



# PUBLIC HEALTH STATEMENT

## Acrylamide

---

**Division of Toxicology and Environmental Medicine**

**September 2009**

---

This Public Health Statement is the summary chapter from the Toxicological Profile for Acrylamide. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs™, is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-800-232-4636.

---

This public health statement tells you about acrylamide and the effects of exposure to it.

The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. Acrylamide has been found in at least 3 of the 1,699 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the possibility exists that the number of sites at which acrylamide is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to this substance may be harmful.

When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact.

If you are exposed to acrylamide, many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

---

**DEPARTMENT of HEALTH AND HUMAN SERVICES, Public Health Service**  
**Agency for Toxic Substances and Disease Registry**

**[www.atsdr.cdc.gov/](http://www.atsdr.cdc.gov/) Telephone: 1-800-232-4636 Fax: 770-488-4178 E-Mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)**



# PUBLIC HEALTH STATEMENT

## Acrylamide

Division of Toxicology and Environmental Medicine

September 2009

### 1.1 WHAT IS ACRYLAMIDE?

<b>White or colorless, odorless crystalline solid</b>	Acrylamide can violently react when melting. When heated, acrid fumes may be released.
<b>Used in industry</b>	Acrylamide is used to make polyacrylamide, which is mainly used in treating effluent from water treatment plants and industrial processes.

### 1.2 WHAT HAPPENS TO ACRYLAMIDE WHEN IT ENTERS THE ENVIRONMENT?

<b>Most commonly found in water</b>	Acrylamide may enter drinking water if polyacrylamide is used in the treatment process. It can be found in soils, but is rarely found in air.
<b>Rapidly broken down in soil and water</b>	If acrylamide enters soil or water, it will be broken down quickly by bacteria.

### 1.3 HOW MIGHT I BE EXPOSED TO ACRYLAMIDE?

<b>Water and soil</b>	Drinking water can sometimes contain acrylamide. It can enter drinking water from the treatment process of municipal supplies as well as from substances used to construct dams and wells. Acrylamide breaks down quickly in water and soil, but there is still a chance of exposure if you live near a plastics or dye plants.
<b>Inhalation and dermal contact</b>	If you smoke, or breathe second-hand tobacco smoke, you might be exposed to acrylamide. Tobacco smoke is a major source of acrylamide exposure within the general population. People involved in the production or use of acrylamide and acrylamide-containing products are exposed if they breathe in air that contains acrylamide. They may also be exposed by coming into skin contact with acrylamide.

DEPARTMENT of HEALTH AND HUMAN SERVICES, Public Health Service  
Agency for Toxic Substances and Disease Registry



# PUBLIC HEALTH STATEMENT

## Acrylamide

Division of Toxicology and Environmental Medicine

September 2009

<b>Food</b>	Acrylamide is formed in foods that are rich in carbohydrates (particularly potatoes) when they are fried, grilled, or baked at normal cooking temperatures. Levels of acrylamide in these foods increase with higher temperatures and longer cooking times. Protein-based foods (such as meats) probably contain low amounts of acrylamide. Ingestion of foods that contain acrylamide is a primary source of exposure.
-------------	---

### 1.4 HOW CAN ACRYLAMIDE ENTER AND LEAVE MY BODY?

<b>May enter your body through food, drinking water, breathing, and skin contact</b>	Acrylamide can enter your body when you eat foods containing acrylamide. Drinking water that contains acrylamide will have a similar effect. Breathing tobacco smoke may cause some level of acrylamide to enter your lungs. Acrylamide can also enter your body if it comes in contact with your skin. Dermal contact with acrylamide can occur if you work in the manufacture of acrylamide or polyacrylamide gels.
<b>Leaves through bodily fluids</b>	Once in your body, acrylamide enters your body fluids. Acrylamide and its breakdown products leave your body mostly through urine; small amounts may leave through feces, exhaled air, and breast milk.

### 1.5 HOW CAN ACRYLAMIDE AFFECT MY HEALTH?

This section looks at studies concerning potential health effects in animal and human studies.

<b>Nervous system effects</b>	Nervous system effects such as muscle weakness, numbness in hands and feet, sweating, unsteadiness, and clumsiness were reported in some acrylamide workers. However, most people are not exposed to acrylamide levels high enough to cause these effects.
<b>Reproductive effects</b>	Acrylamide reduces the ability of male animals to produce offspring and could cause similar effects in humans, but not likely at exposure levels experienced by most people.
<b>Cancer</b>	Acrylamide has caused several types of cancer in animals. We do not know whether acrylamide causes cancer in humans.

DEPARTMENT of HEALTH AND HUMAN SERVICES, Public Health Service  
Agency for Toxic Substances and Disease Registry



# PUBLIC HEALTH STATEMENT

## Acrylamide

Division of Toxicology and Environmental Medicine

September 2009

### 1.6 HOW CAN ACRYLAMIDE AFFECT CHILDREN?

This section discusses potential health effects in humans from exposures during the period from conception to maturity at 18 years of age.

<b>Effects in children</b>	Acrylamide is expected to affect children in the same manner as adults. It is not known whether children are more susceptible than adults to the effects of acrylamide.
<b>Developmental effects</b>	Effects such as decreased body weight, decreased startle responses, and decreased levels of some chemicals involved in transmission of brain signals were seen in some animals exposed to acrylamide before or shortly following birth. There are no reports of acrylamide causing developmental effects in humans.

### 1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO ACRYLAMIDE?

<b>Limit exposure to tobacco and second-hand smoke</b>	Tobacco smoke contains acrylamide. Avoid smoking or breathing in second-hand smoke.
<b>Reduce consumption of foods that contain acrylamide</b>	Avoid eating a lot of carbohydrate-rich foods that are cooked at high temperatures (e.g., French fries). Foods with higher protein content appear to have lower amounts of acrylamide. Avoid overcooking foods.

### 1.8 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO ACRYLAMIDE?

<b>Can be measured in blood and urine</b>	Acrylamide and its breakdown products can be measured in blood and urine. These measurements may be useful in estimating how much acrylamide has entered the body.
---	--

DEPARTMENT of HEALTH AND HUMAN SERVICES, Public Health Service  
Agency for Toxic Substances and Disease Registry



# PUBLIC HEALTH STATEMENT

## Acrylamide

Division of Toxicology and Environmental Medicine

September 2009

### 1.9 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government develops regulations and recommendations to protect public health. Regulations can be enforced by law. The EPA, the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) are some federal agencies that develop regulations for toxic substances. Recommendations provide valuable guidelines to protect public health, but cannot be enforced by law. The Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH) are two federal organizations that develop recommendations for toxic substances.

Regulations and recommendations can be expressed as “not-to-exceed” levels. These are levels of a toxic substance in air, water, soil, or food that do not exceed a critical value. This critical value is usually based on levels that affect animals; they are then adjusted to levels that will help protect humans. Sometimes these not-to-exceed levels differ among federal organizations because they used different exposure times (an 8-hour workday or a 24-hour day), different animal studies, or other factors.

Recommendations and regulations are also updated periodically as more information becomes available. For the most current information, check with the federal agency or organization that provides it.

Some regulations and recommendations for acrylamide include the following:

<b>Levels in drinking water set by EPA</b>	The EPA has determined that exposure to acrylamide in drinking water at concentrations of 1.5 mg/L for one day or 0.3 mg/L for 10 days is not expected to cause any adverse effects in a child.
<b>Levels in workplace air set by OSHA</b>	OSHA set a legal limit of 0.3 mg/m <sup>3</sup> for acrylamide in air averaged over an 8-hour work day.

DEPARTMENT of HEALTH AND HUMAN SERVICES, Public Health Service  
Agency for Toxic Substances and Disease Registry

[www.atsdr.cdc.gov/](http://www.atsdr.cdc.gov/) Telephone: 1-800-232-4636 Fax: 770-488-4178 E-Mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)



# PUBLIC HEALTH STATEMENT

## Acrylamide

Division of Toxicology and Environmental Medicine

September 2009

### 1.10 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns, please contact your community or state health or environmental quality department, or contact ATSDR at the address and phone number below.

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses that result from exposure to hazardous substances.

Toxicological profiles are also available on-line at [www.atsdr.cdc.gov](http://www.atsdr.cdc.gov) and on CD-ROM. You may request a copy of the ATSDR ToxProfiles™ CD-ROM by calling the toll-free information and technical assistance number at 1-800-CDCINFO (1-800-232-4636), by e-mail at [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov), or by writing to:

Agency for Toxic Substances and Disease Registry  
Division of Toxicology and Environmental Medicine  
1600 Clifton Road NE  
Mailstop F-62  
Atlanta, GA 30333  
Fax: 1-770-488-4178

Organizations for-profit may request copies of final Toxicological Profiles from the following:

National Technical Information Service (NTIS)  
5285 Port Royal Road  
Springfield, VA 22161  
Phone: 1-800-553-6847 or 1-703-605-6000  
Web site: <http://www.ntis.gov/>

---

DEPARTMENT of HEALTH AND HUMAN SERVICES, Public Health Service  
Agency for Toxic Substances and Disease Registry

[www.atsdr.cdc.gov/](http://www.atsdr.cdc.gov/) Telephone: 1-800-232-4636 Fax: 770-488-4178 E-Mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)