

Abstract

Exposure Assessment of Respirable Crystalline Silica Dust among Concrete Finishers in the Construction industry

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OBJECTIVES: The objective of this study was to evaluate the concentration and size-distribution of crystalline silica among concrete finishers in the construction industry.

METHODS: Active-specific personal air sampling(n=129) and local air sampling(n=54) were carried out in 8 apartment building construction sites by using PVC(poly vinyl chloride) filters with aluminum cyclones(flow rate at 2.5Lpm) and mylar substrates with cascade impactors. Crystalline silica was analyzed by FTIR(Fourier-transform infrared spectroscopy). The concentration of crystalline silica were showed by three different types of construction job(concrete chipping, grinding, plastering) and four different workplace(outside wall, inside of apartment room, stairway, underground parking lot).

RESULTS: The concentration of crystalline silica was highest in concrete grinding(2.058 mg/m^3) followed by concrete chipping(0.123 mg/m^3), and plastering work(0.003 mg/m^3). Concentration of crystalline silica was differ by the types of workplace in concrete grinding work, stairway shows highest concentration(4.177 mg/m^3) followed by inside of apartment(2.761 mg/m^3), underground parking lot(1.302 mg/m^3), and out side wall(0.893 mg/m^3). The mass fraction of inhalable, thoracic, and respirable dust were 68.6%, 25.9%, 9.3% in concrete chipping work and 69.7%, 29.1%, 10.5% in concrete grinding work.

CONCLUSIONS: It was found that concrete finishers in construction industry have the risk of expose to crystalline silica hazards level of exceeding the exposure limits. The use of air supply and exhaust equipment, special safety and health education and personal protective equipment is necessary in concrete grinding and chipping work. In addition, there is a need to establish construction specific work monitoring system, health planning and management practices.