

1. PUBLIC HEALTH STATEMENT

This public health statement tells you about diazinon 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. Diazinon has been found in at least 25 of the 1,678 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 diazinon 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 harm you.

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 diazinon, 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.

1.1 WHAT IS DIAZINON?

Diazinon is the common name of an organophosphorus insecticide used to control pest insects in soil, on ornamental plants, and on fruit and vegetable field crops. It was formerly used as the active ingredient in household and garden products manufactured to control household pests such as flies, fleas, and cockroaches. This chemical is synthetic and does not occur naturally in the environment. Diazinon is sold under common trade names including Alfatox, Basudin, AG 500, Dazzel, Gardentox, and Knoxout.

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The pure chemical (100% diazinon) is a colorless and practically odorless oil. Preparations used in agriculture and by exterminators contain 85–90% diazinon and appear as a pale to dark-brown liquid. This form of diazinon is diluted with other chemicals before use. The diazinon that was formerly sold for home and garden use contained 1–5% diazinon in a liquid or as solid granules. These preparations had a slight chemical odor, but could be identified by smell. Most of the diazinon used is in liquid form, but it is possible to be exposed to the chemical in a solid form. Diazinon does not burn easily and does not dissolve easily in water. It will dissolve in alcohol or other organic solvents such as petroleum products. Its basic physical and chemical properties are summarized in Chapter 4; for more information on its production and use, see Chapter 5.

1.2 WHAT HAPPENS TO DIAZINON WHEN IT ENTERS THE ENVIRONMENT?

Diazinon may enter the environment during the manufacturing process, but most environmental contamination comes from agricultural and household application of the chemical to control insects. Diazinon is often sprayed on crops and plants, so small particles of the chemical may be carried away from the field or yard by wind before falling to the ground. Studies have not shown harmful human health effects resulting from airborne contamination of areas surrounding fields where diazinon has been used. After diazinon has been applied, it may be present in the soil, surface waters (such as rivers and ponds), and on the surface of the plants. Diazinon on soil and plant surfaces may also be washed into surface waters by rain. Up to 25% of applied diazinon can return to the air from the surface where it was applied. In the environment, diazinon is rapidly broken down into a variety of other chemicals. Depending on the soil or water conditions, the time required for one-half of the diazinon to be broken down is between a few hours and 2 weeks. Diazinon can move through the soil and contaminate groundwater (water below the surface such as well water). Diazinon is rapidly broken down by most animals that eat it. This means that the chemical is not likely to build up to high or dangerous levels in animal or plant foods that you might eat. For more information on diazinon use and its fate in the environment, see Chapters 5 and 6.

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1.3 HOW MIGHT I BE EXPOSED TO DIAZINON?

Small amounts of diazinon have been detected in foods sold to consumers, but studies by the U.S. Food and Drug Administration (FDA) have found that the levels in food are far below the level that might cause any harmful health effects. Diazinon has been found in surface water and groundwater samples collected at many locations. Only a few of these samples contained high levels of diazinon contamination. These were associated with runoff from contaminated fields or single sources responsible for contamination such as illegal dumping. In areas surrounding hazardous waste disposal or treatment facilities, you could be exposed by contact with contaminated soils or contaminated runoff water or groundwater that resulted from spills or leaks of material on the site. People who work in the manufacture and professional application of diazinon have the most significant exposure to this insecticide. Although diazinon was formerly used as the active ingredient in home and garden pest control products, sales of these home and garden products in the United States was terminated in 2004. However, previously purchased diazinon-containing home and garden products may still be in use and present the potential for exposure. For more information on the ways people might be exposed to diazinon, see Chapter 5.

1.4 HOW CAN DIAZINON ENTER AND LEAVE MY BODY?

If you breathe air containing diazinon, you may absorb it into your body through your lungs. If you eat food or drink water containing diazinon, the chemical may be absorbed from your stomach and intestines. Diazinon may also enter your body across the skin. People living near hazardous waste sites are most likely to be exposed to diazinon through contact with contaminated soil or runoff water.

Once in the body, diazinon is rapidly broken down and eliminated from the body mainly in the urine. Diazinon has not been shown to accumulate in any tissues and almost all of the chemical is eliminated from the body in 12 days. For more information, see Chapter 3.

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1.5 HOW CAN DIAZINON AFFECT MY HEALTH?

Scientists use many tests to protect the public from harmful effects of toxic chemicals and to find ways for treating persons who have been harmed.

One way to learn whether a chemical will harm people is to determine how the body absorbs, uses, and releases the chemical. For some chemicals, animal testing may be necessary. Animal testing may also help identify health effects such as cancer or birth defects. Without laboratory animals, scientists would lose a basic method for getting information needed to make wise decisions that protect public health. Scientists have the responsibility to treat research animals with care and compassion. Scientists must comply with strict animal care guidelines because laws today protect the welfare of research animals.

Most people are not likely to be exposed to amounts of diazinon large enough to adversely affect their health. Most cases of unintentional diazinon poisoning in people have resulted from short exposures to very high concentrations of the material. Usually, this occurs when workers who use diazinon are not properly protected and inhale or swallow the chemical or contaminate their skin. Whether you have harmful effects to your health from diazinon exposure depends on how much you are exposed to and for how long you are exposed. Diazinon affects the nervous system. Some mild symptoms of exposure are headache, dizziness, weakness, feelings of anxiety, constriction of the pupils of the eye, and not being able to see clearly. If you experience these symptoms, you should seek medical attention immediately. Emergency rooms have drugs that stop the harmful effects of diazinon. More severe symptoms include nausea and vomiting, abdominal cramps, slow pulse, diarrhea, pinpoint pupils, difficulty breathing, and passing out (coma). These signs and symptoms may start to develop within 30–60 minutes of the exposure and reach their maximum at about 6–8 hours. Very high exposure to diazinon has resulted in death in people accidentally exposed and in those who have swallowed large amounts of the chemical to commit suicide. Damage to the pancreas has developed in some people and in laboratory animals exposed to large amounts of diazinon. Longer exposure to lower levels of diazinon has also been reported to produce some of these symptoms in exposed workers and in people living in houses recently treated with the chemical to control pests. In almost all cases,

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complete recovery occurred when the exposure stopped. There is no evidence that long-term exposure to low levels of diazinon causes any harmful health effects in people. Diazinon has not been shown to cause birth defects or to prevent conception in humans. Diazinon has not been shown to cause cancer in people or animals. The International Agency for Research on Cancer (IARC), the EPA, and the National Toxicology Program (NTP) have not officially classified diazinon as to its carcinogenicity.

In animal studies, high doses of diazinon produced effects on the nervous system similar to those seen in people. For more information on the health effects of diazinon, see Chapter 3.

1.6 HOW CAN DIAZINON AFFECT CHILDREN?

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

Children can be exposed to diazinon in the same manner as adults, by eating food or drinking water that contains diazinon. However, the levels in food or drinking water are not likely to cause adverse health effects. Children who live and play near agricultural areas where diazinon is used may be exposed to diazinon from the air, ground, or water.

Diazinon affects the nervous system in children and adults alike. Some mild symptoms of exposure are headache, dizziness, weakness, feelings of anxiety, constriction of the pupils of the eye, and not being able to see clearly. More severe symptoms include nausea and vomiting, abdominal cramps, slow pulse, diarrhea, pinpoint pupils, difficulty breathing, and passing out (coma). Very high exposure to diazinon can result in death.

We do not know whether children are more susceptible than adults to diazinon toxicity. There is no evidence that environmental exposure to diazinon causes birth defects or other developmental effects in people. In animals, levels of exposure to diazinon high enough to affect the health of pregnant mothers caused developmental effects in their newborn babies.

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Animal studies have shown that diazinon and/or its breakdown products can be transferred from a pregnant mother to a developing fetus, but there is no information in humans regarding the transfer of diazinon from the mother to the fetus or nursing infant.

More information regarding children's health and diazinon can be found in Section 3.7.

1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO DIAZINON?

If your doctor finds that you have been exposed to substantial amounts of diazinon, ask whether your children might also have been exposed. Your doctor might need to ask your state health department to investigate.

The general population is not likely to be exposed to large amounts of diazinon. People who live near agricultural areas where diazinon is still used should stay away from the area that was treated. Diazinon can be dispersed some distance from a spray zone by air currents and runoff water. If you are aware that diazinon is being sprayed in the vicinity, you may want to go indoors or leave the area for a short time. Agricultural workers who have come into contact with relatively large amounts of diazinon at work may need to remove contaminated clothing and wash before coming into contact with other family members. To reduce the risk of exposure to diazinon residue on fresh fruits or vegetables, wash the foods prior to eating them.

Occasionally, diazinon may be improperly sprayed inside the home to kill insects. Make sure that any person who treats your home with pesticides is properly certified. Ask what chemical or chemicals are being used. Diazinon is a "restricted use" chemical and is no longer registered for residential indoor or garden use.

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

Most of the signs and symptoms resulting from diazinon poisoning are due to the inhibition of an enzyme called acetylcholinesterase in the nervous system. This enzyme is also found in your red blood cells and a similar enzyme (plasma cholinesterase) is found in blood plasma. The most common test for exposure to many organophosphorus insecticides, including diazinon, is to determine the level of cholinesterase activity in the red blood cells or plasma. This test requires only a small amount of blood and is routinely available in your doctor's office. It takes time for this enzyme to completely recover to normal levels following exposure. Therefore, a valid test may be conducted a number of days following the suspected exposure. This test indicates only exposure to an insecticide of this type. It does not specifically show exposure to diazinon. Other chemicals or disease states may also alter the activity of this enzyme. There is a wide range of normal cholinesterase activity in the general population. If you have not established your normal or baseline value through a previous test, you might have to repeat the test several times to determine if your enzyme activity is recovering.

Specific tests are available to determine the presence of diazinon or its breakdown products in blood, body tissue, and urine. These tests are not routinely available through your doctor's office and require special equipment and sample handling. If you need the specific test, your doctor can collect the sample and send it to a special laboratory for analysis. This test is only useful if done within a few hours or days of exposure. This is because diazinon is rapidly broken down and excreted from the body. For more information on how to determine if you have been exposed to diazinon, see Chapters 3 and 7.

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

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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, that is, levels of a toxic substance in air, water, soil, or food that do not exceed a critical value that 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 diazinon include the following:

The federal government has set standards and guidelines to protect people from the possible harmful health effects of diazinon. The EPA has developed 1- and 10-day health advisories (maximum recommended drinking water concentrations) for children of 20 micrograms per liter ($\mu\text{g/L}$) of water. The lifetime health advisories determined for both children and adults are 0.6 micrograms per liter of drinking water. The EPA has also set tolerances for residues of diazinon in various raw food products of 0.1–40 parts of diazinon per million parts of food (ppm). NIOSH recommends an occupational exposure limit (10-hour time-weighted average [TWA]) of 0.01 milligram per cubic meter of air (mg/m^3) based on working 8 hours/day for 40 hours/week. For more information on regulations and guidelines to protect human health, see Chapter 8.

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.

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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 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-CDC-INFO (1-800-232-4636), by e-mail at 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-32
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/>