Abstract:
Exposure to flavoring chemicals has been suggested by some scientists to cause respiratory disease in food and flavoring workers. We previously demonstrated that naturally-occurring diacetyl and 2,3-pentanedione are released during roasting and grinding of coffee beans in an industrial setting. However, there are no published data on exposure to these diketones and other potential respiratory irritants, such as acetaldehyde and methanol, from coffee processing workers spreading large volumes of roasted, ground and artificially flavored coffee. We conducted an exposure study to determine the concentrations of diacetyl, 2,3-pentanedione, acetaldehyde, and methanol released from spreading ground flavored coffee in two plywood bins representing industry-sized coffee silos. Personal and area samples were collected for 15 min during and after spreading coffee; samples were analyzed for diacetyl and 2,3-pentanedione, acetaldehyde, and methanol using the OSHA 1012, NIOSH 2016, and NIOSH 2000 methods, respectively. Headspace measurements were also taken from the coffee delivery tote and bins. Personal sampling mean concentrations for diacetyl, 2,3-pentanedione, and acetaldehyde ranged from 0.083-0.23, 0.086-0.23, and 0.17-0.88 ppm, respectively. Area mean concentrations for diacetyl, 2,3-pentanedione, and acetaldehyde ranged from 0.039-0.088, 0.037-0.085, and 0.03-0.17 ppm, respectively. Headspace concentrations for diacetyl, 2,3-pentanedione, and acetaldehyde ranged from 0.76-4.9, 0.55-4.6, and 5.1-12 ppm, respectively. Methanol was not detected in any samples. Our findings suggest that diacetyl, 2,3-pentanedione are released from ground flavored coffee at concentrations that may exceed proposed occupational exposure limits; acetaldehyde did not exceed occupational exposure limits. These results may be useful in understanding the potential risks of respiratory disease from various volatile organic compounds at coffee processing facilities.