AS 4784—2003
ISO 14887:2000
Reconfirmed 2016

Australian Standard™

Sample preparation for particle size analysis—Dispersing procedures for powders in liquids

Standards Australia

This Australian Standard was prepared by Committee CH-032, Particle Size Analysis. It was approved on behalf of the Council of Standards Australia on 28 February 2003 and published on 10 April 2003.

The following are represented on Committee CH-032:

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This Standard was issued in draft form for comment as DR 02330.

STANDARDS AUSTRALIA

RECONFIRMATION

OF
AS 4784—2003
Sample preparation for particle size analysis—Dispersing procedures for powders in liquids

RECONFIRMATION NOTICE

Technical Committee NT-001 has reviewed the content of this publication and, in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

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Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 9 September 2016.

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Australian Standard™

Sample preparation for particle size analysis—Dispersing procedures for powders in liquids

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PREFACE

This Standard was prepared by the Standards Australia Committee CH-032, Particle Size Analysis. This Standard is identical with and has been reproduced from ISO 14887:2000, *Sample preparation—Dispersing procedures for powders in liquids*.

The objective of this Standard is to help particle size analysts in the preparation of good dispersions from powder/liquid combinations with which they are not experienced. It provides procedures for wetting a powder into a liquid, deagglomerating the wetted clumps, determining if solution composition can be adjusted to prevent reagglomeration, selecting dispersing agents to prevent reagglomeration and evaluating the stability of the dispersion against reagglomeration. This Standard is applicable to particles ranging in size from approximately 0.05 to 100 µm. It provides a series of questions on the nature of the powder and liquid involved. The answers are used with charts that guide the user to generic dispersing agents that are likely to be suitable for dispersing the powder in the liquid.

This Standard applies only to the preparation of simple, dilute dispersions (less than 1% by volume solids) for particle size analysis. It does not deal with the formulation of complex and commercial mixtures highly loaded with solids, such as paints, inks, pharmaceuticals, herbicides and composite plastics.

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number appears on the cover and title page while the International Standard number appears only on the cover.

(b) In the source text, 'this International Standard' should read 'this Australian Standard.'

(c) A full point substitutes for a comma when referring to a decimal marker.

(d) Substitute 'mL' for 'ml' wherever it appears.

(e) The following corrections should be made:

  (i) Page 2, Clause 4, line 4, IS, *replace* 'ionic strength '(mol/m^3)' with '(mol/dm^3)'.

  (ii) Page 7, Clause 8.5:

    (A) In Item (a) *replace* '8.4.1' with '8.5.1';

    (B) In Item (b) *replace* '8.4.2' with '8.5.2';

    (C) In Item (c) *replace* '8.4.3' with '8.5.3'.

  (iii) Page 20, in the Note under Table B10, *replace* 'amminium' with 'ammonium'.

(f) The ISO document listed as a normative reference in Clause 2 has not been adopted as an Australian Standard.

CONTENTS

INTRODUCTION

The evaluation of particle size distribution is of crucial importance for research projects, product development, process control, quality control, and other technical activities where particle size effects are important. Paints, inks, filled plastics, ore processing, pharmaceuticals, agricultural and cosmetic products depend on accurate particle size analysis for their commercial production.

A typical powder is composed of clumps of “primary" particles that are held together by weak or strong forces. The size of clumps remaining after the powder has been wetted into a liquid depends in part on how much energy has been expended in breaking up these clumps. Since a clump responds to most particle sizing methods as a large particle would, the presence of clumps in incompletely dispersed samples skews the reported particle size distribution to larger sizes than if all the clumps were broken up. A particle size analysis is useful only if the sample is prepared so that the particles are in a well-defined degree of dispersion, preferably one in which most clumps are fully deagglomerated and in which the particles do not reagglomerate or adhere to the walls of the sample container during the time required for analysis.

While "complete" dispersion to primary particles is often desired, it is important to remember that in many cases the most useful information is obtained when the sample is not fully dispersed. For example, if a customer blends the powder into a liquid using a low-shear process that does not break moderately strong bonds in the clumps, the quality control tests for powder intended for that customer should use similarly low shear during sample preparation and analysis.

Because of the impurities present, the equipment available for breaking up clumps, the methods used for particle size analysis, and the dispersing agents available for testing may vary from one site to another, the procedure developed at one site by applying the guidelines in this International Standard may differ from (but be as valid and as useful as) that developed at another site for the same powder.

A list of references for further study, including standards for evaluation of some of these more complex systems, is given in the bibliography.

Annex A discusses some of the complications that arise

— when the powder has a surface treatment or soluble components;

— when the liquid contains ionic or polymeric solutes;

— when the dispersing agent contains minor ingredients.

Annex B covers the classification of commercial dispersing agents in the various dispersing agent categories.

AUSTRALIAN STANDARD

Sample preparation for particle size analysis— Dispersing procedures for powders in liquids

1 Scope

This International Standard was developed to help particle size analysts make good dispersions from powder/liquid combinations with which they are not experienced. It provides procedures for

— wetting a powder into a liquid;

— deagglomerating the wetted clumps;

— determining if solution composition can be adjusted to prevent reagglomeration;

— selecting dispersing agents to prevent reagglomeration;

— evaluating the stability of the dispersion against reagglomeration.

This International Standard is applicable to particles ranging in size from approximately 0,05 to 100 µm. It provides a series of questions on the nature of the powder and liquid involved. The answers are used with charts that guide the user to generic dispersing agents that are likely to be suitable for dispersing the powder in the liquid.

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2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 8213:1986 *Chemical products for industrial use — Sampling techniques — Solid chemical products in the form of particles varying from powders to coarse lumps.*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1
agglomerate
assemblage of particles which are loosely coherent

SEE **floc** (3.5)