

## Product Safety Summary

### Toluene Diamine

This Product Safety Summary is intended to provide a general overview of the chemical substance. The information on the Summary is basic information and is not intended to provide emergency response information, medical information or treatment information. The summary should not be used to provide in-depth safety and health information. In-depth safety and health information can be found on the Material Safety Data Sheet (MSDS) for the chemical substance.

#### Chemical Identity

Abbreviation:	TDA
CAS Number :	25376-45-8
Common Names:	Diaminotoluene Toluenediamine isomers Methylphenylene diamine Tolyenediamine

#### Product Overview

- Pure toluene diamine is a highly poisonous, colorless solid which turns dark upon exposure to air.
- A majority of TDA produced in the United States is used as an 80% 2,4- and 20% 2,6-toluenediamine mixture to make toluene diisocyanate (TDI). A smaller amount is also made from a mixture of 65% 2,4- and 35% 2,6-toluenediamine. Some isolated 2,4-toluenediamine is used to produce pure 2,4-TDI. 2,4 is also used to make about 60 dyes, of which 28 are believed to be commercially significant. Other uses of TDA include enhancement of thermal stability in polyamides, fatigue resistance and dye ability in fibers, and the preparation of impact resistant resins, polyimides with superior wire coating properties, benzimidazolethiols (antioxidants), hydraulic fluids, urethane foams, fungicide stabilizers, and sensitizers for explosives.
- May be fatal if swallowed, inhaled or absorbed through skin. Causes irritation to the skin, eyes and respiratory tract. Combustible solid or liquid when heated. May cause methemoglobinemia. Affects blood, cardiovascular system, central nervous system, liver and kidneys.
- No airborne limits have been established for toluene diamine in the work environment.
- For further safety and health information, the current Material Safety Data Sheet (MSDS) should be used for this substance.

#### Physical/Chemical Properties

- TDA is a colorless solid which darkens on exposure to light or air. It has a weak amine or fish like odor.
- The specific gravity of TDA is 1.05 and is denser than water. TDA is soluble in water .
- The boiling point of TDA is 292C and the melting point is approximately 99C. The flash point of TDA is 149C, by the Tag Closed cup method.

## Health Information

TDA is a potentially hazardous material. A thorough knowledge of potential dangers, with strict adherence to recommended safety practices, is essential before aniline products are handled, stored or used. Workers must be properly instructed and supervised in the handling of TDA. No limits have been established for allowable concentrations in the work environment. The skin is a known route of exposure. TDA is listed as a category 2 carcinogen.

### Effects on the Respiratory System:

Exposures to mists or dust can produce eye, nose or lung irritation. The hot liquid may cause severe skin burns. Symptoms may include bluish discoloration of lips and tongue, severe headache, nausea, confusion, dizziness, shock, respiratory paralysis, death. TDA affects the ability of the blood to carry oxygen. The effects may be delayed.

### Effects on the Skin:

TDA may be absorbed through the skin. Symptoms of skin absorption parallel those from inhalation exposure. May cause skin irritation and local contact may cause dermatitis.

### Effects on the Eyes:

TDA vapor or dust is an eye irritant. May cause tearing and blurred vision. Splashes may cause corneal damage.

### Effects of Ingestion:

TDA is toxic. Symptoms of ingestion parallel those of inhalation exposure.

### Chronic Hazards:

TDA is a blood toxin, causing hemoglobin to convert to methemoglobin, resulting in cyanosis. Lengthy or repeated exposures may result in decreased appetite, anemia, weight loss, nervous system affects, and kidney, liver and bone marrow damage. Any exposure may cause an allergic skin reaction. This substance is possibly carcinogenic to humans. May cause genetic damage in humans.

## Environmental Information

Do not wash away into sewer. Sweep spilled material into containers; if appropriate, moisten first to prevent dust generation. Then remove to a safe place. Do not let TDA enter the environment.

TDA is expected to be very toxic to terrestrial and aquatic life.

A variety of federal, state and local regulations govern the release of any material to the land, air or surface waters. Any release or discharge of TDA must be evaluated in reference to these regulations to determine appropriate response actions and reporting requirements. TDA is one of the chemicals for which releases to all environmental media must be annually reported. TDA has a reportable quantity (RQ) of 10 pounds per CERCLA.

A regulation called Resource Conservation and Recovery Act (RCRA) must be followed if a volume of TDA or material contaminated with TDA is to be disposed of or discarded. Based on RCRA criteria, aniline or materials contaminated with TDA will likely be considered a "Hazardous Waste" upon disposal and will need to follow certain storage, handling and disposal restrictions as outlined in RCRA. Strict adherence to these restrictions as well as proper characterization and labeling of the material is the responsibility of the generator and handler of the waste material.

Emphasis should be placed on the prevention of releases through careful design of equipment and sound operating procedures. If TDA is lost from containment through a leak or spill, care should be taken to use the proper personal protective equipment, decontamination procedures and other safety considerations. It is important to remember that spills of TDA and materials contaminated by TDA must be handled as RCRA hazardous wastes (U221).

Any release of TDA greater than the "reportable quantity", 10 pounds, designated by the EPA in CERCLA or SARA should be reported immediately on discovery to the National Response Center and State Emergency Response Agency (see current MSDS for reportable quantity and pertinent phone numbers).

In the event of accidental spillage of TDA to surface waters or to a municipal water system, contact the local and state pollution control agencies immediately.

### **Additional Hazard Information**

Protect containers against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be no smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers may be hazardous when empty since they retain product residues (vapors/liquids); observe all warnings and precaution listed for TDA.

### **Exposure Potential**

Although potential for exposure does exist during TDA manufacture, transportation and use, enclosed systems limit the exposure to worker populations and nearby communities. Exposure to the general public may occur in accidental situations. TDA is not intended for the general use by the general public.

TDA vapor or dust has a fish like odor which should not be used for early detection of any potential release. If you smell TDA, you are over the recommended exposure. TDA should only be handled by knowledgeable, well-trained personnel who thoroughly understand the hazards associated with the transportation, storage and use of the chemical.

Workplace exposure should be limited by the use of engineering controls. TDA vapors and dusts must be monitored and controlled below applicable regulatory limits. TDA should be processed within a closed system. Worker exposure can potentially happen from leaks in piping system, during repair or replacement of the piping system or during removal of a sample for quality control purposes.

Regulations involving hazardous chemicals are continually evolving and thus exposure guidelines are reviewed regularly and modified whenever new information dictates a change. It is important that all companies handling aniline are aware of the current legislative requirements.

The guidelines established by OSHA, ACGIH, NIOSH and others, represent current thinking and are believed to be conservative and protective of occupational workers. There is not guarantee of absolute safety.

## **Risk Management**

The potential hazards associated with TDA can be avoided if workers are adequately instructed in supervised on the proper procedures of handling TDA.

Personal protective equipment (PPE) should be selected based on the potential for exposure to particular chemical(s), and the unique properties of that chemical. In general, PPE is not an adequate substitute for appropriate workplace controls (such as ventilation), or other safe work practices. There may be situations when the only practical means of preventing employee exposure is through the effective use of PPE. When PPE is provided to employees, they must be trained in how, where, when, and why the equipment should be used. The facility must also have provisions for decontaminating and replacing such equipment as necessary.

Eye protection in the form of chemical splash goggles should be worn to prevent TDA from accidentally splashing in an employee's eye. Goggles should be non-vented, and designed specifically to protect against chemical splash. If an employee wears corrective lenses, chemical goggles should be worn over the lenses. Contact lenses are not recommended for use in areas where there is a potential for exposure to aniline. Corrosive vapors or dust can collect behind contact lenses and may cause severe damage to the eye and/or cause the contact lenses to adhere to the eyes.

Skin protection may be found in many forms. Hand protection such as chemical resistant gloves, protective arm sleeves, aprons, full body coveralls, boots, and head coverings are among the types available. Skin protection must be made of a material impervious to TDA. Personal protective equipment should be selected on the basis of potential exposure, e.g., gloves may be required for sample collection while full body clothing including gloves, boot covers, head covering may be necessary for spill clean-up. Skin protection for the purpose of preventing chemical exposure may be worn in conjunction with other types of PPE. For example, steel toe safety shoes may be required to prevent a person's foot from being crushed, but an additional boot cover may be required to prevent TDA permeation into the safety shoe. Skin protection PPE is available in a variety of sizes, and should be available in a size that fits the employee wearing it. Improperly sized PPE may compromise its effectiveness and create additional safety hazards. When skin protection PPE is used, there must be a means of cleaning or disposal/replacement of the PPE.

Respiratory protection is available in two basic varieties, air purifying, and air supplied. In general, air purifying respirators provide less protection than air supplied respirators. Both types, however, have their particular advantages and limitations. The appropriate type of respirator must be selected to provide the appropriate level of protection for the anticipated degree of exposure to airborne aniline (vapor or mist). Detailed guidance for the selection of respiratory protection can be found in The American National Standards Institute Document Z88.2. Respiratory protective equipment should be approved by NIOSH. It must be carefully maintained, inspected, and cleaned. All employees required to wear respiratory protection must be medically cleared to do so (this ensures their physical capability to wear a respirator) and trained to use and care for the equipment. OSHA requirements for respiratory protection can be found in 29 CFR 1910.134.

Properly designed emergency showers and eyewash fountains should be placed in convenient locations wherever acrylic acid is used. All employees should know the location and operation of this equipment. All equipment must be frequently inspected to make sure they are in proper working condition.

**Federal/Science Findings** (optional)

U.S. Environmental Protection Agency – Integrated Risk Information System (IRIS)

<http://www.epa.gov/ncea/iris/subst/0536.htm>

U.S. Environmental Protection Agency

<http://www.epa.gov/ttn/atw/hlthef/diamino.html>

U.S Department of Labor – Occupational Safety and Health Administration (OSHA)

[http://www.osha.gov/dts/chemicalsampling/data/CH\\_272300.html](http://www.osha.gov/dts/chemicalsampling/data/CH_272300.html)

American Conference of Governmental Industrial Hygienists (ACGIH)

<http://www.acgih.org>**Contact Information**<http://www.basf.com>**MSDS**[http://worldaccount.basf.com/wa/PublicMSDS-en\\_US/Search](http://worldaccount.basf.com/wa/PublicMSDS-en_US/Search)**References**

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