AS 3844—1998

Australian Standard™

Recommended practice for metal analysis by electrochemical stripping techniques

This Australian Standard was prepared by Committee CH/10, Analysis of Metals. It was approved on behalf of the Council of Standards Australia on 18 September 1998 and published on 5 December 1998.

The following interests are represented on Committee CH/10:

Australasian Institute of Mining and Metallurgy

Australasian Railway Association

Australian Aluminium Council

Australian Chamber of Manufactures

Copper Development Association of Australia

National Association of Testing Authorities, Australia

The Royal Australian Chemical Institute

University of New South Wales

Review of Australian Standards. *To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.*

Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

This Standard was issued in draft form for comment as DR 97434.

AS 3844—1998

Australian Standard™

Recommended practice for metal analysis by electrochemical stripping techniques

First published as AS 3844—1998.

Published by Standards Australia
(Standards Association of Australia)
1 The Crescent, Homebush, NSW 2140

ISBN 0 7337 2288 1

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CH/10, Analysis of Metals. This Standard is the result of a consensus among representatives on the Joint Committee to produce it as an Australian Standard.

The objective of this Standard is to provide general guidance to facilitate selection of instrumentation and techniques for metal analysis by electrochemical stripping techniques.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

© Copyright – STANDARDS AUSTRALIA

Users of Standards are reminded that copyright subsists in all Standards Australia publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia. Permission may be conditional on an appropriate royalty payment. Requests for permission and information on commercial software royalties should be directed to the head office of Standards Australia.

Standards Australia will permit up to 10 percent of the technical content pages of a Standard to be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia.

Standards Australia will also permit the inclusion of its copyright material in computer software programs for no royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia at any time.

CONTENTS

Page

SECTION 1 SCOPE AND GENERAL
1.1 SCOPE 5
1.2 PRINCIPLE 6
1.3 REFERENCED DOCUMENTS 6
1.4 DEFINITIONS 6
1.5 REAGENT CONTAINERS 7
1.6 SAFETY PRECAUTIONS 7

SECTION 2 INSTRUMENTATION
2.1 INSTRUMENT DESIGN 8
2.2 POTENTIOSTAT 8
2.3 WAVEFORM GENERATOR 9
2.4 GALVANOSTAT 9
2.5 MEASUREMENT VESSEL 9
2.6 PURGE SYSTEM 9
2.7 SAMPLE MIXER 9
2.8 ELECTRODES 9
2.9 DATA ACQUISITION AND SIGNAL PROCESSING SYSTEM 12
2.10 CHEMICAL INTERFERENCES 12
2.11 SETTING UP THE INSTRUMENT 13

SECTION 3 PREPARATION FOR ANALYSIS
3.1 GENERAL 14
3.2 SAMPLE COLLECTION AND STORAGE 14
3.3 PRETREATMENT OF THE LABORATORY SAMPLE 14

SECTION 4 THE ACCUMULATION PROCESS
4.1 ACCUMULATION 15
4.2 REST PERIOD 15

SECTION 5 THE STRIPPING PROCESS
5.1 ANODIC STRIPPING VOLTAMMETRY (ASV) 16
5.2 ADSORPTIVE STRIPPING VOLTAMMETRY (AdSV) 17
5.3 ADSORPTIVE CATALYTIC STRIPPING VOLTAMMETRY (AdCatSV) . . . 17
5.4 STRIPPING POTENTIOMETRY (SP) 17
5.5 CONSTANT CURRENT STRIPPING POTENTIOMETRY (CCSP) 17
5.6 ADSORPTIVE CONSTANT CURRENT STRIPPING POTENTIOMETRY (AdCCSP) 17

SECTION 6 CALIBRATION AND ANALYSIS
6.1 REAGENTS 18
6.2 VOLUMETRIC GLASSWARE 18
6.3 REFERENCE MATERIALS 18
6.4 QUALITY CONTROL 18

Page

6.5 SETTING UP AN EXPERIMENTAL RUN 18
6.6 QUANTITATION BY STANDARD ADDITIONS 19
6.7 QUANTITATION BY CALIBRATION CURVE 20

SECTION 7 RESULTS AND TEST REPORT
7.1 ACCEPTANCE OF RESULTS 23
7.2 TEST REPORT 24

APPENDICES
A SAFETY PRECAUTIONS FOR HANDLING ELECTROCHEMICAL SYSTEMS 25
B EXAMPLE OF A MERCURY FILM TEST ON A GLASSY CARBON SUBSTRATE 27
C BIBLIOGRAPHY 29

STANDARDS AUSTRALIA

Australian Standard

Recommended practice for metal analysis by electrochemical stripping techniques

S E C T I O N 1 S C O P E A N D G E N E R A L

1.1 SCOPE This Standard sets out recommendations for the selection of stripping techniques (see Figure 1) suitable for the determination of the concentration of metals. Examples of metals that may be determined in the solution phase as electroactive solvated metal ions or inorganic complexes by well established stripping techniques are contained in the list below.

NOTE: Organic and organo metallic compounds which also may be determined by electrochemical stripping techniques are not considered.

Al	Aluminium
Sb	Antimony
As	Arsenic
Bi	Bismuth
Cd	Cadmium
Co	Cobalt
Cr	Chromium
Cu	Copper
Ga	Gallium
Ge	Germanium
Au	Gold
In	Indium
Fe	Iron
La	Lanthanum
Pb	Lead
Mn	Manganese
Hg	Mercury
Mo	Molybdenum
Ni	Nickel
Pd	Palladium
Pt	Platinum
Se	Selenium
Ag	Silver
Tc	Technetium
Tl	Thallium
Th	Thorium
Sn	Tin
Ti	Titanium
U	Uranium
V	Vanadium
Zn	Zinc
Zr	Zirconium

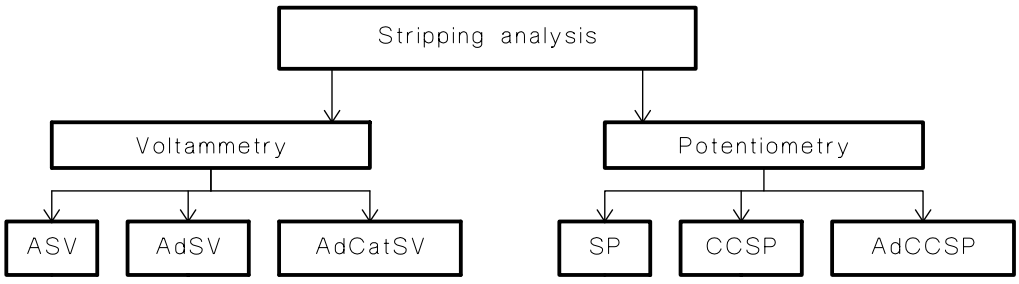

FIGURE 1 METHOD INTER-RELATIONSHIPS (refer to Clause 1.4)

COPYRIGHT