



National Institute of Standards & Technology

Report of Investigation

Reference Material 8504

Transformer Oil

Reference Material (RM) 8504 is a transformer oil intended to be used as a diluent oil with Standard Reference Materials (SRMs) 3075, *Aroclor 1016 in Transformer Oil*, 3076, *Aroclor 1232 in Transformer Oil*, 3077, *Aroclor 1242 in Transformer Oil*, 3078, *Aroclor 1248 in Transformer Oil*, 3079, *Aroclor 1254 in Transformer Oil*, 3080 *Aroclor 1260 in Transformer Oil*, and/or SRM 3090 *Aroclors in Transformer Oil* [1] when developing and validating methods for the determination of polychlorinated biphenyls (PCBs) as Aroclors in transformer oil or similar matrices. SRMs 3075–3080 and SRM 3090 consist of individual Aroclors in the same transformer oil that was used to prepare RM 8504. A unit of RM 8504 consists of one bottle containing approximately 100 mL of transformer oil. No additional constituents were added to the oil.

PCBs (as Aroclors): < 0.1 mg/kg oil

Expiration of RM Investigation: The Report of Investigation for this RM is valid until **01 June 2020**, and is nullified if the RM is damaged, contaminated, or modified. NIST reserves the right to withdraw, amend, or extend this investigation at anytime.

Maintenance of RM Investigation: NIST will monitor this RM periodically during its shelf-life. If substantive changes are observed, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

The preparation of this RM was under the direction of D.L. Poster and M.M. Schantz of the NIST Analytical Chemistry Division.

Preparation of the RM was performed by M.P. Cronise of the Measurement Services Division. Analytical measurements of the RM were performed by D.L. Poster.

The support aspects involved in the issuance of this RM were coordinated through the NIST Measurement Services Division. Partial support was provided by the U.S. Environmental Protection Agency Office of Water, Office of Enforcement and Compliance Assurance, and Office of Research and Development.

Stephen A. Wise, Chief
Analytical Chemistry Division

Gaithersburg, MD 20899
Certificate Issue Date: 14 February 2006

Robert L. Watters, Jr., Chief
Measurement Services Division

NOTICE AND WARNING TO USERS

Handling and Storage: This material is transformer oil and should be handled with care. Contact your regional EPA office for information regarding proper disposal of oil. The material, as received, should be stored at room temperature.

PREPARATION AND ANALYSIS¹

The transformer oil used in the preparation of this RM was obtained from a commercial source. The RM was prepared at NIST by aliquoting transformer oil (Univolt 60, Exxon) into 100 mL amber glass bottles using an automated dispensing machine. The bottles were filled with approximately 100 mL oil and were capped with Teflon-lined screw-caps.

An aliquot of transformer oil from the barrel containing the bulk transformer oil was examined for traces of PCBs, as Aroclors, by capillary gas chromatography with electron capture detection (GC-ECD). The aliquot of oil was first placed on aminopropyl solid phase extraction columns, eluted with hexane, concentrated, and analyzed by GC-ECD equipped with an immobilized non-polar (5 % [mole fraction] phenyl methylpolysiloxane) stationary phase column. Additional aliquots from six bottles of RM 8504, selected according to a stratified random sampling scheme, were analyzed by GC-ECD and two immobilized stationary phase columns: a relatively non-polar stationary phase and a 5 % phenyl methylpolysiloxane stationary phase. Prior to gas chromatography, these samples were processed using analytical methods used for the determination of the concentrations of PCBs, as Aroclors, in transformer oil. Specifically, samples were placed on aminopropyl solid phase extraction columns and eluted with hexane. The concentrated eluants were then placed on a semi-preparative aminopropylsilane column using hexane as the mobile phase. This is the same approach used for the determination of the concentrations of Aroclors in SRMs 3075–3080 and SRM 3090 [1]. PCBs, as Aroclors, were not detectable in GC-ECD analyses of RM 8504 samples, indicating that levels are below the detection limit of 0.1 mg/kg oil.

REFERENCE

- [1] Poster, D.L.; Schantz, M.M.; Leigh, S.D.; Wise, S.A.; *Standard Reference Materials (SRMs) for the Calibration and Validation of Analytical Methods for PCBs (as Aroclor Mixtures)*; J. Res. Natl. Inst. Stand. Technol., Vol. 109 (2), pp. 245–266 (2004).

Users of this RM should ensure that the certificate in their possession is current. This can be accomplished by contacting the RM Program at: telephone (301) 975-6776; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet at <http://www.nist.gov/srm>.

¹Certain commercial equipment, instruments, or materials are identified in this paper to specify adequately the experimental procedure. Such identification does not imply recommendation or endorsement by NIST, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.