

Volatile Organic Compounds

(Formaldehyde, Toluene, D-Limonene)

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Volatile Organic Compounds (VOCs) are a class of substances that are likely to be gases at room temperatures. Many VOCs are present in the indoor and outdoor environments. Common sources range from industrial processes involving petrochemicals, to combustion of fuel, to the natural biological emissions of growing plants. Many VOCs are toxic to humans and can cause a host

of health problems up to and including premature death.

Traditional carbon air purifiers can only concentrate VOCs within their media, they cannot destroy or render them harmless. Studies have shown that carbon filters reach a saturation point and tend to re-release VOCs into the environment.



Molekule's PECO Technology Successfully Removed VOCs From the Air in a Rigorous, Scientifically Controlled Testing Environment

PURPOSE

This research tested the effectiveness of the PECO technology of Molekule Air and Molekule Air Mini in destroying VOCs including formaldehyde, toluene, and D-limonene along with investigating any additional formation of formaldehyde.

SET-UP

The two different units were sealed in a thirty square meter testing chamber. The VOC mixture was injected into the space and allowed to circulate for thirty minutes after which the first sample was taken. The units were then turned on and allowed to run in the contaminated chamber. Concentrations of VOCs were sampled regularly then quantified with gas chromatography/ mass spectrometry and high-performance liquid chromatography. In addition to testing the cocktail of 3 VOCs, formaldehyde was measured alone for comparison against cocktail destruction. This large sealed chamber test with a relatively low concentration of a mixture of VOCs is more indicative of a real-world environment than previous smaller chamber tests performed so far.



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RESULT

The PECO-Filter inside the Molekule units was able to reduce the concentrations of all VOCs below quantification levels within a few hours. These results show that PECO technology is able to destroy VOCs without re-release, unlike any other technology available. Concentration of formaldehyde did not change in the presence of toluene and D-limonene, showing no secondary formation of formaldehyde during oxidation.

CHALLENGE SUBSTANCE	INITIAL CONCENTRATION	REMOVAL AFTER 8 HOURS
MOLEKULE AIR		
Formaldehyde	1067 µg/m ³ 828 ppb	89.6%
Toluene	1988 µg/m ³ 528 ppb	99.5%
D-limonene	1666 µg/m ³ 299 ppb	100%*
MOLEKULE AIR MINI		
Formaldehyde	1071 µg/m ³ 882 ppb	59.2%
Toluene	1938 µg/m ³ 514 ppb	99.7%
D-limonene	1919 µg/m ³ 344 ppb	100%*
MOLEKULE AIR PRO		
Formaldehyde	1249 µg/m ³ 911 ppb	80.7%
Toluene	1822 µg/m ³ 483 ppb	100%*
D-limonene	2782 µg/m ³ 500 ppb	100%*

*After 8 hours of continuous operation of the air purifier this pollutant was not quantifiable by the instruments used.



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Intertek Report on Molekule's Efficacy
Against Volatile Organic Compounds

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