



Standard Test Method for Determining Residual Solvents in Packaging Materials¹

This standard is issued under the fixed designation F 1884; 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 test method covers determination of the amount of residual solvents released from within a packaging material contained in a sealed vial under a given set of time and temperature conditions and is a recommended alternative for Test Method F 151.

1.2 This test method covers a procedure for quantitating volatile compounds whose identity has been established and which are retained in packaging materials.

1.3 The analyst should determine the sensitivity and reproducibility of the method by carrying out appropriate studies on the solvents of interest. The analyst is referred to Practice E 260 for guidance.

1.4 For purposes of verifying the identity of or identifying unknown volatile compounds the analyst is encouraged to incorporate techniques such as gas chromatography/mass spectroscopy, gas chromatography/infrared spectroscopy or other suitable techniques in conjunction with this test method.

1.5 Sensitivity of this test method in the determination of the concentration of a given retained solvent must be determined on a case by case basis due to the variation in the substrate/solvent interaction between different types of samples.

1.6 This test method does not address the determination of total retained solvents in a packaging material. Techniques such as multiple headspace extraction can be employed to this end. The analyst is referred to the manual supplied with the GC-Autosampling system for guidance.

1.7 The values stated in SI units are to be regarded as the standard.

1.8 *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.*

2. Referenced Documents

2.1 ASTM Standards:

E 177 Practice for Use of the Terms Precision and Bias in

ASTM Test Methods²

E 260 Practice for Gas Chromatographic Procedures²

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method²

F 151 Test Method for Residual Solvents in Flexible Barrier Materials³

3. Terminology

3.1 Definitions:

3.1.1 *ream*— $3000 \text{ ft}^2 = 278.7 \text{ m}^2 = 27.87 \times 10^6 \text{ cm}^2$.

3.1.2 *retained solvents*—those chemical species, which are retained by packaging material and can be detected in the headspace of sealed sample vials under conditions of elevated temperature.

4. Summary of Test Method

4.1 Retained volatile organic solvents are determined by subjecting the packaging material to elevated temperatures in a headspace sampling system with subsequent gas chromatography of the headspace and detection using a suitable detection device such as a flame ionization detector (FID).

4.2 Volatile components can then be quantified by comparison with standards of known concentration.

4.3 Qualitative analysis may be carried out on a gas chromatograph (GC) coupled to an appropriate detector capable of compound detection / identification, such as a mass spectrometer or infrared detector.

5. Significance and Use

5.1 This test method is intended to measure volatile organic compounds that are emitted from packaging materials under high-temperature conditions.

5.2 This test method may be useful in assisting in the development and manufacture of packaging materials having minimal retained packaging ink/adhesive solvents.

5.3 Modification of this procedure by utilizing appropriate qualitative GC detection devices such as a mass spectrometer in place of the flame ionization detector may provide identification of volatile organics of unknown identity.

6. Interferences

6.1 *Gas Chromatography*—Because of the potentially large number of chemical species that can be analyzed using this

¹ This test method is under the jurisdiction of ASTM Committee F-2 on Flexible Barrier Materials and is the direct responsibility of Subcommittee F02.30 on Test Methods.

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² Annual Book of ASTM Standards, Vol 14.02.

³ Annual Book of ASTM Standards, Vol 15.09.