Particulate Matter, Fine Dust and VOCs

Particulate Matter (known as PM) refers to all particles suspended in the air (called airborne particles), which can vary in size, shape, composition and origin. These particles can be solid or liquid and come from a wide range of natural sources (such as dust storms or forest fires) and human activities (such as fossil fuel burning, industry, vehicles, etc.)[1]. PM is generally classified according to its size:

PM_{10}: particulate matter with a diameter equal to or less than 10 micrometres	$PM_{2.5}$: particulate matter with a diameter equal to or less than 2.5 micrometres.	PM_1: particulate matter with a diameter equal to or less than 1 micrometre.

The ultrafine dust particles (PM smaller than 2.5 micrometres, that is, $PM_{2.5}$ and PM_1) are the most dangerous to human health due to their ability to penetrate deeper into the airways and bloodstream[2]. PM_{10} are particles that are small enough to be inhaled into the upper respiratory tract but may not reach the lungs as deeply as finer particles.

Fine Dust is a specific type of dust consisting of airborne particles that fall within this size range (PM_{10}) or smaller, like $PM_{2.5}$[3]. These particles can include materials such as dust, urban dust, construction dust, and other pollutants that are small enough to be inhaled deep into the lungs. Fine dust is one of the most serious pollutants because it affects air quality, visibility, human health, and global climate change.

In summary, the term 'particulate matter, PM' encompasses all particles of different sizes, and 'fine dust' refers to the smallest fraction of these particles (usually PM_{10} and $PM_{2.5}$ but also PM_1). PM is a more general term covering all airborne particles, regardless of size, and can include both large particles (such as construction dust) and fine particles (such as fine dust and PM_1). In short, all fine dust is part of PM, but not all PM is fine dust.

The best way to clean surfaces and maintain good air quality is using a damp cloth and avoid using duster devices as they will increase the amount of PM into the air.

In this context, it is important also to understand the term VOCs, as they are present in many products and materials that are used daily, such as paints, solvents, cleaning products, and fuels.

[1] E. Zender-Swiercz, B. Galiszewska, M. Telejko, M. Starzomska. The effect of temperature and humidity of air on the concentration of particulate matter - PM2.5 and PM10. Atmospheric Research, 312, 2024, 107733. https://doi.org/10.1016/j.atmosres.2024.10773300

[2] K. Perini. M. Ottelé; S. Giulini; A. Magliocco; E. Roccotiello. Ecological Engineering. Quantification of fine dust deposition on different plant species in a vertic0000al greening system. Volume 100, March 2017, Pages 268-276. https://doi.org/10.1016/j.ecoleng.2016.12.032.

[3] Eun-Min Cho; H. Jin Jeon; D. Ki Yoon; Si Hyun Park; H. Jin Hong; K. Yong Choi; Heun Woo Cho; Hyo Chang Cheon; Cheol Min Lee. Reliability of Low-Cost, Sensor-Based Fine Dust Measurement Devices for Monitoring Atmospheric Particulate Matter Concentrations. Int. J. Environ. Res. Public Health 2019, 16(8), 1430. https://doi.org/10.3390/ijerph16081430.

Volatile Organic Compounds (VOCs) are a diverse group of carbon-containing chemicals that can easily evaporate at room temperature, which means that they can change from liquid or solid to gaseous state at relatively low temperatures. Common examples of VOCs are formaldehyde (present in plywood products and furniture), benzene (in fuels and chemicals), toluene and xylene (in paints and solvents), acetone (in cleaning products and cosmetics) and methane (primarily emitted from agriculture: ruminants and cultivation)[4].

Many VOCs are emitted into the air, which can affect indoor and outdoor air quality. Some of these compounds has negative environmental implications and exposure to high levels of VOCs can also be detrimental to human health.

[4] European Environment Agency, VOC, <https://www.eea.europa.eu/help/glossary/other-eea-terms/voc>