AS 3867—1991

Australian Standard®

The qualitative identification of surfactant components in detergents

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The following interests are represented on Committee CH/11:

Australian Chemical Industry Council

Australian Consumers Association

Chemical Confederation of Australia

CSIRO, Division of Food Processing

CSIRO, Division of Wool Technology

Department of Primary Industries and Energy (Commonwealth)

The Royal Australian Chemical Institute

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PREFACE

This Standard was prepared by the Standards Australia Committee on Methods of Test for Detergents under the supervision of the Chemical Standards Board.

It was originally requested by the detergents industry because of the growth in scale and complexity of detergents in the market place and to provide a uniform basis for identifying components by separating them from one another systematically. The scheme thus provided is seen as the logical first step in the complete analysis of detergents.

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STANDARDS AUSTRALIA

Australian Standard
The qualitative identification of surfactant components in detergents

1 SCOPE This Standard sets out a scheme of analysis for the qualitative identification of surfactant components in commercial detergent compositions and in household and personal care products used in Australia. The biodegradability or otherwise of detergents may also be estimated using this scheme. The scheme may also have limited application for other purposes.

NOTE: A list of references for additional reading is included as Appendix A. The use of these references, as appropriate, is recommended for supplementary information.

2 APPLICATION This Standard is for use by laboratories that are required to characterize detergents for comparison, assessment of type or biodegradability characteristics, and which possess facilities for infra-red spectroscopic analysis.

NOTE: This Standard considers only those surfactant components commonly found in detergents in Australia.

3 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS
2162 Code of practice for the use of volumetric glassware

2164 One-mark volumetric flasks

4 DISCUSSION OF SCHEME OF ANALYSIS

4.1 General The scheme of qualitative analysis is illustrated by the flow diagram given in Figure 1. This shows the separation of the constituents of the composition into their major component groupings, using solubility and ion characteristics, and the subsequent characterization of individual components, using spectrographic and chromatographic techniques. Guidelines are here given for infra-red spectroscopy because of its wide availability.

NOTE: Guidance is given in Appendix B on interpreting the infra-red absorption characteristics of anionic and cationic constituents of detergents. Typical absorption band characteristics are shown for these components.

4.2 Constituents for identification There are four categories of constituent which may present themselves for identification in detergents. These are described as follows, under their generic headings.

(a) *Anionic constituents* Anionic constituents are either hydrolysable to acid or non-hydrolysable to acid. Constituents included are as follows:

(i) Acid hydrolysable anionic constituents. These are alkyl sulfate or alkyl ethoxy sulfate, or both, or alkyl phenol ethoxy sulfate.

(ii) Acid non-hydrolysable anionic constituents. These are alkyl sulfonate or alkylbenzene sulfonate, or both.

NOTES:

1 A method for the isolation and identification of acid-hydrolysable anionic constituents is specified in Appendix C.

2 Although soap, which may be present, is an anionic constituent, it is not included above as it appears in a separate fraction during the analysis.

(b) *Non-ionic constituents* Non-ionic constituents most usually included consist of the following types:

(i) Alcohol ethoxylate(s), alkylphenol ethoxylate(s), fatty acid ethoxylate(s).

(ii) Fatty acid alkanolamide, fatty acid alkanolamide ethoxylate(s).

(iii) Glycol(s), glycerol.

(iv) Polyoxyethylene glycol (PEG), polyoxypropylene glycol (PPG), copolymers containing both polyoxyethylene and polyoxypropylene derivatives.

(v) Fatty alcohol, fatty alcohol ethoxylate from the corresponding sulfate anionics, unsulfonated alkane, alkylbenzene.

(c) *Cationic constituents* The common cationic constituents are:

(i) Alkanolamines; present either as an added component or present as neutralizing agents for the anionic constituent.

(ii) Quaternary ammonium compounds.

(d) *Amphoteric constituents* These constituents include betaines and amine oxides.

NOTE: Amphoteric constituents tend to be eluted together with the cationic constituents.

5 PRINCIPLE The detergent material is separated into its major component groupings, in accordance with the flow diagram given in Figure 1. The separate groupings are then characterized by infra-red spectroscopy.