

Household cleaning products emit hazardous contaminants and may pose health risks

Cleaning products – A source of air pollutants!

A groundbreaking new study revealed that some household consumer cleaning agents, particularly those with pine, orange and lemon scents, may emit harmful levels of toxic air pollutants. Volatile organic compounds (VOCs) including ethylene-based glycol ethers and terpenes commonly found in household cleaning products and air fresheners can contaminate the air and cause minor ailments, such as irritations of the respiratory system, eyes and nose. Chronic exposure can lead to more serious problems, including asthma and nasal cancer. Exposure to these pollutants and their byproducts may exceed regulatory guidelines when used repeatedly or in small, poorly ventilated rooms, researchers at the University of California, Berkeley and Lawrence Berkeley National Laboratory concluded after a four-year study.

What are ethylene-based glycol ethers and terpenes?

ETHYLENE-BASED GLYCOL ETHERS, a category of VOCs, are common, water-soluble solvents used in a variety of cleaning agents, latex paints and other products. They are classified as hazardous air pollutants under the U.S. Environmental Protection Agency's 1990 Clean Air Act Amendments and as toxic air contaminants by California's Air Resources Board. Their toxicity varies with their chemical structure. Representative members of this category include ethylene glycol monobutyl ether (CAS no. 111-76-2), ethylene glycol monoethyl ether (CAS no. 110-80-5), ethylene glycol monoethyl ether acetate (CAS no. 111-15-9) and ethylene glycol monomethyl ether (CAS no. 109-86-4).

Current indoor air quality regulatory standards or guidelines for total VOC, ozone, and formaldehyde

Place	Regulation/Guideline	Total VOC ($\mu\text{g}/\text{m}^3$)	Ozone ($\mu\text{g}/\text{m}^3$)	Formaldehyde ($\mu\text{g}/\text{m}^3$)
Hong Kong, China	IAQ ^a Objective (Level 1) ^b IAQ Objective (Level 2) ^c	< 200 (8 hrs) < 600 (8 hrs)	< 50 (8 hrs) < 120 (8 hrs)	< 30 (8 hrs) < 100 (8 hrs)
China	GB/T 18883-2002	600 (8 hrs)	160 (1 hr)	100 (1 hr)
California, US	Office of Environmental Health Hazard Assessment	500 ^d	180 (1 hr)	94 (1 hr)
EU	WHO: Air Quality Guidelines for Europe	300 ^e	150-200 (1 hr) 100-120 (8 hrs)	100 (0.5 hr)
Japan	Indoor Concentration Level Guideline	400	N/A ^f	100

Note: US California Air Resources Board further provided recommended for individual compounds. Ethylene glycol monobutyl ether: 14000 $\mu\text{g}/\text{m}^3$ (1 hr); Ethylene glycol monoethyl ether: 370 $\mu\text{g}/\text{m}^3$ (6 hrs); Ethylene glycol monoethyl ether acetate: 140 $\mu\text{g}/\text{m}^3$ (6 hrs); Ethylene glycol monomethyl ether: 93 $\mu\text{g}/\text{m}^3$ (6 hrs).

^aIndoor air quality

^bLevel 1 represents very good indoor air quality that a high-class and comfortable building should have.

^cLevel 2 represents the indoor air quality that provides protection to the public at large including the very young and the aged.

^dState of Washington's requirement 1989

^eGuidelines for Ventilation Requirements in Building (CEC, 1992)

^fNot available

TERPENES are a class of chemicals derived from plant oils that are widely used in many consumer products either as solvents or to provide a distinctive pleasant, fruity scent. Although terpenes themselves are not considered toxic, some recent studies have shown that they may react with ozone in the air to create formaldehyde, which is a carcinogen. It has been also noted that ozone, a secondary pollutant, can enter the indoor environment from infiltration of outdoor air. Additionally, ozone is also produced indoors by some office machines such as copiers or printers, and by some devices marketed as "air purifiers" that purposely emit ozone into the indoor environment.



Please also refer to our SafeGuards 070/05 « Allergenic compounds now be listed on labelling » dated November 2005.

Practical Implication

While effective cleaning can improve the healthfulness of indoor environments, use of some consumer cleaning agents such as disinfectants, general-purpose degreasers, general-purpose cleaners, wood cleaners, furniture maintenance products, spot removers, multi-purpose solvents and air fresheners can yield high levels of VOCs. Persons involved in cleaning, especially those who clean occupationally or often, might encounter excessive exposures to these pollutants owing to cleaning product emissions. Repeated and prolonged exposure to VOCs in workplace or household would also pose a potential health threat. Mitigation options include effective screening of product ingredients and increased ventilation during and after cleaning. Preventive measure through regular and systematic inspection of indoor air quality helps to take any necessary actions and precautions prior to reaching alarming levels.

SGS anticipated the hazardous effects and is helping customers to test your products and workplace.

Armed with strong expertise and remarkable technical support,



SGS VOC COMPETENCE CENTRE can offer professional and comprehensive testing services not only for consumer cleaning agents but also for other VOC-emitting products. Examples include textile, footwear, electrical & electronic appliances, toys, furniture,

wooden products, aerosol products, paints, inks, and cosmetics. Indoor air quality monitoring services available from **ENVIRONMENTAL TESTING DEPARTMENT** can help clients comply with the requirements of the occupational safety regulations. This is achieved by survey, risk assessment, regular monitoring, sampling, record keeping, and regular reviews.



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