

An End-of-Service-Life Indicator for Small Gas Cartridges Using Window of Detecting Reagent

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ABSTRACT

Any end-of-service-life indicator (ESLI) is desirable for chemical-cartridges because of its small gas removing capacity. Constantly, there are incidents caused by the uses over breakthrough times of chemical-cartridges at workplaces in Japan. In this study, we developed a low-cost ESLI for chemical-cartridges of organic vapors or ammonia. The indicator was based on the technology of detector tubes installed in the center of a cartridge and visible from front side through small circle window. This ESLI is categorized as a unified model that the indicator was a part of the objective cartridge and of single use. The indicator does not need any power supply but does not have active warning facility.

These chemical-cartridges do not have enough depth to install the window at sidewall. Moreover, gas concentration at sidewall may not represent the average sectional gas adsorption situation of the cartridge. Color of the indicator changed from peripheral part of the circle window with chemical reaction of gases and reagent. Several detecting reagents for organic vapors and ammonia were surveyed to detect small amount of organic vapors or ammonia. Our system will need further research on its performance before practical applications.

Comparative study of respirator fit-testing instruments using ambient aerosols.

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Abstract

As a fit-testing instrument using ambient aerosols, PortaCount (TSI Inc.) is well-known and based on condensation nuclei counter (CNC). On the other hand, a fit-test instrument based on optical particle counter (Sibata Mask fitting tester MT-03) is widely used in Japan. In this study, we compared the performance of these instruments using human subjects wearing particulate respirators. Five male human subjects joined voluntarily in this project and 19 types of RL2 class (equivalent to R95 mask of NIOSH) replaceable half mask particulate respirators were used. Five exercises of the fit-testing were based on OSHA 1910.134 but talking was conducted in accordance with Japanese Industrial Standard. Fit factor measured by the instruments showed good agreement for artificial leakages of HEPA filters with hypodermic needles. Averaged fit factor of each human subject for each particulate respirator was also compared with both instruments. The fit factor measured by PortaCount without N95 Companion showed around third times higher than MT-03. It was caused by the difference of filter collection efficiency of respirators measured by both instruments. Furthermore, moisture in the exhaled air may affect positively on MT-03 counting and negatively on PortaCount counting.