

Characterization of NO₂ sorption by Japanese cedar wood

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Introduction

In recent years wood has been found to sorb air pollutants such as NO₂. Japanese cedar wood showed especially high NO₂ sorption ability compared with other wood species. The morphological structure, the components and the moisture of wood were the factors affecting the sorption of pollutants. However, influences of these factors are not evaluated systematically and comprehensively so far. This research discusses the characterization of the NO₂ sorption phenomenon of Japanese cedar wood.

Materials and Methods

Materials: 40 year-old natural dried heartwood of Japanese cedar (*Cryptomeria japonica* D.DON) from Osaka was used. In order to investigate the effect of tracheid structure and grain size, disk-shaped end grain sample (d: 10mm(R), t: 1.5mm(L)), and 3 sizes of wood flour were prepared respectively. To investigate functions of wood components, extracted wood flour, holocellulose and α -cellulose were prepared. To investigate the effect of moisture, humidified (MC: 0-12%) wood flour and components were prepared.

Methods: In an incubator at 20°C, samples set into U-shaped glass tube or Teflon tube were aerated with concentrated NO₂ (1000ppb, flow velocity: 560ml/min). NO₂ and NO concentration before and after passing through the samples were monitored with a NO_x analyzer. NO₂ sorption ratio and NO generation ratio were calculated and compared among various samples. The relative humidity of the aeration gas was controlled to be same with the humidified samples.

Results and discussion

Fig.1 shows the NO₂ sorption ratio of wood components in dry and humidified condition. The moisture content affected the NO₂ sorption ratio for each component. NO₂ sorption ratio of humidified samples became larger than dried samples except in case of hemicelluloses. It seemed that lignin and extractives gave larger effect on the sorption phenomenon in humidified condition.

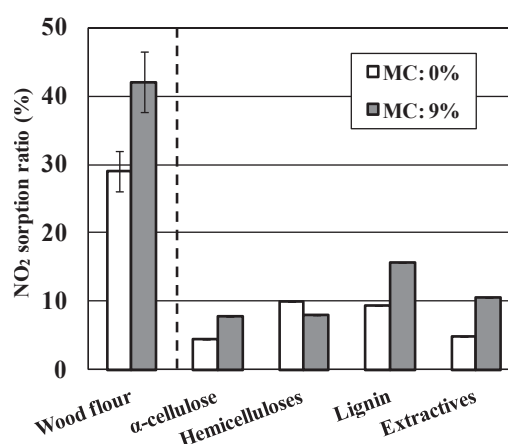


Fig1. NO₂ sorption ratio of dry and humidified samples

NO₂ : 1000ppb Flow velocity : 560ml/min
T : 20°C RH : 0, 56 ± 5%
Sample weight : 0.5g (Wood flour)
Component ratio : α -cellulose 41.8%
 Hemicelluloses 24.0%
 Lignin 31.6%
 Extractives 2.6%