. $NO_2$ is rather reactive and can be removed indoors through a process other than ventilation. The rate of $NO_2$ had been determined in several foreign countries.

The purpose of this study is to determine the decay rate and deposition velocity on interior surface properties as well as air exchange separately in a typical Korean living room. These results will be helpful to approach a prediction method of indoor $NO_2$ level by a simple calculation and to identify the processes and materials responsible for $NO_2$ removal in indoor air and to characterize the rates and factors that affect those processes.

## 2. 연구방법

To obtain the $NO_2$ decay rate in residence, we measured the concentrations of $NO_2$ and carbon dioxide ($CO_2$) in 25 houses. Simultaneously, temperature and relative humidity of the houses were recorded. Checklist in relation to house characteristics, and volume and area of living room was investigated. Passive filter badge were utilized for all $NO_2$ measurements. The badges are small (5x4x1cm3) and light weight (15g), and they do not involve pumps or other technologies that could cause difficulties for 48 hours. The passive filter badges could easily be clipped onto the for the duration of the sampling periods. The filter badges absorbs $NO_2$ on a triethanolamine solution in a cellulose fiber filter. $CO_2$ levels to measure infiltration rate were measured by continuous monitor instrument (TSI 8731 Co.).

## 3. 연구결과

Infiltration rate by residence type was anticipated, infiltration rates between single and apartment houses was not significantly different. Main factors of infiltration rate in residence are wind direction and wind velocity of outdoor and temperature difference. We did not measure the wind direction and velocity of outdoor. Difference between indoor and outdoor temperatures significantly affects the infiltration rates. That is to say, difference between indoor and outdoor temperature can cause the pressure variation, and this variation affects infiltration rate. Higher difference between indoor and outdoor temperature, higher infiltration rate.

The average and standard deviation of $NO_2$ decay rates were $1.06hr^{-1}$ and 0.86, respectively. Typical reactive removal rate of $NO_2$ are on the order of $0.8hr^{-1}$in western countries. Sink rate of $NO_2$ in Japan was 0.99±0.19hr-1. With the exception of two outliers in this study, the apparent rate constants lies in a band centered about at 0.8 $hr^{-1}$. These data suggest a mean half-life of 52 min for reactive removal of $NO_2$ from these residences. When volume and surface were measured, interior property of living room was investigated at the same time. Though carpet appeared to remove more $NO_2$ than other surfaces, it was not apparent in this field study. Mean deposition velocity was 0.79 cm/min with two outliers.

## 4. 고찰결과

Since the overall decay process of $NO_2$ follows first-order reaction in a typical living room, we calculated the $NO_2$ decay rate using $NO_2$ passive sampler. The use of gas range is prevalent in Korea, generation of $NO_2$ and $CO_2$ was from gas-range turn on for 30 minutes. The $NO_2$ decay rate could be obtained from $NO_2$ cumulative concentration using passive sampler and infiltration rate using $CO_2$ decay. With the exception of two outliers, mean $NO_2$ decay rate in Korea residence was 0.84(± 0.38)hr-1, mean deposition velocity was 0.79 cm/min.