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A Study on the Application of the Field Air Dilution Function Method for Odor Measurement

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Extended Abstract

The Ministry of Environment of Korea classifies emission allowance standards and strict emission allowance standards for odor management, and stipulates that odors should be measured using the complex odor method (Air Dilution Function Method)[1]. However, the air dilution function method collects odor samples from the site and can cause sample loss during transportation. In order to solve the underestimated problem[2], overseas is introducing a method of directly measuring odor strength at the odor generation site. In Europe, a dynamic olfactometer according to the EN13725 method is used[3], and in the United States, a Scentometer device is used to evaluate odors at the site[4].

This study conducted equipment development and field evaluation research from 2022 to 2023 to prepare an on-site odor measurement method using the field air dilution function method. The first phase of the study (2022) focused on developing a field air dilution device and conducting comparative experiments with existing odor measurement methods. The device applied a odorless/deodorizing gas control method using MFC, and dilution drainage can be applied from 3 times to up to 3000 times in the same way as the process test standards.

The findings from the first study suggest that the material of the mask, its high adhesion, and the appropriate exhaust airflow should be considered to minimize the olfactory adaptation of panelists. Additionally, further research is needed to modify the structure of the apparatus to improve the accuracy of the experiments. Therefore, the second study (2023) was conducted with four experimental plans designed to address issues such as the adhesion of the adsorption port and the inhalation flow, identified through the comparative experiments (first study), and to ensure the reliability of the on-site air dilution method.

First, in order to improve the structure of the mask, a medical oxygen mask that is durable and has little effect on measurement data even when reused was selected in consideration of adhesion and the presence or absence of an exhaust port. In addition, when diluting a high-concentration sample, the area where external air and odorless gas are not properly mixed or the odor remains inside the device has been improved. The second was to identify the limitations of the existing test method (air dilution function method) in which samples are lost over time for the same test method, and the third was to evaluate whether the on-site air dilution method could be applied in the field by securing data on seasonal complex odors. Finally, the applicability of the field air dilution function method was evaluated by experimenting with various odor emission sources.

As a result of the field evaluation, the two test methods, the existing air dilution function method (laboratory) and the field air dilution function method, produced similar results through several device improvements, and substances that lose samples over time were also identified, confirming that the introduction of the field air dilution function method was necessary.

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