



Standard Test Method for Dicumyl Peroxide and Dicumyl Peroxide Decomposition Products in Resins¹

This standard is issued under the fixed designation E1090; 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 and is applicable to the determination of dicumyl peroxide² and the decomposition products dimethylbenzyl alcohol and acetophenone in cured and uncured polyethylene (PE) and ethylene vinyl acetate (EVA) resins. These uncured polymers normally contain from 1 to 2 % dicumyl peroxide, whereas the residual peroxide level in the cured polymers is usually less than 0.1 %.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

1.3 Review the current Material Safety Data Sheets (MSDS) for detailed information concerning toxicity, first aid procedures, and safety precautions.

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. Specific hazards are given in Section 7.*

2. Referenced Documents

2.1 *ASTM Standards:*³

[D1193 Specification for Reagent Water](#)

[E180 Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial and Specialty Chemicals](#) (Withdrawn 2009)⁴

[E300 Practice for Sampling Industrial Chemicals](#)

¹ This test method is under the jurisdiction of ASTM Committee E15 on Industrial and Specialty Chemicals and is the direct responsibility of Subcommittee E15.01 on General Standards.

Current edition approved April 1, 2008. Published May 2008. Originally approved in 1986. Last previous edition approved in 2002 as E1090 – 96 (2002). DOI: 10.1520/E1090-08.

² Dicumyl peroxide; peroxide, bis(1-methyl-1-phenylethyl) C₁₈H₂₂O₂; CAS Registry No. 80-43-3.

³ 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.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

[E682 Practice for Liquid Chromatography Terms and Relationships](#)

[E685 Practice for Testing Fixed-Wavelength Photometric Detectors Used in Liquid Chromatography](#)

[E755 Test Method for Dicumyl Peroxide, Assay \(Liquid Chromatography\)](#)

3. Summary of Test Method

3.1 Dicumyl peroxide and dimethylbenzyl alcohol are extracted from a cryogenically ground sample with methylene chloride. The extract is concentrated, redissolved in methanol, and analyzed by high performance liquid chromatography (HPLC). Acetophenone is extracted from a separate sample with methanol and analyzed directly by HPLC. The analyses are performed on a reversed phase octadecylsilane (ODS) column using acetonitrile/water as the mobile phase and an ultraviolet detector at 254 nm. The concentration of each component is determined by the internal standard technique, using peak height ratios of the sample and standard chromatograms.

4. Significance and Use

4.1 Knowledge of the peroxide content of uncured PE and EVA samples is required to regulate the degree of crosslinking in the cured product. As end use applications of the cured product can be affected by residual amounts of the peroxide or its decomposition products—dimethylbenzyl alcohol and acetophenone—knowledge of these levels is also important. This test method provides a procedure for determining the concentration of these compounds. A method for the HPLC assay of dicumyl peroxide is described in Test Method [E755](#).

5. Apparatus

5.1 *Liquid Chromatograph*, equipped with a 254-nm UV detector, injection valve, and an isocratic-solvent delivery system capable of operating to a gage pressure of 3000 psi. The detector should be equipped with an attenuator switch to change the sensitivity range as required. (See Practices [E682](#) and [E685](#).)

5.2 *Recorder*, 0 to 1 mv range, 1 s or less full-scale deflection, with a chart speed of 0.1 in./min or other convenient

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