

Inhalants

Inhalants are a diverse group of volatile substances whose chemical vapors can be inhaled to produce psychoactive (mind-altering) effects. While other abused substances can be inhaled, the term “inhalants” is used to describe substances that are rarely, if ever, taken by any other route of administration. A variety of products common in the home and workplace contain substances that can be inhaled to get high; however, people do not typically think of these products (e.g., spray paints, glues, and cleaning fluids) as drugs because they were never intended to induce intoxicating effects. Yet young children and adolescents can easily obtain these extremely toxic substances and are among those most likely to abuse them. In fact, more 8th-graders have tried inhalants than any other illicit drug.¹

What Types of Products Are Abused as Inhalants?

Inhalants generally fall into the following categories:

Volatile solvents—liquids that vaporize at room temperature

- *Industrial or household products*, including paint thinners or removers, degreasers, dry-cleaning fluids, gasoline, and lighter fluid
- *Art or office supply solvents*, including correction fluids, felt-tip marker fluid, electronic contact cleaners, and glue

Aerosols—sprays that contain propellants and solvents

- *Household aerosol propellants* in items such as spray paints, hair or deodorant sprays, fabric protector sprays, aerosol computer cleaning products, and vegetable oil sprays

Gases—found in household or commercial products and used as medical anesthetics

- *Household or commercial products*, including butane lighters and propane tanks, whipped cream aerosols or dispensers (whippets), and refrigerant gases
- *Medical anesthetics*, such as ether, chloroform, halothane, and nitrous oxide (“laughing gas”)

Nitrites—a special class of inhalants that are used primarily as sexual enhancers

- *Organic nitrites* are volatiles that include cyclohexyl, butyl, and amyl nitrites, commonly known as “poppers.” Amyl nitrite is still used in certain diagnostic medical procedures. When marketed for illicit use, organic nitrites are often sold in small brown bottles labeled as “video head cleaner,” “room odorizer,” “leather cleaner,” or “liquid aroma.”

These various products contain a wide range of chemicals such as—

- toluene (spray paints, rubber cement, gasoline),

- chlorinated hydrocarbons (dry-cleaning chemicals, correction fluids),
- hexane (glues, gasoline),
- benzene (gasoline),
- methylene chloride (varnish removers, paint thinners),
- butane (cigarette lighter refills, air fresheners), and
- nitrous oxide (whipped cream dispensers, gas cylinders).

Adolescents tend to abuse different products at different ages.² Among new users ages 12–15, the most commonly abused inhalants are glue, shoe polish, spray paints, gasoline, and lighter fluid. Among new users age 16 or 17, the most commonly abused products are nitrous oxide or whippets. Nitrites are the class of inhalants most commonly abused by adults.³

How Are Inhalants Abused?

Inhalants can be breathed in through the nose or mouth in a variety of ways (known as “huffing”), such as sniffing or snorting fumes from a container, spraying aerosols directly into the nose or mouth, or placing an inhalant-soaked rag in the mouth. Users may also inhale fumes from a balloon or a plastic or paper bag that contains an inhalant.

The intoxication produced by inhalants usually lasts just a few minutes; therefore, users often try to extend the “high” by continuing to inhale repeatedly over several hours.

How Do Inhalants Affect the Brain?

The effects of inhalants are similar to those of alcohol, including slurred speech, lack of coordination, euphoria, and dizziness. Inhalant abusers may also experience lightheadedness, hallucinations, and delusions. With repeated inhalations, many users feel less inhibited and less in control. Some may feel drowsy for several hours and experience a lingering headache. Chemicals found in different types of inhaled products may produce a variety of additional effects, such as confusion, nausea, or vomiting.

By displacing air in the lungs, inhalants deprive the body of oxygen, a condition known as hypoxia. Hypoxia can damage cells throughout the body, but the cells of the brain are especially sensitive to it. The symptoms of brain hypoxia vary according to which regions of the brain are affected: for example, the hippocampus helps control memory, so someone who repeatedly uses inhalants may lose the ability to learn new things or may have a hard time carrying on simple conversations.

Long-term inhalant abuse can also break down myelin, a fatty tissue that surrounds and protects some nerve fibers. Myelin helps nerve fibers carry their messages quickly and efficiently, and when damaged, can lead to muscle spasms and tremors or even permanent difficulty with basic actions such as walking, bending, and talking.

Although not very common, addiction to inhalants can occur with repeated abuse. According to the 2006 Treatment Episode Data Set, inhalants were reported as the *primary* substance abused by less than 0.1 percent of all individuals admitted to substance abuse treatment.⁴ However, of those individuals who reported inhalants as their primary, secondary, or tertiary drug of abuse, nearly half were adolescents aged 12 to 17. This age group represents only 8 percent of total admissions to treatment.⁵

What Other Adverse Effects Do Inhalants Have on Health?

Lethal Effects

Sniffing highly concentrated amounts of the chemicals in solvents or aerosol sprays can directly induce heart failure and death within minutes of a session of repeated inhalation. This syndrome, known as “sudden sniffing death,” can result from a single session of inhalant use by an otherwise healthy young person. Sudden sniffing death is particularly associated with the abuse of butane, propane, and chemicals in aerosols.

High concentrations of inhalants may also cause death from suffocation by displacing oxygen in the lungs, causing the user to lose consciousness and stop breathing. Deliberately inhaling from a paper or plastic bag or in a closed area greatly increases the chances of suffocation. Even when using aerosols or volatile products for their legitimate purposes (i.e., painting, cleaning), it is

wise to do so in a well-ventilated room or outdoors.

Harmful Irreversible Effects

- Hearing loss—spray paints, glues, dewaxers, dry-cleaning chemicals, correction fluids
- Peripheral neuropathies or limb spasms—glues, gasoline, whipped cream dispensers, gas cylinders
- Central nervous system or brain damage—spray paints, glues, dewaxers
- Bone marrow damage—gasoline

Serious but Potentially Reversible Effects

- Liver and kidney damage—correction fluids, dry-cleaning fluids
- Blood oxygen depletion—varnish removers, paint thinners

HIV/AIDS, Hepatitis, and Other Infectious Diseases

Because nitrites are abused to enhance sexual pleasure and performance, they can be associated with unsafe sexual practices that greatly increase the risk of contracting and spreading infectious diseases such as HIV/AIDS and hepatitis.

How Widespread Is Inhalant Abuse?

Monitoring the Future Survey[†]

According to the Monitoring the Future survey, more 8th-graders (15.7 percent) have tried inhalants in their lifetime than any other illicit drug, including marijuana. Lifetime use (use at least

once during a respondent's lifetime) of inhalants was reported by 15.7 percent of 8th-graders, 12.8 percent of 10th-graders, and 9.9 percent of 12th-graders in 2008; 4.1 percent of 8th-graders, 2.1 percent of 10th-graders, and 1.4 percent of 12th-graders were current users of inhalants (had used at least once during the 30 days preceding response to the survey).

The perception of harm associated with trying inhalants once or twice is at its lowest level among 8th-graders—in 2008, 34 percent of 8th-graders perceived harm, compared to 46 percent in 2001. This change in attitude could signal a subsequent increase in use, an outcome that would be of great concern.

National Survey on Drug Use and Health (NSDUH)^{††}

Data from the National Survey on Drug Use and Health show that the

primary abusers of most inhalants are adolescents ages 12 to 17. In 2007, 3.9 percent of adolescents reported using inhalants in the past year. Among young adults aged 18 to 25, past-year use of inhalants decreased from 1.8 percent in 2006 to 1.6 percent in 2007. Of the 775,000 persons aged 12 or older who tried inhalants for the first time within the previous year, 66.3 percent were under age 18 when they first used.

Other Information Sources

For additional information on inhalants, please refer to NIDA's inhalant-specific Web site: **www.inhalants.drugabuse.gov**.

For a list of street terms used to refer to inhalants and other drugs, visit **www.whitehousedrugpolicy.gov/streetterms/default.asp**.

Data Sources

† These data are from the 2008 Monitoring the Future survey, funded by the National Institute on Drug Abuse, National Institutes of Health, Department of Health and Human Services, and conducted annually by the University of Michigan's Institute for Social Research. The survey has tracked 12th-graders' illicit drug use and related attitudes since 1975; in 1991, 8th- and 10th-graders were added to the study. The latest data are online at www.drugabuse.gov.

†† NSDUH (formerly known as the National Household Survey on Drug Abuse) is an annual survey of Americans age 12 and older conducted by the Substance Abuse and Mental Health Services Administration. Copies of the latest survey are available at www.samhsa.gov and from the National Clearinghouse for Alcohol and Drug Information at 800-729-6686.

References

¹ Institute for Social Research. *Monitoring the Future, 2008* (Study Results). Ann Arbor, MI: University of Michigan, 2008. Data retrieved 12/11/2008 from <http://www.monitoringthefuture.org>.

² Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *The NSDUH Report: Inhalant Use Across the Adolescent Years*. Available at: <http://www.oas.samhsa.gov/2k8/inhalants/inhalants.cfm>. Accessed April 22, 2008.

³ Wu LT, Schlenger WE, and Ringwalt CL. Use of nitrite inhalants ("poppers") among American youth. *J Adolesc Health* 37:52-60, 2005.

⁴ Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *Treatment Episode Data Set (TEDS). Highlights—2006*. National Admissions to Substance Abuse Treatment Services, DASIS Series S-40, DHHS Publication No. (SMA) 08-4313, Rockville, MD, 2008.

⁵ Substance Abuse and Mental Health Services Administration, Office of Applied Studies. (March 13, 2008). *The DASIS Report—Adolescent Admissions Reporting Inhalants: 2006*. Available at: <http://www.oas.samhsa.gov/2k8/inhalantsTX/inhalantsTX.htm>. Accessed April 22, 2008.