Designation: D3438 – 15

Standard Practice for Sampling and Handling Naphthalene, Maleic Anhydride, and Phthalic Anhydride[1]

This standard is issued under the fixed designation D3438; 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 reapproval. 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 naphthalene, maleic anhydride, and phthalic anhydride in various solid forms, and as liquids at elevated temperatures in a safe manner that represents and preserves quality.

1.2 Any person sampling or handling these products should consult the applicable Safety Data Sheet (SDS) for specific first aid instructions and information on the proper equipment to have available for use in the event of personal contact or exposure.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *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, and 7 and an appropriate SDS.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E300 Practice for Sampling Industrial Chemicals

2.2 *Other Documents:*

OSHA Regulations, 29 CFR paragraphs 1910.1000 and 1910.1200 [3]

3. Significance and Use

3.1 This practice is issued to provide information useful in establishing sampling procedures. It is expected that this information will only be utilized in conjunction with an existing health and safety program and consultation with the appropriate SDS. The information provided herein cannot be used as a substitute for expert safety and medical advice, but rather as a supplement to such advice.

4. Description of Products (See Table 1)

4.1 Phthalic anhydride is classified as hazardous by the Department of Transportation as a corrosive material and is therefore subject to DOT regulations governing the transportation of hazardous materials. Maleic anhydride and naphthalene are classified as hazardous by the Department of Transportation and are subject to DOT regulations. Maleic anhydride has the classification corrosive material, and naphthalene has the classification flammable solid.

4.1.1 These products are normally transported in several types of containers, including cartons, barrels, bags, cans, metal and fiber drums, tank trucks, tank cars, and barges.

5. Hazards

5.1 *Health*—Consult current OSHA regulations and supplier's Safety Data Sheet, and local regulations for all materials used in this practice.

5.1.1 Aside from the risk of burns in sampling these products when molten, and a possibility of dermatitis from impurities, particularly in crude grades, industrial use does not present a significant health hazard. However, ordinary sampling precautions must be observed to protect personnel from contact with molten material or excessive exposure to dusts or high concentrations of vapor.

5.1.2 Precautions must be observed to protect personnel from excessive inhalation of vapors and dust.

NOTE 1—For permissible exposure limits see OSHA Regulations, paragraph 1910.1000.

5.2 *Fire:*

5.2.1 These products in both the solid and liquid forms are combustible, and introduce a potential fire hazard where they are stored, handled, or used.

[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.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www/ecfr/gov.

***A Summary of Changes section appears at the end of this standard**

TABLE 1 Typical Physical Properties

Product	Melting Point, °C	Boiling Point, °C	Forms	Flash Point, °C	Explosive Limit, %		Ignition Temperature, °C	Specific Gravity, 20°C
					Lower	Higher		
Naphthalene	80	218 (sublimes)	flakes, balls, liquid, rods, tablets	78	0.9	5.9	526	1.15
Maleic anhydride	53	200 (sublimes)	rods, briquettes, liquid	101	1.4	7.1	470	1.43
Phthalic anhydride	130	284 (sublimes)	flakes, liquid	165	1.7	10.5	570	1.53

5.2.2 Naphthalene, maleic anhydride and phthalic anhydride vapors or dust can form explosive mixtures with air.

5.2.3 When molten naphthalene, at temperatures above 110°C, comes into contact with water, foaming or possible explosion may result.

5.2.4 Dry chemicals, carbon dioxide, and foam can all be used in fighting fires involving these materials.

5.2.5 Maleic anhydride decomposes violently in the presence of amines or alkali metals, especially at elevated temperatures.

6. Protective Equipment

6.1 Persons working with molten naphthalene, maleic anhydride, and phthalic anhydrides should be well trained and should maintain safe working conditions. They should read the appropriate SDS in its entirety and consult appropriate local safety personnel if they have any questions or concerns.

7. Safety Precautions

7.1 Sampling operations of molten liquids should be performed only by carefully instructed personnel.

7.2 Exercise care to prevent spills and leaks. If they do occur, only properly protected personnel should remain in the contaminated area per instructions in the appropriate SDS. All spill-related activities should comply with applicable EPA, OSHA, and local regulations and laws.

7.3 Because of fire and explosion hazards, do not permit open flames in the vicinity of tank carriers, other shipping containers, or storage tanks. Provide all electrical fixtures with vapor-proof globes and explosion-proof safety devices. Ground all containers and lines by an approved method. Prohibit smoking in the area.

7.4 Consult the appropriate SDS for specific first aid instructions and equipment to have available for use in the event of personnel contact or exposure.

8. Sampling Tank Cars

8.1 Use brown 1-L bottles made of heat-resistant glass with screw caps to collect samples of molten maleic anhydride and phthalic anhydride. Use metal 1-L cans with screw caps for sampling molten naphthalene.

NOTE 2—Caps must have aluminum foil liners.

8.2 Install the can or glass bottle in a suitable weighted sampling harness, constructed in such a way that the top of the container is held in an upright position, when the apparatus is lowered into the car.

8.3 Obtain the sample through the open dome. Lower the can or bottle in the weighted harness quickly to the bottom of the compartment, and raise it slowly at such a rate so that it is about three fourths full as it emerges from the liquid.

8.3.1 Remove the sample apparatus carefully, taking care not to strike it sharply against the tank car. As soon as the sampling container is removed from the harness, cap and wipe it off with a rag before the material solidifies on the threads.

8.3.2 Label the sample container in accordance with OSHA Regulations or other appropriate local regulations, or both, to indicate, as a minimum, the source of the sample, type of material, quantity, hazards, and the purpose of the sample.

8.3.3 It should be emphasized that cleanliness and the absence of moisture are absolutely essential to ensure that a truly representative sample is obtained from the tank car. The practices recommended for Practice E300 should be observed.

9. Sampling Metal Drums and Cans of Naphthalene

9.1 Before heating the container of naphthalene, provide a vent and protect the material from contamination. Melting the naphthalene with dry heat is preferred to avoid moisture contamination.

9.2 To ensure a representative sample, mix the contents of the container thoroughly by a suitable means.

9.3 Sample the naphthalene as soon as possible after it is melted and mixed. Collect the sample in tinned cans. Sampling may be done either by dipping out portions or by means of a heated pipet.

9.4 Label the sample container in accordance with 8.3.2.

10. Sampling Solid Naphthalene (Chips, Flakes, Balls)

10.1 *Bulk Quantities:*

10.1.1 Take a representative sample, preferably from a falling naphthalene stream, using a straight-path sampler. Adjust sampler feed rate, slot width, cutter speed, and frequency to collect 227 g of sample per 4540 kg of naphthalene.

10.1.2 Melt the entire naphthalene sample and mix thoroughly before analyzing.

10.2 *Bags (45.4 kg):*

10.2.1 Using a small thief, 203 to 305 mm, remove about 227 g of sample from 1 bag out of every 40 bags (1814 kg) of naphthalene. Take the sample from the filling ear or, if necessary, by opening one corner of the bag. Place each sample in a plastic bag or brown glass jar labeled with proper identification in accordance with 8.3.2.

10.2.2 Make a composite blend from the individual samples. Melt the blend and mix thoroughly before analyzing.

10.3 *Drums (91 to 109 kg):*

10.3.1 Insert a thief into the center of the drum to the halfway point and remove about 200 g of naphthalene. Sample 1 drum out of every 20 drums (1814 to 2268 kg). Place each

sample in a plastic bag or brown glass jar labeled with proper identification. Label the sample container in accordance with 8.3.2.

10.3.2 Make a composite blend from the individual samples. Melt the blend and mix thoroughly before analyzing.

10.3.3 Label the sample container in accordance with 8.3.2.

11. Sampling Solid Maleic Anhydride and Phthalic Anhydride

11.1 For the purpose of this sampling procedure, a sample unit is defined as 907 kg consisting of forty approximately 22.7-kg bags, for maleic anhydride and phthalic anhydride. These are usually shipped on a pallet.

11.2 It is recommended that 10 % of the shipment be sampled, with a maximum of five sample units comprising a composite sample.

11.3 A maximum of five sample units may be composited for analysis with a minimum of 200 g taken from each sample unit.

11.4 Sample containers shall be brown glass bottles, fitted with aluminum foil-lined caps. Before use, clean and dry the bottles in a clean air convection-type oven.

11.5 Nickel, high-density polyethylene, polypropylene, or stainless steel-type scoops are recommended for taking samples of product from the bags selected for sampling.

11.6 Extreme care and good judgment are necessary to ensure that the samples truly represent the product.

11.7 Seal the opened bags with a suitable tape.

11.8 Label the bottles in accordance with 8.3.2.

12. Keywords

12.1 maleic anhydride; naphthalene; phthalic anhydride; sampling

SUMMARY OF CHANGES

Committee D16 has identified the location of selected changes to this standard since the last issue (D3438 – 10) that may impact the use of this standard. (Approved June 1, 2015.)

(1) Editorial changes made to Sections 1, 3, 4, 5, 6, 7, 10, 11, and 12.