

Methods to evaluate gas phase air-cleaning technologies

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SUMMARY

Gas-phase air cleaning methodologies have been considered as an attractive and cost-benefit alternative, and supplement to the traditional ventilation systems securing that air quality in buildings is meeting the prescribed standards. The systems can use the air that has been already conditioned to the required temperature and relative humidity, and by removing airborne gaseous pollutants, this air can be supplied indoors again. In this way the energy used to ventilate the buildings is expected to be considerably reduced, and in some cases, especially when outdoor air quality is poor or during specific extreme weather events, the buildings can be kept airtight and shut tight from the impact of outdoor air pollution and ambient impacts. Despite numerous technological solutions for gas-phase air cleaning available on the market there is basically no standard on how to evaluate their efficiency and effectiveness in removing gaseous pollutants. Such development is desired and necessary without further due. Standards exist regarding the systems for removing particles from the air, but as it comes to gas-phase air cleaners only the standards that exist present methods for using sorbents and sorbent-like technologies, and even they can be considered as incomplete. Standard methods must be developed, tested and put into practical use that would not only allow estimating the air cleaner efficiency in removing the pollutants but also comparing different technologies against each other concerning their performance. This presentation intends to shed some light on this topic. It will discuss advantages and disadvantages of using different methods for evaluating air cleaner performance focusing on chemical measurements and methods in which the ratings of humans are used; the former is the most accepted method at present. It will also discuss the risks and limitations of using these methods. Besides the selection of the method based on which the performance of gas-phase air cleaners should be evaluated, there are also other challenges that need to be considered when the method is implemented. These include (1) the selection of challenge pollutants and exposures; (2) examining potential by-products created during air-cleaning process; and (3) long-term performance of air-cleaners. They will also be discussed during this presentation. Finally, the efficiency of air cleaners should be assessed against the costs of their operation including both the running costs of energy and the maintenance costs. This presentation will specifically focus on using subjective ratings to assess air-cleaner performance and the selection of challenge pollutants.

KEYWORDS

Air-cleaner; Gaseous pollutants; Chemical analysis; Sensory ratings; Human subjects; Performance