AS 5239—2011

Australian Standard®

Examination of ignitable liquids in fire debris

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The following are represented on Committee CH-041:

- Australia New Zealand Policing Advisory Agency
- Australian and New Zealand Forensic Science Society
- Australian Federal Police
- Consumer Action
- Expertise, Evidence & Law Program, School of Law, University of New South Wales
- National Association of Testing Authorities
- National Institute of Forensic Science
- New South Wales Police Force
- Queensland Police Service
- University of Canberra
- Victoria Police Forensic Services Department
- Victorian Institute Forensic Medicine
- Western Australia Chemistry Centre
- Western Australia Police

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PREFACE

This Standard was prepared by the Australian members of joint Standards Australia/Standards New Zealand Committee CH-041, Forensic Analysis.

The objective of this Standard is to outline procedures that are designed to maximize the recovery and evidential value of ignitable liquid residues (ILR) that may be present in fire debris samples submitted for analysis.

This Standard provides requirements and information on methods for the determination of the presence of ILR in fire debris for forensic purposes and covers the following processes:

(a) Packaging and storage of fire debris samples.

(b) Extract of sample.

  (i) Solvent extraction.

  (ii) Steam distillation.

  (iii) Headspace sampling.

  (iv) Passive headspace sampling.

  (v) Dynamic headspace sampling.

  (vi) Passive headspace sampling with SPME.

(c) Analysis of extract.

  (i) Gas chromatography (GC).

  (ii) Gas chromatography/mass spectrometry (GC/MS).

(d) Interpretation of results.

(e) Classification scheme for ignitable liquids.

(f) Reporting of results.

Reference was made to the following ASTM Standards in the preparation of this Standard:

ASTM

E1385 Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Steam Distillation (historical standard)

E1386 Standard Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Solvent Extraction

E1388 Standard Practice for Sampling of Headspace Vapors from Fire Debris Samples

E1412 Standard Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Activated Charcoal

E1618 Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography—Mass Spectrometry

E2154 Standard Practice for Separation and Concentration of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Solid Phase Microextraction (SPME)

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

CONTENTS

Page

FOREWORD

In the investigation into the cause of any suspicious fire, the identification of any ignitable liquids that may be present is a key part of the process. The presence or absence of ignitable liquid residues can assist in reaching a conclusion on the cause of a suspicious fire. It is critically important that any information generated is reliable and based on accepted standards of scientific practice.

Because of the volatile nature of ignitable liquids, the procedures involved in packaging, storing, sampling and analysing samples from fire debris need to be defined and carefully controlled to ensure that potential evidence is not lost or altered.

A number of alternatives in sampling, extraction, analysis and interpretation are available. The methodology selected to collect, sample and analyse fire debris can be influenced by numerous factors. The type and amount of sample being analysed, requirements for re-analysis, analysis time and sensitivity are all factors that will influence methodology. It is critical that the methodology and equipment employed are fit for purpose and provide appropriate sensitivity and discrimination.

The utilization of accepted scientific practice in the interpretation and classification of results is also critically important to ensure that the conclusions reached are reliable and verifiable. Because of the nature of fire debris samples, the impact of matrix effects and evaporation can be significant and, for this reason, such factors must be considered when interpreting analytical results.

For reliable interpretation of results, it may be desirable for the analyst to know about relevant aspects of the case. Interpretation of results may be informed by observations regarding the scene from which material was collected. Recent research* suggests the importance of blinding or sequential exposure for reliable interpretation, therefore information that does not directly inform the analysis should be avoided.

* Dror, Itiel E., Charlton, David, Péron, Ailsa E., ‘Contextual information renders experts vulnerable to making erroneous identifications’. *Forensic Science International*; 6 January 2006; 156 (1): 74–78.

STANDARDS AUSTRALIA

Australian Standard
Examination of ignitable liquids in fire debris

1 SCOPE

This Standard specifies requirements and provides guidance for the analysis of fire debris on methods applicable to the determination of the presence of ignitable liquid residues (ILR) in fire debris for forensic purposes.

The overall processes involved in the analysis of ignitable liquids and covered in this Standard are—

(a) packing and storage of fire debris samples;

(b) extraction of sample;

(c) analysis of extract;

(d) interpretation of results;

(e) classification of ignitable liquids; and

(f) reporting of results.

The typical hydrocarbon classes that are normally present in ILR are illustrated in Appendix A.

WARNING: THIS STANDARD CALLS FOR THE USE OF PROCEDURES THAT MAY BE A HEALTH HAZARD OR CAUSE INJURY IF ADEQUATE PROVISIONS ARE NOT TAKEN.

NOTE: The provisions of this document are restricted to qualified scientists, with proven competence in the use of appropriate scientific instruments and techniques in a forensic context.

2 REFERENCED AND RELATED DOCUMENTS

2.1 Referenced documents

The following documents are referred to in this Standard:

AS
2162 Verification and use of volumetric apparatus
2162.1 Part 1: General—Volumetric glassware
2162.2 Part 2: Guide to the use of piston-operated volumetric apparatus (POVA)
2164 Laboratory glassware—One-mark volumetric flasks
2166 Laboratory glassware—One-mark pipettes
2167 Graduated straight pipettes

AS/ISO/IEC
17025 General requirements for the competence of testing and calibration laboratories

ISO
3696 Water for analytical laboratory use—Specification and test methods