Water quality improvement project for textile dyeing industry using active oxygen technology in Vietnam

Ministry of the Environment
Government of Japan

Location

Vietnam (Mainly in the northern region)

Implementation systems

Japan side

- Global Environment Centre Foundation(GEC)
- WEF Institute of Technology Inc.

Vietnam side

- Institute of Science and Technology for Energy and Environment, Vietnam Academy of Science and Technology（VAST-ISTEE）

Background

- The dyeing industry generates large volumes of wastewater and, in some cases, requires significant investment to remove recalcitrant organic substances and colored water. However, many factories have difficulty complying with wastewater discharge standards (COD, color, etc.), resulting in water pollution in surrounding areas.
- These substances are efficiently broken down by active oxygen technology to solve the problems. The technology reduces the operational costs of existing wastewater treatment facilities, such as chemicals and sludge disposal, and promotes local commercialization to realize an optimal treatment system.

Project outline

- This study investigates current status, challenges, and technical needs related to wastewater in the textile dyeing industry. By demonstrating the water quality improvement effects and overall effectiveness of the proposed technology to relevant stakeholders, the study aims to confirm its acceptability and applicability. Based on the results of the study, a business plan will be developed to expand sales channels for active oxygen technology in the water treatment field.

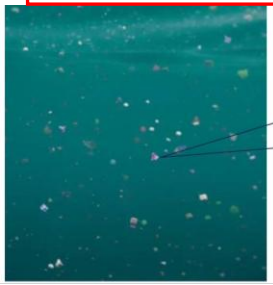
Outline of Technology

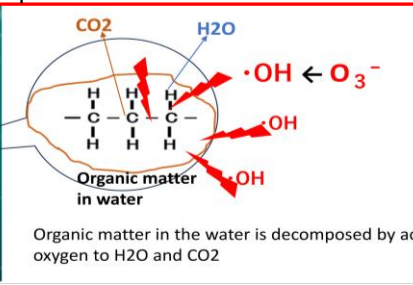
- The active oxygen generation device is a proprietary technology (patented) that utilizes the strong oxidative decomposition power of hydroxyl radicals generated during the generation process combined with ozone. It is effective in reducing the volume of waste such as sludge.
- In the water sector, the technology is highly effective in decomposing recalcitrant organic substances and in decolorization. It can be applied to dyeing wastewater, etc. facing these issues, thereby contributing to the resolution of local environmental problems.

1: $\cdot O_2^- + O_3 \rightarrow O_3^- + O_2$ **(Generation of Ionized ozone)**
- Ionized ozone is produced by reacting superoxide with ozone.

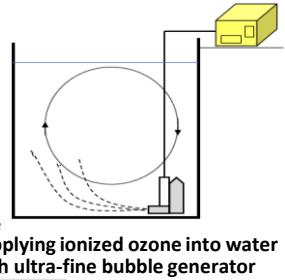
2: $O_3^- + H^+ \rightarrow HO_3\cdot$

$HO_3\cdot \rightarrow \cdot OH + O_2$ **(Formation of Hydroxyl radical)**
- Ozonized ozone is protonated in water to form ·OH.





Organic matter in the water is decomposed by active oxygen to H2O and CO2



Supplying ionized ozone into water with ultra-fine bubble generator

Expected results and business prospects

- The pollution load on coagulation-sedimentation and biological treatment can be reduced by introducing the technology into wastewater with high concentrations of dyeing and scouring processes and containing recalcitrant substances. This leads to a decrease in the amount of chemicals and sludge disposal in these processes, thereby contributing to reduced maintenance costs.
- If dyeing wastewater is discharged without proper decolorization, it may cause complaints from nearby residents and raise concerns about the safety of water used for irrigation.
- A business model for equipment installation and maintenance in the local market will be developed through collaboration with local engineering companies and distributors.