☐ Nanoparticles ☑ Combustion aerosol particles ☐ Air Cleaning & contamination control ☐ IAQ
☐ Bioaerosol ☐ Atmospheric Aerosol ☐ Instrumentation ☐ Filtration ☐ Material Processing

Chemical composition and toxicity of fresh and photochemically aged diesel exhaust particles

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keywords : oxidation flow reactor, diesel exhaust particles, fine particle, size distribution, chemical composition

Atmospheric oxidation is the primary process that governs the transformation of the naturally and anthropogenically emitted species in the atmosphere. Different processes involved in atmospheric oxidation have been studied with the use of environmental chambers and the recently developed oxidation flow reactors. In this study, a Potential Aerosol Mass Oxidation Flow Reactor (PAM-OFR) was used to simulate the photochemical aging process of diesel exhaust particles, which is considered as one of the major anthropogenically emitted air pollutants. The PAM-OFR was characterized and calibrated to accommodate the conditions of using a source-generated sample. Diesel exhaust particles (DEP) were first diluted in a dilution chamber before passing through the PAM-OFR, where aging conditions were achieved by adjusting the lamp voltage (Aged 1-2V and Aged 2-6V). Fresh and aged diesel exhaust particles were then characterized via their size distribution, chemical properties and oxidative potential. A unimodal size distribution was observed for the fresh and aged particles, peaking at 162.5 nm for the fresh and 174.7 nm and 181.1 nm for Aged 1 and Aged 2, respectively. While the mode diameter increased, the observed number concentration for the aged particles have decreased. On the other hand, the $PM_{2.5}$ mass concentration collected on filter substrates increased with the equivalent aging day. An average of 903.59 mg m^{-3} was collected for fresh DEP, while an average of 1054.53 and 1621.99 mg m^{-3} were collected for the two aging conditions, respectively. This evidence shows that atmospheric oxidation processes can alter the properties of the diesel exhaust particles. To further investigate this phenomenon, chemical properties and oxidative potential of the fresh and aged diesel exhaust particles will be examined.

Acknowledgement
This research was funded by Ministry of Science and ICT (NRF-2019R1A2C3007202).

Reference
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atmospheric chemistry research. Chem. Soc. Rev., 49, 2570-2616.