
Cleaning for School Health

Asthmagens in Institutional Cleaning Products

Asthma is a serious public health concern in the US, currently affecting 7.2 percent of the population.¹ Between 1980 and 1995, the percentage of children with asthma in the US more than doubled, rising from 3.6 percent in 1980 to 7.7 percent in 1995.² Although researchers are working to identify the causes of this increase, mounting evidence demonstrates a link between exposure to toxic cleaning products and asthma. Looking at cleaning products for potential asthma triggers, INFORM discovered that disinfectants and floor-care products commonly used in schools are asthmagens and rank among some of the most toxic products used in the cleaning industry.³

A study published in the *American Journal of Industrial Medicine* found that janitorial workers experience the highest rates of occupational asthma, twice the rate for other workers.⁴ Because industrial cleaners are widely used in public and private buildings, including schools and multifamily residences, children are exposed to these products daily. This causes concern because children are more vulnerable than adults to toxic exposure and the effects can have a long-term impact on children's developing bodies.^{5,6} Children take more breaths and breathe more deeply than adults, which make them more susceptible to airborne toxins.⁷ Recognizing the health and environmental impacts of toxic cleaners, many states, counties, and municipalities are replacing them with less-toxic products. INFORM has provided government agencies, public institutions, and private organizations across the country with technical information about "greener" cleaners.

What is asthma?

Asthma is a chronic condition the effects of which are reversible. During an asthmatic attack, the tissues become more inflamed and coated with mucous, narrowing the airways and making it difficult to breathe. Asthma sufferers experience symptoms such as coughing, wheezing, chest tightness, and difficulty breathing when stimuli inflame their airways. During a severe episode, asthma sufferers may need emergency treatment to restore normal breathing, and if not treated promptly and appropriately, a severe attack can result in death.⁸ In the US, slightly more than 4,000 asthma cases per year are fatal.⁹

How many people have asthma?

According to the National Center for Environmental Health, part of the Centers for Disease Control and Prevention, 20.3 million people had asthma in 2003.¹⁰ Furthermore, asthma is the most common and expensive chronic illness in the US, estimated to have cost \$14 billion in lost productivity and medical costs in 2002.¹¹

How common is asthma in children?

Current statistics show that 7.9 percent of children in the US have asthma.¹² It is the third-leading cause for hospitalization for children under the age of 15¹³ and the most common cause of school absenteeism.¹⁴

What causes asthma?

The causes of asthma are not completely understood, but genetics seem to be a factor.¹⁵ Exposure to asthmagens can cause an attack in a person with a predisposition to asthma, even if he or she did not have the disease prior to exposure.¹⁶ For a person with asthma, various triggers can cause an attack, including dust mites, mold, secondhand cigarette smoke, and cockroaches.¹⁷ Mounting evidence suggests that common interior architectural finishes, interior floor-care products, and cleaning products may be asthma triggers.^{18,19}

What evidence exists of a correlation between cleaning products and asthma?

Cleaning products are coming under scrutiny because janitorial workers experience the highest rates of occupational asthma, twice the rate for other workers.²⁰ In four states—California, Massachusetts, Michigan, and New Jersey—12 percent of work-related asthma cases were associated with exposure to cleaning products,²¹ and 80 percent of those were new onset cases.²² Additional research found that even short-term exposure to cleaning agents caused asthmatic attacks.²³ Occupational exposure to disinfectants was also found to be an important risk factor for developing asthma. The National Institute for Occupational Safety and Health (NIOSH) has initiated a major research effort to identify sources of work-related asthma, and it identified commercial cleaning products as being increasingly associated with asthma.²⁴

What cleaning products contain asthmagens?

There are too many to list here. However, existing material safety data sheets (MSDSs) for the products you already use or are considering for purchase will identify many cleaning product ingredients as being “respiratory irritants” or as “aggravating existing respiratory conditions.” MSDSs can be located online at <http://www.setonresourcecenter.com/MSDSs/comply1.htm>. Any product that warns about potential respiratory effects may exacerbate asthma.

The Commonwealth of Massachusetts’ specifications for environmentally preferable cleaning products identify the following ingredients as asthma-causing agents²⁵:

- Monoethanolamine (CAS 141-43-5)
- Tall oil or rosin (CAS 8002-26-4)
- Chlorhexidine (CAS 55-56-1)
- Ammonium quaternary disinfectants (not limited to the following CAS numbers: 8001-54-5, 121-54-0, 122-18-9, 8044-71-1, 124-03-5, 122-19-0)

Are all building occupants really exposed to these chemicals, or just janitors?

Cleaning products affect interior air quality wherever they are used. All building occupants are potentially exposed to the toxic emissions from cleaning, disinfectant, and floor-care products.²⁶

Can I simply specify that all products should be free of asthmagens?

No. Unfortunately, for some applications, the safest available products that meet performance expectations still contain asthmagens. For example, Haz-Map, an occupational health information database provided by the National Library of Medicine’s Specialized Information Services Division, lists monoethanolamine (MEA), a common solvent used in floor strippers, as being associated with asthma. However, MEA is considered a preferable replacement for aqueous ammonia, which can cause acute respiratory irritation. Although MEA does not have the strong smell of ammonia, it too can cause respiratory irritation and dizziness or migraines.²⁷ (For a comprehensive explanation of floor finishes and strippers, see Green Seal’s *Choose Green Report: “Floor-Care Products: Finishes & Strippers.”*)

You can request that vendors disclose the asthmagens contained in the products they use or offer. For example, Massachusetts asked contractors to disclose the presence of several known asthmagens in their cleaning products.²⁸ Of the seven vendors used, four claimed that the product lines they supplied to the state contained none of the asthmagens listed above.

- The Clean Environment Company, Inc.
- ECOgent Environmental Solutions, Ltd. (<http://www.ecogent.ca/index1.htm>)
- EnvirOx, LLC (<http://www.h2orange2.com>)
- Cleanline Products, Inc. (<http://www.cleanlineproducts.com>)

Two other vendors said that the majority of their product lines had none of the listed asthmagens, even though their disinfectants did contain asthmagens identified in the Massachusetts specification.

- Boston Chemical/M.D. Stetson Company, Inc. (<http://www.mdstetson.com>)

- Rochester Midland EnviroCare (<http://www.rochestermidland.com/>)

The seventh vendor, Ramsey Company, identified one product line that may contain asthmagens and a second that contains MEA.

What actions should I take when ordering and handling these products?

In your purchasing specifications, require disclosure of asthmagens so that custodial staff can be alerted to the presence of respiratory irritants and handle these products accordingly. Create a clear protocol describing the potential health effects of these products and their proper usage, handling, storage, and disposal. Educate custodial staff about the proper protocol and about the dangers associated with mishandling toxic chemicals.

Do asthmagen-free environmentally preferable cleaners perform as well as conventional cleaners?

Yes. With proper training, janitorial staff can easily learn to use environmentally preferable products, and case studies demonstrate the efficacy of these products.²⁹

Are asthmagen-free environmentally preferable cleaners cost effective when compared with conventional cleaning products?

When used properly, these products are cost effective, particularly if lifecycle costs are factored in. Nontoxic products cost less to store and dispose of; they also reduce absenteeism for staff and students alike.³⁰

What about areas that must be disinfected?

When disinfection is required, use the least toxic disinfectant available, and then *only* in areas where it is necessary. Disinfectants should not be used as cleaners; clean areas that are to be disinfected with a “general” cleaner, unless the disinfectant is identified as effective on dirty surfaces.

Because the most common disinfectants are respiratory irritants, follow your protocol established for dealing with toxic chemicals. (For more information, see INFORM fact sheet “General Guideline for Healthier Cleaning.”)

How do I choose and specify the safest products available for the application?

There are several sources you can consult for information.

- INFORM's report *Cleaning for Health: Products and Practices for a Safer Indoor Environment* is available free on INFORM's website at <http://www.informinc.org/cleanforhealth.php>.
- INFORM worked with the Commonwealth of Massachusetts to develop a request for proposal (RFP) for environmentally preferable cleaners. You can access the Massachusetts RFP at <http://www.newdream.org/procure/products/MassRFP.pdf>.
- Center for a New American Dream maintains a current list of environmentally preferable cleaning products that meet the standards of the Massachusetts RFP at <http://www.newdream.org/procure/products/approved.php>.
- Green Seal has developed a certification system for institutional cleaning products in a number of categories, and it publishes reports that contain pertinent information about the ingredients used in many types of cleaning products and about the environmental and human health impacts of these products. These can be accessed at <http://www.greenseal.org/>.
- The distributor from whom you currently order can probably supply you with environmentally preferable products. Speak to your sales representative about which products or product lines are offered, and ask him or her to assist you in finding the products that suit the needs of your facilities.

What other resources provide guidance about environmentally preferable cleaners?

You can consult a number of resources, including:

- INFORM's *Cleaning for Health* guide: <http://www.informinc.org/cleanforhealth.php>
- American Lung Association: <http://www.lungusa.org/>

- The Ashkin Group, LLC: <http://www.ashkingroup.com>
- Asthma and Allergy Foundation of America: <http://www.aafa.org/>
- Building Green: <http://www.buildinggreen.com/>
- Center for a New American Dream: <http://www.newdream.org/clean/>
- Deirdre Imus Environmental Center for Pediatric Oncology: <http://www.dienviro.com/index.aspx>
- US Environmental Protection Agency: <http://www.epa.gov/>
- Green Seal: <http://www.greenseal.org>
- Hospitals for a Healthy Environment, "Green Cleaners and Other Environmental Service Products": http://www.h2e-online.org/tools/grnpurch/prod_cleaners.htm
- National Center for Environmental Health: <http://www.cdc.gov/nceh/>
- Tools for Schools: <http://www.hse.gov.uk/pubns/indg95.pdf>

¹ Centers for Disease Control and Prevention, National Center for Health Statistics, "National Health Interview Survey," September 2004, pp. 76–84, available at http://www.cdc.gov/nchs/data/nhis/earlyrelease/200409_15.pdf. (Also see, "Fast Stats A to Z: Asthma," available at <http://www.cdc.gov/nchs/faststats/asthma.htm>.)

² US Environmental Protection Agency, "America's Children and the Environment," June 11, 2004, available at <http://www.epa.gov/envirohealth/children/findings/index.htm>.

³ US Environmental Protection Agency, "Safe Substitutes at Home: Non-Toxic Household Products," fact sheet, November 13, 1995, available at <http://es.epa.gov/techinfo/facts/safe-fs.html>.

⁴ F. Reinisch, R. J. Harrison, S. Cussler, et al., "Physician Reports of Work-Related Asthma in California, 1993–1996," *American Journal of Industrial Medicine* 39, 1 (January 2001): 72–83.

⁵ P. J. Landrigan, "Children as a Vulnerable Population," *International Journal of Occupation, Medicine, and Environmental Health* 17, 1 (2004): 175–77.

⁶ L. R. Goldman, "Children—Unique and Vulnerable: Environmental Risks Facing Children and Recommendations for Response," *Environmental Health Perspectives* 103, Supplement 6 (September 1995): 13–18.

⁷ US Environmental Protection Agency, "Children's Health: Childhood Asthma Is Increasing," June 10, 2004, available at http://www.epa.gov/region6/6xa/child_health_asthma.htm.

⁸ American Lung Association, "Asthma in Adults," fact sheet, June 2004, available at <http://www.lungusa.org/site/apps/s/content.asp?c=dvLUK9O0E&b=34706&ct=67470>.

⁹ Centers for Disease Control and Prevention, "National Health Interview Survey," pp. 76–84. (Also see, "Fast Stats A to Z: Asthma," available at <http://www.cdc.gov/nchs/faststats/asthma.htm>.)

¹⁰ Ibid.

¹¹ US Environmental Protection Agency, Office of Air and Radiation, "Asthma Facts," EPA-402-F-04-019, May 2005, available at http://www.epa.gov/asthma/pdfs/asthma_fact_sheet_en.pdf.

¹² Centers for Disease Control and Prevention, "National Health Interview Survey," pp. 76–84. (Also see, "Fast Stats A to Z: Asthma," available at <http://www.cdc.gov/nchs/faststats/asthma.htm>.)

¹³ Ibid.

¹⁴ Asthma and Allergy Foundation of America (AAFA), "Asthma Facts and Figures," no date, available at <http://www.aafa.org/display.cfm?id=8&sub=42>.

¹⁵ US Environmental Protection Agency, "Safe Substitutes at Home: Non-Toxic Household Products."

¹⁶ G. D. Leikauf, "Hazardous Air Pollutants and Asthma," *Environmental Health Perspectives* 110, Supplement 4 (August 2002): 505–26, available at <http://ehp.niehs.nih.gov/members/2002/suppl-4/505-526leikauf/leikauf-full.html>.

¹⁷ US Environmental Protection Agency, "Indoor Environmental Asthma Triggers," April 5, 2005, available at <http://www.epa.gov/asthma/triggers.html>.

¹⁸ US Environmental Protection Agency, "Indoor Environmental Asthma Triggers."

¹⁹ E. L. Petsonk, "Work-Related Asthma and Implications for the General Public," *Environmental Health Perspectives* 110, Supplement 4 (August 2002): 569–72, available at <http://ehp.niehs.nih.gov/members/2002/suppl-4/569-572petsonk/petsonk-full.html>.

²⁰ F. Reinisch, et al., "Physician Reports of Work-Related Asthma in California."

²¹ K. D. Rosenman, M. J. Reilly, D. P. Schill, et al., "Cleaning Products and Work-Related Asthma," *Journal of Occupational and Environmental Medicine* 45, 5 (May 2003): 556–63.

²² Ibid.

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- ²³ C. E. Mapp, V. Pozzato, V. Pavoni, and G. Gritti, "Severe Asthma and ARDS Triggered by Acute Short-Term Exposure to Commonly Used Cleaning Detergents," *European Respiratory Journal* 16, 3 (September 2000): 570–72.
- ²⁴ E. L. Petsonk, "Work-Related Asthma and Implications for the General Public."
- ²⁵ Commonwealth of Massachusetts, Environmentally Preferable Products Procurement Program, "Product Information: Cleaning Products, Environmentally Preferable," no date, available at <http://www.mass.gov/epp/products/cleaning.htm>.
- ²⁶ K. Skyberg, K. R. Skulberg, W. Eduard, E. Skaret, F. Levy, and H. Kjuus, "Symptoms Prevalence among Office Employees and Associations to Building Characteristics," *Indoor Air* 13, 3 (September 2003): 246–52.
- ²⁷ K. Davis and M. Swanson, "Floor-Care Products: Finishes & Strippers," *Green Seal's Choose Green Report*, June 2004, available at http://www.greenseal.org/recommendations/CGR_floorcare.pdf.
- ²⁸ M. Deegler, "Operational Services Division Update: New Contract Award, Contract #GRO16, Cleaning Products, Environmentally Preferable," August 2003.
- ²⁹ US Environmental Protection Agency, "Environmentally Preferably Purchasing: Green Cleaning Resources," November 28, 2005, available at <http://www.epa.gov/epp/pubs/cleanresources.htm>.
- ³⁰ Center for a New American Dream, "Cleaning Products and Services: Price and Performance Issues," no date, available at <http://www.newdream.org/procure/products/cleanprice.php>.