



Designation: D 3436 – 99

Standard Practice for Sampling and Handling Aniline¹

This standard is issued under the fixed designation D 3436; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last approval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers procedures for sampling and handling aniline.

1.2 Any person sampling or handling aniline should have specific first aid instructions and equipment available for use in the event of personal contact or exposure.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see Sections 3, 4, 5, 6, 7 and 8.

2. Referenced Documents

2.1 ASTM Standards:

E 300 Practice for Sampling Industrial Chemicals²

2.2 Other Documents:

OSHA Regulations, 29 CFR, paragraphs 1910.1000 and 1910.1200³

DOT Regulations, 49 CFR, Subchapter C; Parts 171-180³

3. Description of Product

3.1 *Typical Properties and Characteristics* (See Table 1):

3.2 *Stability*—Aniline is a stable material under normal conditions. It does not decompose at its boiling point or when exposed to high environmental temperatures for long periods. Although the vapor given off at elevated temperatures is flammable, aniline can be handled with little danger of fire. Should aniline ignite, it may be successfully extinguished with water, applied in the form of a fog or spray (see 4.2).

3.3 *Solubility*—Aniline is miscible with alcohol, ether, benzene, and most organic solvents. It is only slightly soluble in water.

3.4 Classification and Regulations:

3.4.1 Aniline is classified as a Class 6 Poison by DOT and the United Nations. As such, it must be packaged in DOT

TABLE 1 Typical Properties and Characteristics of Aniline

Chemical names	aniline, aminobenzene, benzenamine, phenylamine
Common names	aniline, aniline oil blue-oil
Empirical formula	C ₆ H ₅ NH ₂
Physical form	oily liquid at normal temperature
Color	colorless to light yellow (clear)
Light sensitivity	tends to become amber brown in color upon exposure to air and light
Boiling point	184.2°C (364°F) at 760 mm Hg
Specific gravity	1.022 at 20/4°C
Solidification point, anhydrous basis, min	-6.2°C (21°F)
Explosive limit lower	1.3 volume % in air
Flash point	
Closed cup	70.0°C (158°F)
Open cup	75.6°C (168°F)
Ignition temperature	1418°F ⁴
Odor threshold	0.5 ppm ⁴
Poisonous gas produced	when heated ⁴

⁴Weiss, G. *Hazardous Chemicals Data Book*, Second Edition.

specification containers when shipped by rail, water, or highway, and all of the DOT Regulations regarding loading, unloading, handling, labeling, and other functions must be followed.

3.4.2 Department of Transportation (DOT) Regulations regarding the shipping of this chemical are specified in 49CFR. Regulations include the handling of aniline packages and return of empty containers. All containers should carry an identifying label or stencil and must bear the DOT POISON label. Aniline is ordinarily transported in tank cars, tank trucks, or metal drums. Sample shipped by air must be packaged to comply with IATA regulations.

3.5 *Toxicity*—Although aniline is highly toxic, it may be handled safely if proper precautions are observed. The odor of aniline can be positively detected at 1.1 ppm in the atmosphere by 50 % of people.⁴ Avoid contact with skin. Maintain adequate ventilation.

4. Hazards

4.1 Consult current OSHA regulations, supplier's Material Safety Data Sheets, and local regulations for all materials utilized in this practice.

4.2 Health:

⁴“Odor as an Aid to Chemical Safety: Odor Thresholds Compared with Threshold Limit Values and Volatilities for 214 Industrial Chemicals in Air and Water Dilution.” *Journal of Applied Toxicology*, August 1983.

¹ This practice is under the jurisdiction of ASTM Committee D16 on Aromatic Hydrocarbons and Related Chemicals and is the direct responsibility of Subcommittee D16.08 on Handling and Sampling Aromatic and Cyclic Hydrocarbons.

Current edition approved June 10, 1999. Published August 1999. Originally published as D 3436 – 75. Last previous edition D 3436 – 96.

² *Annual Book of ASTM Standards*, Vol 15.05.

³ Available from Superintendent of Documents, Government Printing Office, Washington, DC 20402.

4.2.1 Aniline is highly toxic and may enter the body easily and rapidly by absorption through the skin, by ingestion, or by inhalation of the vapor. The most common incidences of accidental poisoning are due to spillage of the liquid on the skin or clothing resulting in direct skin contact or the prolonged inhalation of vapor because of inadequate ventilation.

4.2.2 Aniline causes the oxygen-carrying pigment in the blood, hemoglobin, to change to a form known as methemoglobin; thus the ability of the blood to transport oxygen to tissues is reduced in aniline poisoning. The systemic effects of poisoning varies with the intensity of the exposure. Cyanosis, the most common symptom of aniline poisoning, is characterized by a bluish tinge which results from the inadequate oxygenation of tissues. Discoloration is most noticeable on the cheeks, lips, ears, fingernail beds, or oral membranes. When the liquid has penetrated the skin, the area of contact will sometimes appear cyanotic. Poisoning may also give rise to headaches, palpitation, dizziness, nausea, difficult breathing, convulsions, and psychic disturbances. Aniline is likewise a mild irritant to the eyes and could cause corneal damage. If a splash occurs, wash the eyes with profuse amounts of water for a minimum duration of 15 min. In all cases, contact a physician as soon as possible.

4.2.3 The threshold for *aniline-skin* is 2 ppm (10 mg/m³ of air) as defined by the American Conference of Governmental and Industrial Hygienists. The most potential contribution to the overall exposure to aniline is by the cutaneous route, either by airborne, or more particularly, by direct contact with the skin. Therefore, the threshold limit value for aniline-skin is 2 ppm to suggest appropriate measures for the prevention of cutaneous absorption so that the threshold limit is not invalidated. With respect to airborne exposure, the threshold limit value of aniline is 2 ppm (10 mg/m³ in air) for an 8-h working exposure. Short term inhalation limits are 50 ppm for 30 min.

4.3 Fire: standards.iteh.ai/catalog/standards/sist/1-42246b

4.3.1 Aniline has a flash point of 70°C well above room temperature. Consequently, ignition in air is difficult and the rate of flame propagation is slow. Fires involving aniline can be extinguished with carbon dioxide, dry chemical, and water fog. If water is used on an aniline fire in which the liquid temperature is near or above the boiling temperature of water, there will be a boil-over as a result of rapid steam formation and spattering of the aniline. This increases the toxic hazard. Therefore, in fighting large fires use fog, foam, or spray in preference to a solid stream of water.

4.3.2 Always avoid skin contact or inhaling of vapors while combating a fire. Fire fighters must be equipped with standard firemans' clothing plus respiratory protection.

4.4 For chemical emergency (spill, leak, fire, exposure or accident), call CHEMTREC day or night at 800-424-9300. For emergency calls outside the United States call 703-527-3887. (Collect calls are accepted and all calls are recorded.)

5. Protective Equipment

5.1 Persons handling aniline must use proper protective equipment. Wearing a chemical protective suit with self-contained breathing apparatus is generally recommended. However, protective equipment is not an adequate substitute for safe working conditions, proper ventilation, and good work

practices. Personal protective equipment only protects the worker wearing it and other unprotected people in the work area may still be exposed to danger. Education of the worker in the proper use of protective equipment is essential.

6. Precaution

6.1 Any person sampling or handling these products should have specific first aid instructions and equipment available for use in the event of personal contact or exposure.

6.2 Conduct sampling and handling operations only by carefully instructed, experienced, reliable employees, under adequate supervision.

6.3 Accomplish loading, unloading, and sampling operations only when adequate lighting is provided.

6.4 Take extreme care to avoid spills and leaks. In case of a spill, wash contaminated areas thoroughly with large quantities of water and collect the liquid in the local chemical waste system. All spill-related activities should comply with applicable EPA, and OSHA and local regulations and laws.

6.5 Follow shipper's instructions always, and read and observe all caution markings on containers.

6.6 Although the vapor given off at elevated temperatures from phenol or cresylic acid will ignite, these materials can generally be handled with little direct danger of fire. The flash points of the liquids are higher than the temperatures at which they are normally handled. In spite of this, carefully restrict open flames and smoking in the vicinity of loading, unloading, and storage operations.

6.7 Do not permit any person ever to enter an empty aniline tank, tank car, or tank truck until it has been thoroughly washed out with warm water, followed by a thorough steaming. Ensure that oxygen content is acceptable and vessel is free of organic vapors. Require the approval and observation by a supervisor in every case. Review Sections 7 and 8 in detail. [436-99](#)

6.8 Allow no eating or drinking in close proximity to the aniline handling or sampling operation.

6.9 Employees shall:

6.9.1 Know the hazards connected with the handling of aniline.

6.9.2 Be completely acquainted with the purpose, use, and maintenance of personal protective equipment;

6.9.3 Be trained to report promptly to supervision all suspected leaks or equipment failures;

6.9.4 Be trained to recognize and report symptoms of systemic poisoning or skin contact; be thoroughly trained in the proper procedures for administering first aid and for obtaining professional medical help;

6.9.5 Know and routinely practice the accepted methods of sampling and handling aniline in order to avoid spilling or splashing, leaks, skin contact, vapor or mist inhalation, or ingestion;

6.9.6 Be completely familiar with the location and operation of safety showers, eye baths, hose lines, and all other first aid equipment; and

6.9.7 Know the importance of personal cleanliness and the necessity for immediate removal of clothing contaminated with aniline.