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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 14643.1-2009

Replacing GB/T 14643.1-1993

**Examination of bacteria and algae in industrial circulating
cooling water - Part 1: Examination of bacteria formed deposits
- Standard of plate count**

工业循环冷却水中菌藻的测定方法 第1部分：粘液形成菌的测定 平皿计数法

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Foreword

GB/T 14643 Examination of Bacteria and Algae in Industrial Circulating Cooling Water is divided into the following parts. - Part 1. Examination of bacteria formed deposits Standard of plate count - Part 2. Examination of soil bacteria Standard of plate count - Part 3. Examination of slime fungus Standard of plate count - Part 4. Examination of soil fungus Standard of plate count - Part 5. Examination of sulfate reducing bacteria MPN method - Part 6. Examination of iron bacteria MPN method This Part is part 1 of GB/T 14643. This Part replaces GB/T 14643.1-1993 Industrial circulating cooling water--Examination of bacteria formed deposits - Standard of plate count Compared with GB/T 14643.1-1993, there is no difference in technical content, except that the text structure and wordings are modified. This Part was proposed by China Petroleum and Chemical Industry Association. This Part shall be administered by Water Treatment Agent Subcommittee of National Standardization Technical Committee in Chemistry (SAC/TC 63/SC 5). Responsible drafting organizations of this Part. CNOOC Tianjin Chemical Research & Design Institute, and Shanghai Weilai Enterprise Co., Ltd. Main drafters of this Part. Zhu Chuanjun, Liu Xin, Zhang Quan, Bai Ying, and Li Lin. This part was first issued in 1993. Examination of bacteria and algae in industrial circulating cooling water - Part 1. Examination of bacteria formed deposits - Standard of plate count

1 Scope

GB/T 14643.1-2009 is the Chinese national standard on examination of bacteria and algae in industrial circulating cooling water - part 1: examination of bacteria formed deposits - standard of plate count, in the field of chemical technology. The /T suffix marks it as a

recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 18 May 2009 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 February 2010. Classification: ICS 71.040.40, CCS G76. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This Part of GB/T 14643 specifies examination of bacteria formed deposits in industrial circulating cooling water. This part applies to the examination of heterotrophic bacteria in suspended slime in industrial circulating cooling water, and the examination of heterotrophic bacteria in deposited slime in industrial circulating cooling water. It also applies to the examination of slime heterotrophic bacteria in raw water, domestic water and other water.

2 Normative references

The articles contained in the following documents have become part of this Part when they are quoted herein. For the dated documents so quoted, all the modifications (excluding corrections) or revisions made thereafter shall not be applicable to this Standard. For the undated documents so quoted, the latest editions shall be applicable to this Standard.

GB/T 603 Chemical reagent--Preparations of reagent solutions for use in test methods (GB/T 603-2002, ISO 6353-1.1982, NEQ)

GB/T 6682 Water for analytical laboratory use - Specification and test methods (GB/T 6682-2008, ISO 3696. 1987, MOD)

3 Method summary

In this method, No. 25 plankton net is used to collect the slime in circulating cooling water, the collected slime is fully grinded with quartz sand to make the cell scattered, and then plate counting technique is used to cultivate them under $(29\pm 1)^{\circ}\text{C}$ for 72h to measure the total number of heterotrophic bacteria in the slime.

4 Reagents and materials

Unless otherwise specified, the reagents in this part shall be analytical reagent and shall be compliance with the provisions of Grade-3 water in GB/T 6682. Preparations and products needed in the trial shall be prepared and based on the provisions of GB/T 603 if there is no other requirement.

7.4 Cultivation When the culture medium (7.3.7) is solidified in the petri dish, INVERT the

plate. CULTIVATE it for 72 h in the biochemistry incubator at (29 ± 1) °C.

8 Counting and report

8.1 After cultivation, TAKE out the petri dish. If colonies occur on the blank petri dish, it indicates that pollution exists during the examination and this examination is invalid.

8.2 SELECT the degree of dilution with average colony count in the range of 30-300. COUNT immediately. GET the average colony count. And ROUND off the results into two significant figures (see example 1 in Table 1).

8.3 If there are two degrees of dilution, and their growing colony counts are in the range of 30-300, then it shall be decided by the ratio between them. If the ratio is smaller than 2, the average shall be reported; if the ratio is greater than 2, the smaller one shall be reported (see sample 2 and sample 3 in Table 1).

8.4 If the average number of colonies of all dilutions exceeds 300, it shall select the petri dish with the highest dilution to count (see Example 4 of Table 1).

8.5 If the average number of colonies of all dilutions is less than 30, it shall select the petri dish with the lowest dilution to count (see Example 5 of Table 1).

8.6 If all dilution degrees have no colony growth, it shall report in accordance with "< 1 x (the minimum dilution ratio)" (see Example 6 of Table 1).

8.7 If average colony count for all the degrees of dilution does not fall in the range of 30-300, which means part of them is greater than 300 and part of others is less than 30, then it selects the petri dish, of which the average colony count is the most close to 30 or 300, for count (see example 7 in Table 1).

8.8 The number of mucus-forming bacteria is expressed by p, in unit of pieces per milliliter (pcs/mL), and CALCULATE in accordance with Formula (2). Where. X1 - The average number of colonies calculated in accordance with (8.2) on the petri dish, in the unit of pcs; V - The amount of slime calculated in accordance with (7.1.3), in the unit of ml/m³; V3 - Numerical value of volume of the slime used for examination, in the unit of mL; K - For examination in accordance with (7.1.4), the ratio of volume (V3) of the slime taken and the total volume (V2) of the slime; F - Dilution degree of samples of count group. Table

1 Examples Dilution and colony count The ratio of the number of colonies for two kinds of dilution degree The total number of slime-forming bacteria / (pcs/mL) Report Pattern
(pcs/mL) 10⁻¹ 10⁻² 10⁻³ 1 - 164 20 - 16400 1.6x10⁴ 2 - 295 46 1.6 37750 3.8x10⁴ 3 - 271 60 2.2 27100 2.7x10⁴ 4 >6500 Estimation 313 - 313000 3.1x10⁵ 5 27 11 5 - 270 2.7x10² 6 0 0 0 - < 1x10³ < 10 7 - 306 12 - 30600 3.1x10⁴

9 Precision

9.1 Because the microbes can exist in the form of individuals, pairs, chains, clusters or groups, etc., and there is no single culture medium that can meet physiological requirements of all bacteria in a water sample. Therefore, the number of colonies obtained from the method may be less than the number of normal living cells.

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