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English Version

Characterization of sludges - Protocol for preparing synthetic suspensions

Caractérisation des boues - Protocole de préparation de suspensions synthétiques

Charakterisierung von Schlämmen - Protokoll zur Herstellung synthetischer Suspensionen

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Foreword

This document (CEN/TR 16394:2014) has been prepared by Technical Committee CEN/TC 308 "Characterization of sludges", the secretariat of which is held by AFNOR.

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Introduction

In order to carry out lab-scale tests of suspensions, and interlaboratory validation trials for standardized methods, it is necessary to have samples with constant characteristics available. When dried suspension samples cannot be used and testing requires fresh sludge samples, problems arise because:

- a) most suspension characteristics change over time, which makes them unfit for storage;
- b) some preservation practices (e.g. freezing) are not applicable, or their effects unknown;
- c) some suspension characteristics are strongly affected by handling;
- d) transporting sludge samples requires special precautions and authorization.

This means that fresh suspension samples cannot be used to guarantee results reliability and reproducibility. As a consequence, fresh suspension samples should be examined by laboratories very close to wastewater or waterworks plants and analysed as soon as possible, minimizing their manipulation. As a result, the circulation of fresh suspension samples to laboratories in several countries is analytically not feasible. Interlaboratory analysis on these suspensions should be carried out through circulation of analysts, close to the place where samples are collected according to the Modified Round Robin tests procedure (CEN/TR 15252).

A valid alternative is the creation and testing of synthetic suspensions.

Synthetic suspensions are prepared on-site on the basis of a defined recipe and specified ingredients. This will also allow the comparison of results obtained from different places, at different times.

This Technical Report establishes methods for preparing synthetic suspensions, both inorganic and organic, in repeatable and quantified conditions, able to describe the behaviour of a real suspension with regard to specific parameters, and suitable for circulation as samples in interlaboratory trials for validation of standards when fresh suspensions cannot be used. It represents the state of the art of the available knowledge on synthetic suspensions.

1 Scope

This Technical Report deals with methodologies for preparing synthetic suspensions. Synthetic suspensions can be used for:

- a) evaluating or testing new devices or techniques for suspension treatment;
- b) studying the influence of different compounds on suspension behaviour with regard to specific parameters, e.g. settleability, dewaterability, physical consistency, etc.

The chemical, physical and biological characteristics of suspensions are subjected to changes as soon as they are collected. Guidance exists on the sampling and handling techniques (see ISO 5667-12 and EN ISO 5667-13), and on the preservation and storage procedures (EN ISO 5667-15) that help minimize changes in the composition. This is mainly achieved by suppressing chemical and/or biological activity and by avoiding contamination.

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.

EN 12832:1999, *Characterization of sludges - Utilization and disposal of sludges - Vocabulary*

EN ISO 17353, *Water quality - Determination of selected organotin compounds - Gas chromatographic method (ISO 17353)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12832:1999 apply.

4 Preparation of inorganic synthetic suspensions

4.1 General

The procedure specified in this Technical Report refers to the preparation of inorganic synthetic suspensions to simulate the behaviour of real inorganic suspensions. Inorganic suspensions produced by waterworks plants exhibit wide variations in their physical and chemical properties due to the raw water differences and the design and operation of each individual treatment plant. Many different products could be used for preparation of such suspensions depending on the properties to be evaluated.

Quartz sand, calcite and kaolin are the three most commonly used minerals in large industrial sectors. Hence, a combination of these three minerals is perfectly suited to simulate the behaviour of real inorganic suspensions. Role and characteristics of such materials have been discussed in [6] and [7].

4.2 Materials

Primary particle properties, such as particle shape, size distribution, specific surface area, density, surface structure, dry bed porosities, as well as their dispersion properties, for example solid concentration, or pH, have a strong influence on the physical properties of inorganic suspensions (e.g. compressibility, settleability, specific resistance), which have to be known and defined for a standardized synthetic suspension.

Table 1 gives an example of the main characteristics of kaolin, calcite, and quartz sand [6].