

Study on new bioassay methods for sewage treatment water

Whole term

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(Purpose)

Bioassay methods, such as mutagenicity test for organisms, have received attention as a general index of safety, along with the increasing social interest in water safety and water quality conservation in water environment during the recent years.

Accordingly, Public Works Research Institute entrusted Japan Institute of Wastewater Engineering Technology to do a study investigating bioassay methods which are used to evaluate the safety of water quality. The study, with the purpose of establishing the safety evaluation method, conducted literature review about safety evaluation methods by bioassay (mutagenicity test, and so on) and a bioassay experiment was conducted using standard reference materials by a representative method.

(Results)

Literature review was conducted on the following items.

1. Sample concentration method for bioassay

Resin column absorption method (XAD-2 and so on), solvent extraction method, blue rayon absorption method, freeze drying concentration method and hollow fiber membrane concentration method.

2. Bioassay for water safety

Representative mutagenicity tests (Ames test, umu test, Rec-Assay)

Basic information on sample concentration methods and mutagenicity tests were obtained through literature review. *Bacillus subtilis* Rec-Assay liquid method was selected as a mutagenicity test, and accordingly, a bioassay experiment was conducted using standard reference materials and the mutagenicity was observed. The results are as follows.

Test result of the standard reference materials

Standard reference material	S-9 mix	R50	Mutagenicity
4 NQO (4-nitroquinolone-oxide)	+		Negative
	-	14.1	Positive
MMC (mitomycin-C)	+	6.76	Positive
	-	6.47	Positive
TCE (trichloroacetic)	+		Impossible to judge
	-		Impossible to judge

Metabolic activator S-9 mix: +

Buffer instead of S-9 mix: -

R50 (50% lethal concentration ratio)

$$= C50 \text{ Rec}^+ (50\% \text{ lethal concentration of Rec}^+) / C50 \text{ Rec}^- (50\% \text{ lethal concentration of Rec}^-)$$

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Keywords

Mutagenicity test, *Bacillus subtilis* Rec-Assay liquid method