



Standard Practice for Separation and Identification of Poly(Vinyl Chloride) (PVC) Contamination in Poly(Ethylene Terephthalate) (PET) Flake ¹

This standard is issued under the fixed designation D 5991; 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 four procedures for separation and qualitative identification of poly(vinyl chloride) (PVC) contamination in poly(ethylene terephthalate) (PET) flakes.

NOTE 1—Although not presented as a quantitative method, procedures presented in this practice may be used to provide quantitative results at the discretion of the user. The user assumes the responsibility to verify the reproducibility of quantitative results. Data from an independent source suggest a PVC detection level of 200 ppm (w/w) based on an original sample weight of 454 g.

1.2 *Procedure A* is based on different fluorescence of PVC and PET when these polymers are exposed to ultraviolet (UV) light.

1.3 *Procedure B* is an oven test based upon the charring of PVC when it is heated in air at 235°C.

1.4 *Procedures C and D* are dye tests based on differential staining of PVC and PET.

NOTE 2—Other polymers (for example, PETG) also absorb the stain or brightener. Such interferences will result in false positive identification of PVC as the contaminant.

1.5 *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 hazards see Section 8.

NOTE 3—There is no equivalent ISO standard.

2. Referenced Documents

2.1 ASTM Standards:

D 1600 Terminology for Abbreviated Terms Relating to Plastics²

D 5033 Guide for the Development of Standards Relating to the Proper Use of Recycled Plastics²

E 380 Practice for Use of the International System of Units

¹ This practice is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.95 on Recycled Plastics. Current edition approved July 10, 1996. Published September 1996.

² *Annual Book of ASTM Standards*, Vol 08.03.

(SI) (the Modernized Metric System)³

3. Terminology

3.1 The terminology used in this practice is in accordance with Terminology D 1600 and Guide D 5033. Units and symbols are in accordance with Practice E 380.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *light material, n*—paper, polymers such as polyethylene and polypropylene, and other materials with densities less than 1.00 g/cm³.

4. Summary of Practice

4.1 For the Beilstein Test, chlorine-containing materials heated in a flame in contact with a copper wire produce a characteristic green flame.

4.2 With Procedure A, a known amount of PET flakes is exposed to ultraviolet radiation. PET normally fluoresces with a blue or violet color. Flakes fluorescing with different colors are removed, weighed, and identified as PVC if they burn with a bright green flame when heated on a copper wire.

4.3 With Procedure B, PET flakes are heated in an oven maintained at 235 $\pm$ 5°C. After 45 min, the flakes are visually examined with removal and subsequent weighing of black, charred pieces. Pieces are confirmed as PVC using the same flame test mentioned in 4.1.

4.4 With Procedure C, PET flakes are soaked in a blue acetone dye solution that preferentially stains any PVC flakes. These flakes are visually identified and subsequently removed, and weighed. If desired, the identification of PVC flakes is confirmed with the flame test.

4.5 With Procedure D, PET flakes are heated with an aqueous solution containing an optical brightener that also preferentially stains the PVC flakes. The flakes are sorted under UV light in a dark room with removal and subsequent weighing of any blue fluorescing PVC flakes.

5. Significance and Use

5.1 Presence of even low concentrations of PVC in recycled PET flakes may result in equipment corrosion problems during processing. The level of PVC contamination may also dictate

³ *Annual Book of ASTM Standards*, Vol 14.02.