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Izvorni znanstveni članak

Correction factor for real-time determination of wood dust mass concentration by photometric method

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Sažetak

Samples of wood dust were collected in the working environment of wood machining processes for the purpose of determining correction factors for measuring mass concentration of wood dust by photometric method. According to the NIOSH 0600 Norm and NIOSH Manual of Analytical Methods for photometric measurement, correction factor must be determined before measuring mass concentration of different types of dust. The correction factor is defined as the ratio of mass concentration obtained by the gravimetric method and mass concentration obtained by the photometric method. The correction factor should be determined because of the influence of particle size distribution, density, particle shape and refractive index on values obtained by the photometric method. The aim of the research was to investigate the possibility of using photometric method for the determination of mass concentration of inhalable fraction of airborne wood dust. Sampling was conducted in several woodworking plants during the machining of wet and dry beech-wood, wet and dry oak-wood, wet fir-wood and particleboard. There is a significant correlation between the results obtained by the photometric method and values obtained by the gravimetric method ($R^2=0.88$) and this is the base for using the photometric method in determining mass concentration of airborne wood dust. According to the results of this research, correction factors must be determined and used for measuring mass concentration of inhalable wood dust during the machining of different wood species and wood with different moisture content. The best corresponding results of photometric and gravimetric methods are obtained for the samples collected during machining of wet fir-wood ($k=1$). The largest correction factor should be used in determining workers exposure to wood dust during machining of dry oak-wood ($k=4.4$) and particleboard ($k=4.5$). Only the results of 8-hour measurements of mass concentration by gravimetric methods can be compared with limit values of aerosol mass concentration. However, the determination of mass concentration of wood dust by photometric method may be applied not only for short-term exposure measurements but also for additional measurements within the analysis of exposure time profile at workplaces during the working day. Additionally, photometric method is very useful for simultaneous collection of samples of the respirable, thoracic and inhalable fractions of airborne particulate matter.

Ključne riječi

photometry; gravimetric method; exposure to wood dust; inhalable particles

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