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Karaktärisering av avfall – Statisk test för bestämning av syrabildnings- och neutraliseringspotential i sulfidhaltigt avfall

Characterization of waste – Static test for determination of acid potential and neutralisation potential of sulfidic waste

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15875

October 2011

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English Version

Characterization of waste - Static test for determination of acid potential and neutralisation potential of sulfidic waste

Caractérisation des déchets - Essai statique pour la détermination du potentiel de génération d'acide et du potentiel de neutralisation des déchets sulfurés

Charakterisierung von Abfällen - Statische Prüfung zur Bestimmung des Säurebildungspotenzials und des Neutralisationspotenzials von sulfidhaltigen Abfällen

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Foreword

This document (EN 15875:2011) has been prepared by Technical Committee CEN/TC 292 “Characterization of waste”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

The preparation of this document by CEN is based on a mandate by the European Commission (Mandate M/395), which assigned the development of standards on the characterization of waste from extractive industries.

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Introduction

This document has been developed primarily to support the implementation of the Directive 2006/21/EC of the European Parliament and of the council on the management of waste from the extractive industries, especially relating to technical requirements for waste characterization as sulfide bearing materials may generate sulfuric acid when subjected to weathering.

Test methods for the determination of acid generation behaviour can be divided in static and kinetic tests. A static test is usually relatively fast to perform, but gives only indicative information based on total composition of the waste material. The kinetic test gives more detailed information on behaviour based on reaction rates under specified conditions. This standard only covers static testing.

The application of this test method alone may not be sufficient to determine the actual potential in the field for the formation of acidic drainage as site specific conditions will affect the behaviour in the field and require a more detailed assessment.

To carry out a more precise assessment of the acid generation potential and buffering capacity mineralogical information is required. A number of special cases can be identified: e.g. presence of sulfate (e.g. gypsum), non-acid producing sulfides or carbonates with no buffering capacity. Acid neutralisation behaviour as obtained by other methods can provide additional information in circumstances of uncertainty.

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1 Scope

This European standard specifies methods to determine the potential of sulfide bearing materials for the formation of acidic drainage. Specified are methods for determining both the acid potential (AP) and the neutralisation potential (NP) of the material. From these results the net neutralisation potential (NNP) and the neutralisation potential ratio (NPR) are calculated.

This European standard is applicable to all sulfide bearing wastes from the extractive industries excluding wastes which will have pH < 2 in the initial step of the procedure described in 8.2.3.

2 Normative references

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

EN 13137:2001, *Characterization of waste — Determination of total organic carbon (TOC) in waste, sludges and sediments*

EN 14346, *Characterization of waste — Calculation of dry matter by determination of dry residue or water content*

EN 14582, *Characterization of waste — Halogen and sulfur content — Oxygen combustion in closed systems and determination methods*

EN 14899, *Characterization of waste — Sampling of waste materials — Framework for the preparation and application of a Sampling Plan*

EN 15002, *Characterization of waste — Preparation of test portions from the laboratory sample*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 15178, *Soil quality — Determination of total sulfur by dry combustion*

ISO 16720, *Soil quality — Pretreatment of samples by freeze-drying for subsequent analysis*

3 Terms and definitions

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

3.1
laboratory sample
sample sent to or received by the laboratory

3.2
test sample
sample, prepared from the laboratory sample, from which test portions are removed for testing or analysis

3.3
test portion
quantity of material of proper size, for measurement of the concentration or other properties of interest, taken from the test sample

NOTE The test portion may be taken from the laboratory sample directly if no preparation of sample is required (e.g. samples of proper homogeneity, size and fineness).

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3.4
acid potential
maximum potential acid generation from a sample assuming that all sulfur occurs as pyrite and that acidity will result from its complete oxidation

3.5
neutralisation potential
capacity of a sample to neutralise the generated acidity

3.6
carbonate rating
carbonate content of the sample used to specify the volume(s) of acid to be added during the procedure

NOTE In this European standard the carbonate rating to specify the volume(s) of acid to be added during the procedure is described in 8.2.3.

3.7
net neutralisation potential
difference between neutralisation potential and acid potential

3.8
neutralisation potential ratio
ratio of neutralisation potential and acid potential

4 Symbols and abbreviations

AP	acid potential
NP	neutralisation potential
CR	carbonate rating
M_d	dry mass of the test portion
M_w	un-dried mass of the test portion
m_d	mass after drying at 105 °C
m_w	mass before drying
M_s	molecular weight of sulfur
NNP	net neutralisation potential
NPR	neutralisation potential ratio
$t = 0$	time at the start of the test (after 15 min ± 5 min stirring)
$V_{A/B}$	volume of acid or base added
$V_{A,\ t=0}$	volume of acid added at $t = 0$
$V_{A,\ t=22h}$	volume of acid added at $t = 22$ h
w_{dr}	dry residue of the sample

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5 Principle

This test method consists of four steps:

— Determination of total sulfur by bomb (EN 14582) or high temperature combustion (ISO 15178) and calculation of acid potential (AP). Instead of total sulfur, sulfides may be determined using techniques described in the informative Annex C.

— Determination of carbonate content by dry combustion (EN 13137:2001, method A) to give the carbonate rating (CR).

— Determination of the neutralisation potential (NP) by hydrochloric acid addition to reach pH = 2 to 2,5 and back titration with sodium hydroxide to reach pH = 8,3 after reaction time of 24 h.

— Calculations of the net neutralisation potential (NNP) and the neutralisation potential ratio (NPR) based on AP and NP.

AP and NP are expressed as H^+ content in mol/kg. The conversion factor is given for expression as carbonate equivalents ($CaCO_3$) in kg/t.

6 Reagents and laboratory devices

6.1 Reagents

6.1.1 Distilled or demineralised water

6.1.2 Hydrochloric acid (analysis grade), *c*(HCl) = 1 mol/l

6.1.3 Sodium hydroxide (analysis grade), *c*(NaOH) = 0,1 mol/l

6.2 Laboratory devices

6.2.1 Analytical balance, with an accuracy of 0,05 g

6.2.2 Bottles or vessels (250 ml) made of inert material such as glass or high density polyethylene (HDPE) or polypropylene (PP) and supplied with a lid of inert material (e.g. PTFE). Rinsing is compulsory. When using magnetic bar in stirring (see 6.2.4) it is crucial to use a test vessel or bottle with flat bottom in order to guarantee good mixing.

6.2.3 Size reducing equipment, e.g. a jaw crusher, rotary swing mill, ball mill or similar device.

6.2.4 Stirring device or magnetic stirring device with magnetic bar coated with PTFE. The parts in contact with the sample and reagents shall be made of materials not affecting the outcome of the test like glass, PTFE.

6.2.5 pH meter with a measurement accuracy of at least ± 0,05 pH units.

6.2.6 Sample dividers (e.g. rotary splitter or riffle divider)

6.2.7 Sieves, conforming to the requirements of ISO 3310-1, with screen size of 0,125 mm.

7 Sampling and sample preparation

7.1 Laboratory sample

Perform sampling in accordance with EN 14899 in order to obtain a representative laboratory sample.

The laboratory sample shall have a mass of at least 1 kg (dry mass).