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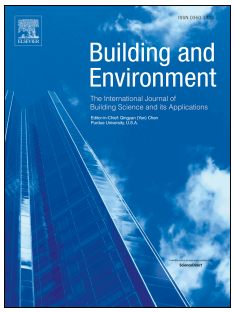

Comparative characteristics of relative pollution exposure caused by human surface chemical reaction under mixing and displacement ventilation

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Comparative characteristics of relative pollution exposure caused by human surface chemical reaction under mixing and displacement ventilation

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Abstract: The purpose of this present study is comparing the characteristics or difference of relative pollution exposure induced by human surface chemical reaction, as to the conditions of mixing and displacement ventilation. In order to comprehensively evaluate impacts extent and relative importance of chemical reaction and ventilation on pollution exposure, the evaluating method of relative pollution exposure was given. As to human surface chemical reaction between ozone and squalene and the authors' previous research of reference [1], influence of air change rate, reactants concentration and chemical reaction rate on the ozone and product concentration in breathing zone and relative pollution exposure (ozone and product concentration ratios between breathing zone to bulk air) were analyzed for these two kinds of ventilation. The results indicate that the maximum variation range of ozone concentration ratio is from 0.92 to 0.98 under mixing ventilation and 0.93 to 0.98 for displacement ventilation. Meanwhile, those of product concentration ratio are from 1.54 to 2.00 and 1.12 to 1.69 for mixing and displacement ventilation, respectively. The variation of ozone and product concentration in breathing zone behaves more distinct features for displacement ventilation. However, mixing ventilation brings slightly greater influence on ozone and product concentration ratios. For ventilation system design and controlling the relative pollution exposure induced by human surface chemical reaction, high ACH and lowering ozone concentration in supplied air and squalene concentration and chemical reaction rate in human surface is very conducive and necessary.

Keywords: chemical reaction; human surface; relative pollution exposure; mixing ventilation; displacement ventilation

1. Introduction

As one typical indoor chemistry, ozone (O_3) reaction with indoor human surface (skin, hair,