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Performance evaluation of treatment technologies for water reuse systems —

Part 9: Guidelines and requirements for electro-chlorination

Évaluation des performances des techniques de traitement des systèmes de réutilisation de l'eau —

Partie 9: Lignes directrices et exigences relatives à l'électrochloration

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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.

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This document was prepared by Technical Committee ISO/TC 282, *Water reuse*, Subcommittee SC 3, *Risk and performance evaluation of water reuse systems*.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Chlorination is usually used as the final process in the treatment for water reuse, as mentioned in ISO 20468-1. The chlorination process is used to add and maintain the minimum level of chlorine in a water reuse distribution system. The chlorination process controls contamination sources with residual chlorine to prevent the regrowth of microorganisms and contamination during the distribution of reclaimed water. The advantages of the conventional chlorination process are its low price and strong persistence, which distinguish it from other oxidizer-based disinfectants. However, a disadvantage of chlorine is that it generates disinfection by-products. Water quality regulations are being strengthened in this regard. In addition, the major disadvantage of chlorine is that it is a toxic substance, which puts a burden on transport, storage and maintenance.

Electro-chlorination is drawing attention as a solution to the problems of conventional chlorination methods. It is a technology that generates sodium hypochlorite (NaOCl) through an electrochemical reaction produced by flowing electric current. The generated sodium hypochlorite controls the organic contaminants and pathogenic microorganisms present in the water. However, despite the safety of the electrolysis method, the sterilization and disinfection efficiency cannot be stably maintained because the residual chlorine concentration is not constant, and the maintenance cost, including electricity cost, is high. In addition, the maintenance and storage of the resulting sodium hypochlorite represent challenges.

This document presents evaluation methods of electro-chlorination and provides guidelines for the performance evaluation of this method.

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Performance evaluation of treatment technologies for water reuse systems —

Part 9:
Guidelines and requirements for electro-chlorination

1 Scope

This document provides guidelines and requirements to evaluate the performance of the method to produce sodium hypochlorite (NaOCl) by electro-chlorination (EC), and to evaluate its disinfection performance for water reuse treatment. It provides a system for evaluating water quality to verify the performance of EC through general parameters, such as the concentration of residual chlorines obtained by electrolysis.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 20670, *Water reuse — Vocabulary*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in ISO 20670 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terms and definitions

3.1.1
electrolysis
process that uses electric energy to cause nonspontaneous electrochemical reactions that result in the decomposition of substances

Note 1 to entry: *Sodium hypochlorite (NaOCl)* (3.1.11) is generated by an oxidation-reduction reaction, which is caused when an *electrode* (3.1.3) is inserted into an *electrolyte* (3.1.2) (e.g. NaCl) aqueous solution and electricity is supplied from the outside.

3.1.2
electrolyte
medium in which an electric current is transported by ions

[SOURCE: ISO 8044:2020, 7.1.1]

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