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Colloidal systems — Methods for zeta potential determination —

Part 3: Acoustic methods

Systèmes colloïdaux — Méthodes de détermination du potentiel zêta —

Partie 3: Méthodes acoustiques

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 24, *Particle characterization including sieving*, Subcommittee SC 4, *Particle characterization*.

ISO 13099 consists of the following parts, under the general title *Colloidal systems — Methods for zeta potential determination*:

— *Part 1: Electroacoustic and electrokinetic phenomena*

— *Part 2: Optical methods*

— *Part 3: Acoustic methods*

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Introduction

Zeta potential is a parameter that can be used to predict the long term stability of suspensions and emulsions, and to study surface morphology and surface adsorption of particles and other surfaces in contact with a liquid. Zeta potential is not a directly measurable parameter. It can be determined using appropriate theoretical models from experimentally determined parameters, which depend on electric charge separation at interfaces. “Electrokinetic phenomena” encompass such experimentally observed effects. A group of electrokinetic phenomena at high frequency on MHz scale is referred to as “electroacoustics”.[1] Each classical electrokinetic phenomenon at DC or low AC conditions has electroacoustic analogue. These electroacoustic phenomena have been widely used to determine electrophoretic mobility of various concentrated particulates without sample dilution. The purpose of this part of ISO 13099 in methods for Zeta potential determination is description of general features of such electroacoustic methods that should be common for all instrumental implementation for measuring electrophoretic mobility using electroacoustics and following calculation of zeta potential of particulates.

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Colloidal systems — Methods for zeta potential determination —

Part 3: Acoustic methods

1 Scope

This part of ISO 13099 describes in general electroacoustic effects that can be defined as high frequency electrokinetic phenomena.

Particular attention is given to two methods of measurement of electrophoretic mobility of particles suspended in a liquid at high concentration above 1 % v/v, colloid vibration current (CVI)[2] and electric sonic amplitude (ESA),[3] [4] respectively.

Estimation of surface charge and determination of zeta potential can be achieved from measured electrophoretic mobility using proper theoretical models, which are described in detail in ISO 13099-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13099-1, *Colloidal systems — Methods for zeta-potential determination — Part 1: Electroacoustic and electrokinetic phenomena*

ISO 13099-2, *Colloidal systems — Methods for zeta-potential determination — Part 2: Optical methods*

3 Terms, definitions and symbols

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

3.1 **Electric double layer** (EDL)

The electric double layer (EDL) is a spatial distribution of electric charges that appears on and at the vicinity of the surface of an object when it is placed in contact with a liquid.

3.1.1
Debye-Hückel approximation
model assuming small electric potentials in the electric double layer

3.1.2
Debye length
κ^{-1}
characteristic length of the electric double layer in an electrolyte solution

Note 1 to entry: The Debye length is expressed in nanometres.

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