

9CM.1**Characterization of Dust Generated from Grinding Natural and Engineered Stones.** DREW THOMPSON, Chaolong Qi, *NIOSH*

Outbreaks of silicosis have been reported among stone countertop fabrication workers in the United States. Due to the high crystalline silica content in engineered stone, which can exceed 90%, dust controls currently employed in some fabrication worksites may not adequately limit exposure levels. In this study the dust generated by grinding natural and engineered stones was systematically characterized in a laboratory testing system. The stones tested included two engineered stones of crystalline silica in a polyester resin matrix (Stones A and B), an engineered stone of recycled glass in a cement matrix (Stone C), and granite. Particle size distributions were measured by Aerodynamic Particle Sizer. Aerosol samples were collected by respirable samplers, total dust samplers, and Micro-Orifice Uniform Deposit Impactor. Bulk dust samples were collected from the dust settled on the floor of the testing chamber. Samples were analyzed by gravimetric analysis and X-Ray diffraction to determine dust generation rates, crystalline silica generation rates, and crystalline silica content. No crystalline silica was detected in the bulk dust of Stone C. Stone A, Stone B, and granite bulk dust were 60%, 23%, and 30% crystalline silica, respectively. The crystalline silica content in bulk dust, respirable dust, and total dust were comparable for each stone type. Granite generated more dust per unit volume of material removed than the engineered stones, which all had similar dust normalized generation rates. Stone A had the highest crystalline silica normalized generation rates, followed by granite, Stone B, and Stone C (non-detect). For all stones containing crystalline silica, the highest size-dependent, normalized generation rate of respirable crystalline silica occurred at 3.2-5.6 μm . All stones generated similar trimodal lognormal particle size distributions, with the most prominent mode at 2-2.3 μm . These results will aid in the selection or development of optimal exposure control measures.

9CM.2**Granular Bed Filter Model for Porous Filter Media.** JAE-HYUN PARK, Myong-Hwa Lee, *Kangwon National University, University of Miami*

Air filters play a crucial role in separating and capturing airborne particles. There are two types of filter media such as a fibrous filter, which fibers are intricately intertwined, and porous filters, featuring randomly distributed pores. The selection of a desirable filter suitable to its application is important. The filtration performance of a fibrous filter can be predicted by a Davies' equation (pressure drop) and a log-penetration equation (collection efficiency). However, there is no reliable method to predict the filtration performance of a porous filter.

A potential method to predict the filtration performance of a porous filter was suggested by using a granular bed theory in this study. Porous filter was regarded as a granular bed filter composed of packing materials. The shape of a packing material was determined by a fiber structure among open cells. Pressure drop of a porous filter could be calculated by Ergun equation and the collection efficiency could be predicted by a log-penetration equation using a single sphere theory. The results revealed that those prediction equations, which are Ergun equation and log-penetration equation considering a shaper factor and variance of the spheres, were applicable to porous filter media.

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