

This fact sheet answers the most frequently asked health questions (FAQs) about 4,4'-methylenedianiline. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information 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.

**HIGHLIGHTS:** Exposure to 4,4'-methylenedianiline occurs mainly in the workplace. Liver damage and skin irritation may occur from exposure to high levels of 4,4'-methylenedianiline. This chemical has been found in none of the 1,445 National Priorities List sites identified by the Environmental Protection Agency (EPA).

## What is 4,4'-methylenedianiline?

(Pronounced məth'əl-ēn' dī ān'əlēn)

4,4'-Methylenedianiline is an industrial chemical that is not known to occur naturally. It is also commonly known as diaminodiphenylmethane or MDA. It occurs as a colorless to pale yellow solid and has a faint odor.

4,4'-Methylenedianiline is used mainly for making polyurethane foams, which have a variety of uses, such as insulating materials in mailing containers. It is also used for making coating materials, glues, Spandex® fiber, dyes, and rubber.

## What happens to 4,4'-methylenedianiline when it enters the environment?

- 4,4'-Methylenedianiline is found in tiny particles in air which will settle to land or water in rain or snow.
- Most of the 4,4'-methylenedianiline in water will attach itself to particles and sink to the bottom sediment.
- 4,4'-Methylenedianiline in water or sediment will be broken down by bacteria and other microorganisms.
- It does not build up in the food chain.

- 4,4'-Methylenedianiline becomes strongly attached to soil and will not easily move into groundwater.
- It may take as long as 10 days for bacteria and microorganisms in soil to break down 4,4'-methylenedianiline.

## How might I be exposed to 4,4'-methylenedianiline?

- Working in an industry that makes or uses 4,4'-methylenedianiline.
- Touching consumer goods such as polyurethane foams that contain it.
- Living near a hazardous waste site where 4,4'-methylenedianiline is disposed of.
- Being treated by a kidney dialysis machine. Tiny amounts are released from the polyurethane parts of the machine when it is sterilized by radiation or heat.

## How can 4,4'-methylenedianiline affect my health?

Limited information is available on the effects of 4,4'-methylenedianiline on people's health. The available

ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

information shows that it can cause skin irritation and liver damage. People who accidentally ate bread baked from flour contaminated with 4,4'-methylenedianiline became ill with a flu-like condition, consisting of stomach and chest pains. They also exhibited jaundice, a yellowish coloring of the skin or internal organs caused by abnormal functioning of the liver.

Animals that breathed very high levels of 4,4'-methylenedianiline showed eye damage, while animals that ate food or drank water with moderate amounts of 4,4'-methylenedianiline for months or years had liver damage and thyroid gland injuries. Exposure of the skin to high levels of the chemical also resulted in liver damage in animals.

It is not known whether 4,4'-methylenedianiline can affect the development of the fetus or the ability to fight disease in people or animals.

### How likely is 4,4'-methylenedianiline to cause cancer?

The International Agency for Research on Cancer has determined that 4,4'-methylenedianiline is possibly carcinogenic to humans.

A study on people exposed to bread contaminated with 4,4'-methylenedianiline did not show an increased risk of cancer. An animal study showed cancer of the liver and thyroid after animals drank water over their lifetimes containing 4,4'-methylenedianiline.

### Is there a medical test to show whether I've been exposed to 4,4'-methylenedianiline?

4,4'-Methylenedianiline can be measured in your urine to see if you have been recently exposed to the chemical. These tests can show you were exposed to 4,4'-methylenedianiline,

but cannot predict the kind of health effects that might occur. These tests are not routinely available in doctor's offices and hospitals because they require special equipment.

### Has the federal government made recommendations to protect human health?

The EPA requires that spills or accidental releases into the environment of 1 pound or more of 4,4'-methylenedianiline be reported to the EPA.

The Occupational Safety and Health Administration has set an occupational exposure limit of 0.081 milligrams of methylenedianiline per cubic meter of air (0.081 mg/m<sup>3</sup>) for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health recommends that workers should not breathe air containing more than 0.03 mg/m<sup>3</sup> of 4,4'-methylenedianiline during a 10-hour workday, 40-hour workweek.

### Glossary

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Toxicological profile for methylenedianiline. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

