

## 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.

### 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.<sup>1</sup> 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.<sup>2</sup>

## 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 2007 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.<sup>3</sup>

## 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<sup>†</sup>***

According to the Monitoring the Future survey, a significant increase in past-month inhalant use was measured among 10th-graders from 2008 to 2009; prevalence of use rose from 2.1 percent to 2.2 percent among that population. Other prevalence measures remained stable. Lifetime<sup>††</sup> use of inhalants was reported by 14.9 percent of 8th-graders, 12.3 percent of 10th-graders, and 9.5 percent of 12th-graders in 2009; 8.1 percent of 8th-graders, 6.1 percent of 10th-graders, and 3.4 percent of 12th-graders reported use in the past year. However, investigators are concerned that perceived risk associated with inhalant use has been in decline for several years, which may leave young people open to renewed interest.

### ***National Survey on Drug Use and Health (NSDUH)<sup>†††</sup>***

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 2008, 1.1 percent reported using inhalants in the past month. From 2002 to 2008, there were declines in past-month inhalant use among young adults aged 18 to 25 (from 0.5 percent to 0.3 percent). Of the 729,000 persons aged 12 or older who tried inhalants for the first time within the previous year, approximately 67 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](http://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](http://www.whitehousedrugpolicy.gov/streetterms/default.asp).

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### Data Sources

<sup>†</sup> These data are from the 2009 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 on line at [www.drugabuse.gov](http://www.drugabuse.gov).

<sup>††</sup> "Lifetime" refers to use at least once during a respondent's lifetime. "Past year" refers to use at least once during the year preceding an individual's response to the survey. "Past month" refers to use at least once during the 30 days preceding an individual's response to the survey.

<sup>†††</sup> NSDUH (formerly known as the National Household Survey on Drug Abuse) is an annual survey of Americans aged 12 and older conducted by the Substance Abuse and Mental Health Services Administration, Department of Health and Human Services. This survey is available on line at [www.samhsa.gov](http://www.samhsa.gov) and can be ordered by phone from NIDA at 877-643-2644.

### References

<sup>1</sup> Substance Abuse and Mental Health Services Administration, Office of Applied Studies, Department of Health and Human Services. *The NSDUH Report: Inhalant Use Across the Adolescent Years*. Available at: <http://www.oas.samhsa.gov/2k8/inhalants/inhalants.cfm>. Accessed April 22, 2008.

<sup>2</sup> Wu LT, Schlenger WE, and Ringwalt CL. Use of nitrite inhalants ("poppers") among American youth. *J Adolesc Health* 37:52-60, 2005.

<sup>3</sup> Substance Abuse and Mental Health Services Administration, Office of Applied Studies, Department of Health and Human Services. *Treatment Episode Data Set (TEDS). Highlights—2007*. National Admissions to Substance Abuse Treatment Services, DASIS Series: S-45, DHHS Publication No. (SMA) 09-4360, Rockville, MD, 2009.