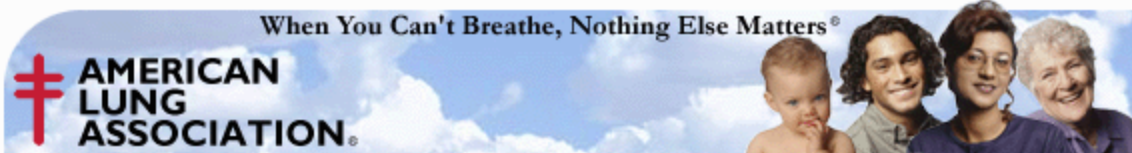


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Residential Air Cleaning Devices: Appendix 3 -- Emerging Technologies

April 2, 2004

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Photocatalysts for Volatile Organic Compounds (VOCs)

Photocatalysts for the destruction of indoor air pollutants, including VOCs and gaseous inorganic pollutants such as nitrous oxides, carbon monoxide, and hydrogen cyanide, are currently in development (Heller, 1996). Photocatalytic air cleaners are composed of a photocatalyst, an ultraviolet light source that illuminates the catalyst surface, and a fan that passes air over the catalyst surface. The photocatalyst absorbs photons of ultraviolet light to drive oxidation and reduction reactions on the catalyst surface. These reactions reportedly convert organic pollutants to carbon dioxide and water. Reports of initial tests show the technology capable of rapidly destroying toxic components of tobacco smoke such as formaldehyde, acrolein, and benzene.

Catalytic Chemical Air Filters

Another mechanism for chemical filtration involves the catalytic conversion of one volatile compound into another, less hazardous compound. For example, harmful ozone can be catalytically converted on a carbon surface into oxygen (Weschler, et al., 1994). This mechanism occurs on the surface of adsorbent media to which specific catalysts have been added. Catalytic chemical air filters are advantageous in that active adsorption surface sites are recycled through catalysis rather than consumed by captured pollutants. Catalytic panels are being developed that effectively remove nitrogen dioxide, ozone, and carbon monoxide from ambient air at room temperature; however, they are not yet available for residential application. Possibly, their use can be extended to aldehydes and ketones as well because these compounds

contain the carbonyl group present in carbon monoxide. These catalytic chemical air filters may prove useful in cleaning intake air in areas where ambient air quality standards are not met.

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