Next-Generation Environmental Purification System

Measurement: W4,800mm X L3,800mm X H2,800mm

We design, manufacture, and sell water and gas purification treatment equipment using activated carbon.

No need to exchange activated carbon

Auto-Regeneration On-site

Patent Technology

UNIDO ITPO Tokyo's STePP Sustainable Technology Promotion Platform

Our technology is registered with the UNIDO STePP.

We offer a wide range of products, from custom-made to standard and mass-produced equipment that meet customer needs.

JTOP CO., LTD.

4-5-44 Migata-cho, Izumi-city, Osaka 594-0042, Japan
Tel: +81-725-51-3860 / Email: info@jtops.com
URL: https://www.jtops.com

Company Outline

Name	JTOP Co., Ltd.
President	Jiichi Nakaki
Address	4-5-44 Migata-cho, Izumi-city, Osaka
TEL	+81-725-51-3860
FAX	+81-725-51-3861
E-mail	info@jtops.com
URL	https://www.jtops.com
Founding	December 14, 2009
Capital	¥80,000,000.-
Capital Reserve	¥101,202,500.-
Business	- Manufacturing and selling of environmental machinery - Engineering and consulting of environmental problems
Corporate Bonds	MIURA CO., LTD. KINKEN BUILD MAINTENANCE. CO., LTD.

UNIDO ITPO Tokyo's STePP Sustainable Technology Promotion Platform

Our technology is registered with the UNIDO STePP.

Products registered with UNIDO STePP

The UNIDO Tokyo Office provides “STePP”, the Sustainable Technology Promotion Platform, to introduce excellent technologies that contribute to sustainable industrial development in developing and emerging countries.

The criteria for registration are **"superior technologies that contribute to the industrial development of developing and emerging countries"** and are judged based on the following five technical criteria and the business attitude of the company.

1. Applicability in developing and emerging countries
2. Comparative advantage over competing technologies
3. Consistency with UNIDO's role in industrial development
4. Contribution to sustainability if the technology is applied.
5. Technological maturity

(http://www.unido.or.jp/en/)

UNIDO ITPO Tokyo's STePP Sustainable Technology Promotion Platform

Confirmation Letter of Registration

The United Nations Industrial Development Organization, Investment and Technology Promotion Office, Tokyo (UNIDO ITPO Tokyo) helps developing and emerging countries and economies in transition in their efforts to achieve inclusive and sustainable economic development with promotional activities of foreign direct investment and technology transfer from Japan.

This letter is to confirm registration of the technology below to the Sustainable Technology Promotion Platform (STePP) of UNIDO ITPO Tokyo(http://www.unido.or.jp/en/).

Name of the Company: JTOP Co.,Ltd.
Name of the Technology: On-site Regeneration System of Activated Carbon Filtration Unit
Registration Date: 30 May, 2019

*Note 1:
UNIDO ITPO Tokyo's Sustainable Technology Promotion Platform (STePP) is designed to share information on Japanese technologies that contribute to sustainable industrialization, in order to promote the transfer of such technologies to developing and emerging countries.

*Note 2:
The technologies are reviewed and checked before registration to the platform by the UNIDO Evaluation Committee based on the following criteria and the corporate's business policy.
1) Applicability in Developing and Emerging Countries
2) Competitive Advantage
3) Conformity with UNIDO's Mandate of Industrial Development
4) Contribution to Sustainability
5) Technical Maturity

Yuko Tonooka
Head

UNIDO | United Nations Industrial Development Organization
Investment and Technology Promotion Office, Tokyo (ITPO Tokyo)

Features

Treatment system that enables on-site regeneration of activated carbon

1. Breakthrough system with patented technology
2. Low cost
3. Space-saving design
4. Low sludge
5. Easy to install
6. Easy to operate
7. Reduced environmental impact
8. Compatible with various wastewater and waste gas treatment

UNIDO ITPO Tokyo's STePPP Sustainable Technology Promotion Platform

Our technology is registered with the UNIDO STePP.

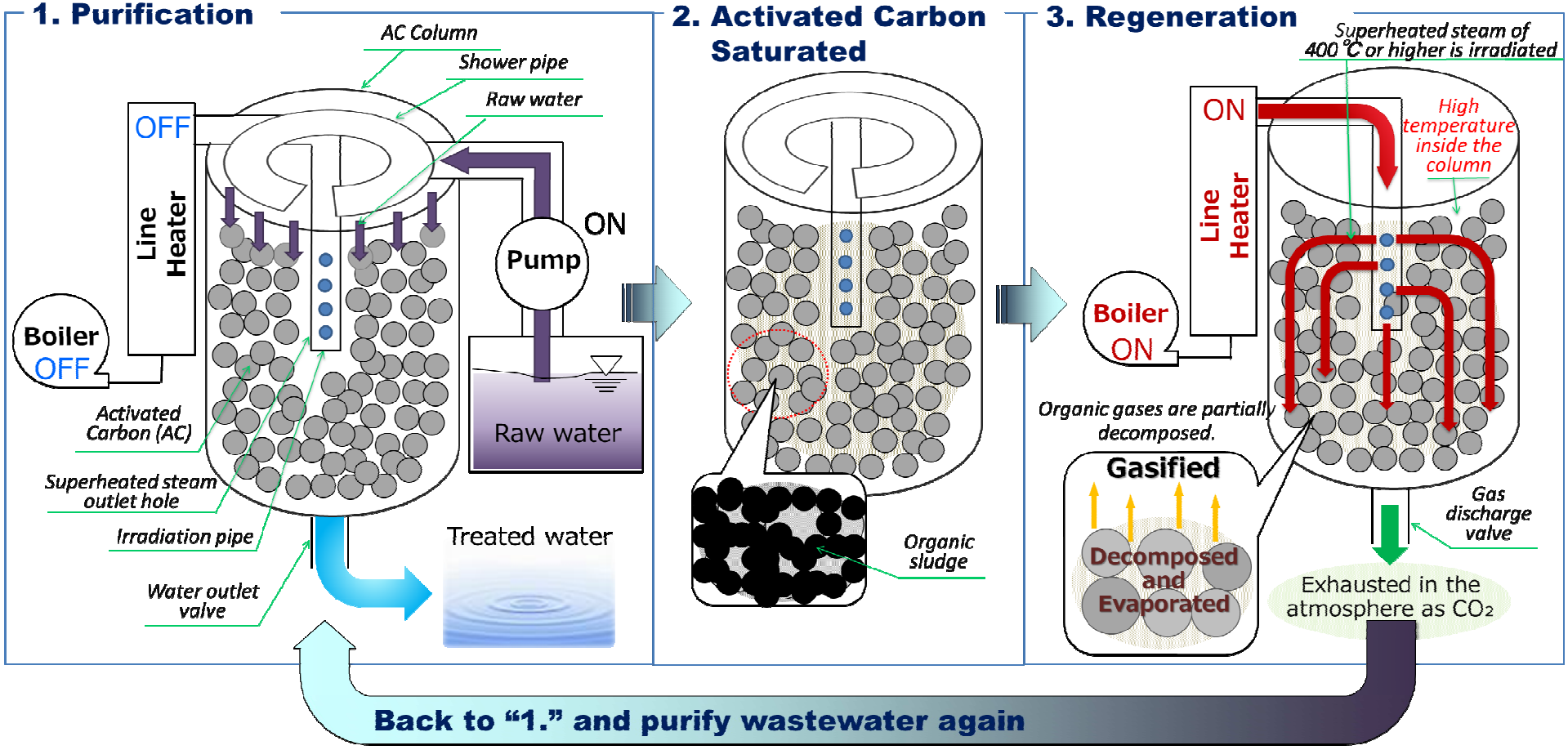
List of important patents

Application	Special Disclosure	Patent Registration #	Title of Invention	Patent info URL
2008-204555	2010-036155	**4335292**	"Water Treatment Equipment and Water Treatment Method"	https://www.j-platpat.inpit.go.jp/c1800/PU/JP-4335292/7B4043066693754BF97F71283355D6A239CD22E9D848A282558660C51D69F749/15/ja
2020-088988	2021-154265	**6813863**	**Joint Patent with MIURA Co., Ltd.** "Adsorbent regenerator, adsorbent regeneration method and adsorbent cooling method"	https://www.j-platpat.inpit.go.jp/c1800/PU/JP-6813863/FD5CBF72EBDAD762A4CEFD881E5DA673299AA09678F280CC072EA10BB68C19FF/15/ja
2020-147281	2021-154271	**6875714**	**Joint Patent with MIURA Co., Ltd.** "Adsorbent regenerator and adsorbent cooling method"	https://www.j-platpat.inpit.go.jp/c1800/PU/JP-6875714/8667A608BDFADD10658FC43ABA77B5F41AC60345151833402867FB6E20F40733/15/ja
2021-128913	2023-023402	**7088583**	"Adsorbent regeneration method and adsorbent regenerator"	https://www.j-platpat.inpit.go.jp/c1800/PU/JP-7088583/663443E1F2F0314C4C3FC9917A1F95046322F15B44F4B86A392256DC83A0EB19/15/ja
2022-071031	-	**7157501**	"Organic substance decomposition method and organic substance decomposition equipment"	https://www.j-platpat.inpit.go.jp/c1800/PU/JP-7157501/05B1009257CC5075A70F100A32CD356BEE2E3D1F317F71CCAD3E8C3EA6275532/15/ja
2020-113334	2022-011910	**Pending**	**Joint Patent with MIURA Co., Ltd.** "Activated carbon regeneration method and activated carbon regeneration equipment"	https://www.j-platpat.inpit.go.jp/c1800/PU/JP-2022-011910/BEF3AA87A8F5FE197E5BE3E508B17E36837E4581109F3B8C0C8B14E881391C35/11/ja
2020-025709	2021-130080	**Pending**	**Joint Patent with MIURA Co., Ltd.** "Regeneration method of activated carbon"	https://www.j-platpat.inpit.go.jp/c1800/PU/JP-2021-130080/643A17A57A5AFD32558BFB6D4DF94F4F8589B6D7096BFDB4788462BDA6B983D9/11/ja

1-1. Innovative system with patented technology

- Overview of on-site regeneration system

High-temperature superheated steam is used to evaporate and remove substances attached to activated carbon. → **Regeneration of activated carbon**



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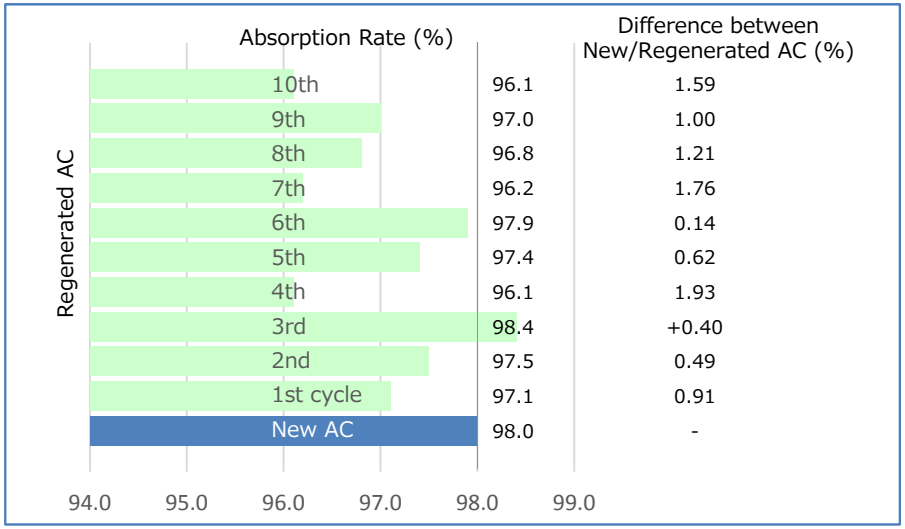
JTOP CO., LTD.

1-2. Innovative system with patented technology

- Performance of regenerated activated carbon

Filtration Test Result of New AC and Regenerated AC for Wastewater Containing Highly Concentrated Organic Matter



Properties of New and Regenerated AC

Elements	unit	Property		Analysis method
		New AC	Regenerated AC - 10th circle	
Iodine adsorption ability	mg/g	990	970	JIS K 1474 6.1.1.1
Specific surface area	m^2/g	1,010	1,020	N_2-BET
Total micropore volume	ml/g	0.51	0.52	N_2-BET
Average micropore size	nm	2.0	2.0	N_2-BET

Even after repeated regeneration, the performance of the activated carbon remained almost the same.

Analysis Report

UNIDO ITPO Tokyo's STePPP Sustainable Technology Promotion Platform

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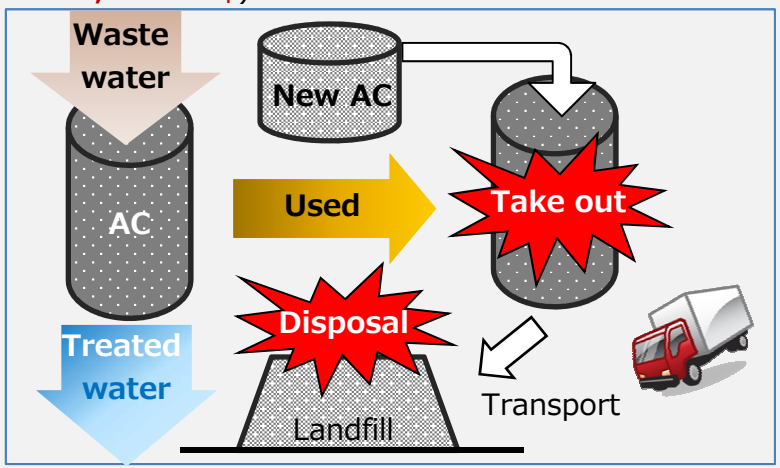
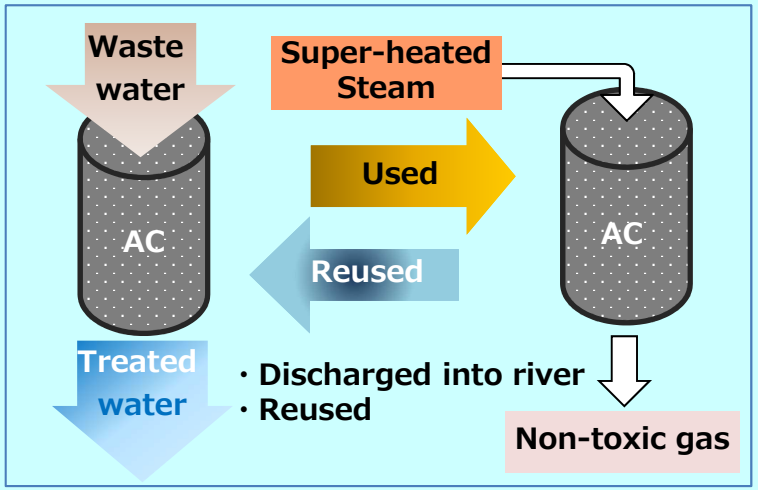
JTOP CO., LTD.

2-1. Low Cost

Comparison with the conventional method

	Conventional method	JTOP method
Labor	Necessary to take out/put in AC	Not required due to automatic regeneration
Hygiene	Microorganisms grow in the AC column.	Sterilized by heating during regeneration
Waste	Used AC is NOT reused ⇒ Disposal of waste	Used AC is reused ⇒ No waste
Running Cost	1. Purchase cost of new AC (Approx. 20,000 US$ per 10m^3 for one time replacement) 2. Disposal cost of used AC (Approx. 3,000-4,000 US$ per 10m^3) 3. Labor cost associated with the replacement of AC (Approx. 1,000 to 2,000 US$ per 10m^3) **Total:** Approx. **25,000 US$ / 10m^3** If replaced 4 times a year, it would be about **100,000 US$**)	Cost of electricity or gas during regeneration only. (If steam is supplied, the regeneration cost per 10 m^3 is less than about **300 US$/10m^3**.) **About 1/100th the cost of conventional systems**





2-2. Low Cost

Running cost per treatment volume

Assuming that water flows up to 200 times the flow rate
(Wastewater is treated to 200 times the amount of activated carbon)

Amount of Wastewater	Max ca. 68 m^3/day	Max ca. 170 m^3/day	Max ca. 255 m^3/day
Size of AC column	**Middle（600A)**	**Large（900A)**	**Ultra-Large(1000A)**
Volume of AC	About 0.4m^3	About 1m^3	About 1.5 m^3
Heater	ca.22.5kW × 7h × 14JPY/kWh About 2,250JPY/day	ca.33.6kW × 7h × 2unit × 14JPY/kWh About 6,585JPY/day	Ca. 40kW × 7h × 2unit x 14JPY/kWh About 7,840JPY/day
Pump of AC Column	ca. 2.2kW × 17h × 14JPY/kWh About 524JPY/day	ca.3.7kW × 17h × 14JPY/kWh About 880JPY/day	ca.3.7kW × 17 × 14day/kWh About 880JPY/day
Control Panel	ca.1kW × 24h × 14JPY/kWh About 300JPY/day	ca.1kW × 24h × 14JPY/kWh About 300JPY/day	ca.1kW × 24h × 14JPY/kWh About 300JPY/day
Total	About 3,029JPY/day	About 7,765JPY/day	About 9,021JPY/day
Per 1m^3	**ca.44.5 JPY/m^3**	**ca.45.7 JPY/m^3**	**ca.35.4 JPY/m^3**

* The running cost of electricity for the electric valve, thermocouple and water level gauge is negligible.
* If there is no steam supply, the cost for steam supply will be incurred separately.
* The electricity cost is calculated as 14 yen/kWh.

Initial costs will be discussed separately.

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2-3. Low Cost

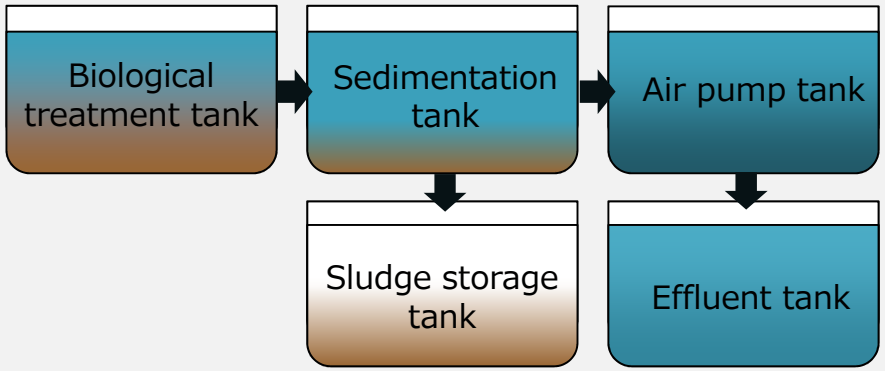
Sales and Rental Prices for Small Equipment

Column size	**50A**	**65A**	**125A**	**150A**
Activated carbon volume	0.5L	2L	8L	10L
Power supply capacity	7kVA	13kVA	15kVA	15kVA
	*Power supply: AC200/220V - 3 phase. Voltage depends on power supply conditions. *Power capacity does not include the capacity of auxiliary equipment such as pumps. *Electric capacity includes boiler and heater, No automatic control.			
Heater capacity	3kW	3kW	4kW	4kW
Boiler capacity	3.3kW	6.6kW	10kW	10kW
Converted steam volume	5kg/h	9.9kg/h	15kg/h	15kg/h
Steam pressure	0.2MPa	0.2MPa	0.2MPa	0.2MPa
Regeneration time	1.5 - 2 hours	2 - 3 hours	3 - 4 hours	3 - 4 hours
Purchase price	4 million Japanese yen	5 million Japanese yen	6 million Japanese yen	6.5 million Japanese yen
Rental fee (3 months)	3 million Japanese yen	4 million Japanese yen	5 million Japanese yen	

* Both purchase and rental prices include boiler and control panel. (Business trip, SV, and transportation costs are not included.)
* Minimum rental period is 3 months (rental period can be extended every 3 months).

3. Space Saving

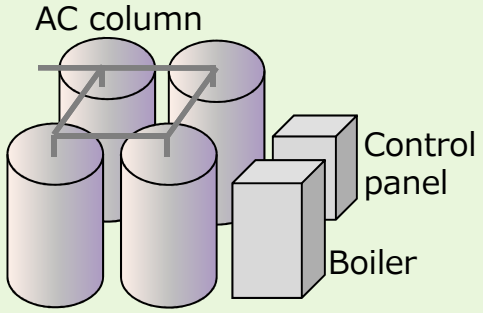
Conventional Method
- Requires sedimentation tank



Requires a large area of **80～100m²**

Based on the example of processing 50 tons per day, the area can be reduced to approx. 1/10.

JTOP method
- Sedimentation tank is NOT required



※Regenerate one column while purifying three columns

Purifies 50t/day
Installation area **Approx. 12m²**

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4. Low sludge

In organic wastewater, zero waste is generated
Part of the organic matter is thermally decomposed, gasified and discharged into the atmosphere.

5. Easy Installation

No civil engineering work is required for installation as it is a unit type.
Easy to cope with the increase in wastewater volume by adding an AC column.

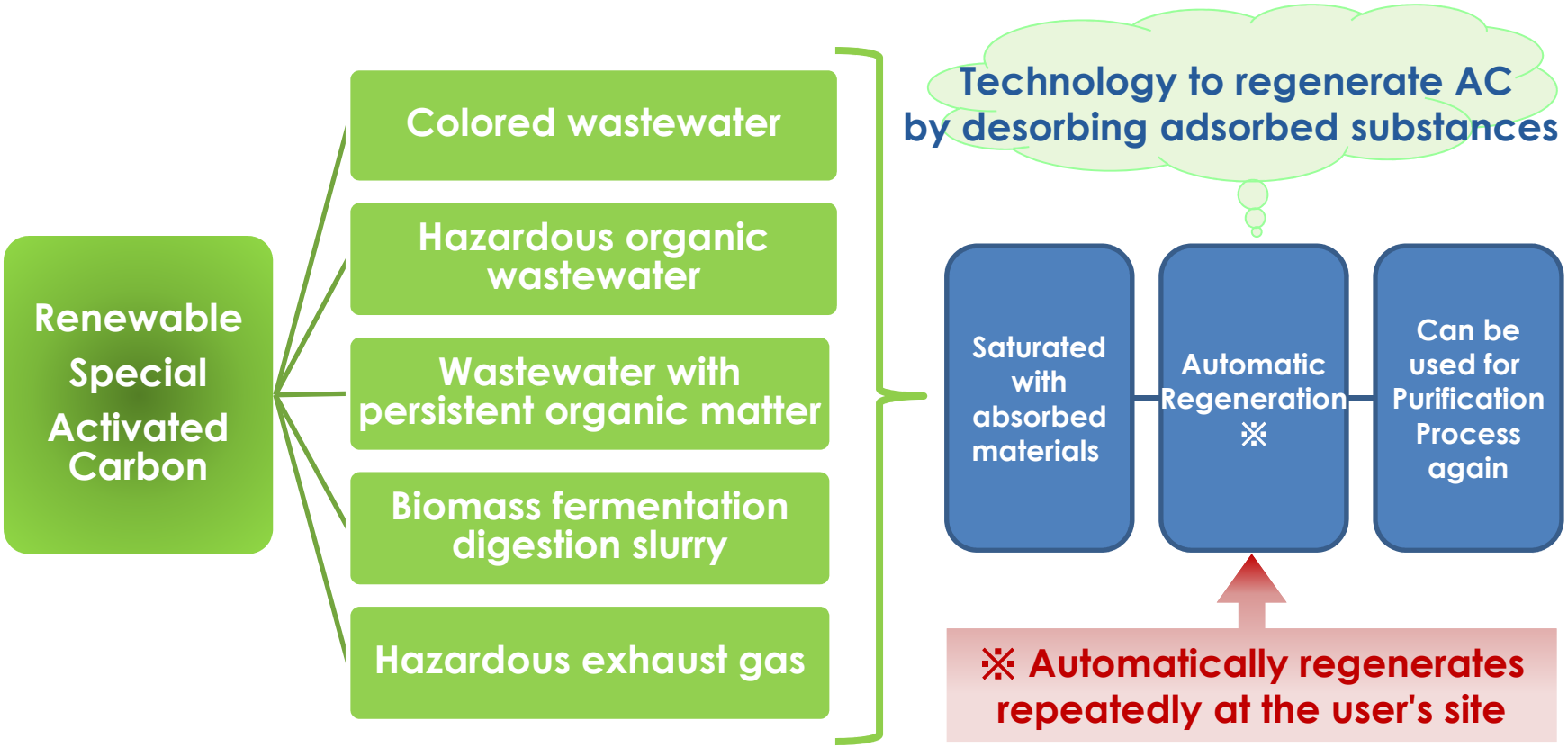
6. Simple Operation

Operates under automatic control
Easy operation with touch panel setting. It will automatically run after setting.

7. Reduced Environmental Impact

Reuse of treated water is possible
Zero-emission of the plant can be promoted by reusing the activated carbon treated water.

8-1. Suitable for various wastewater and exhaust gas treatment



UNIDO ITPO Tokyo's STePP Sustainable Technology Promotion Platform

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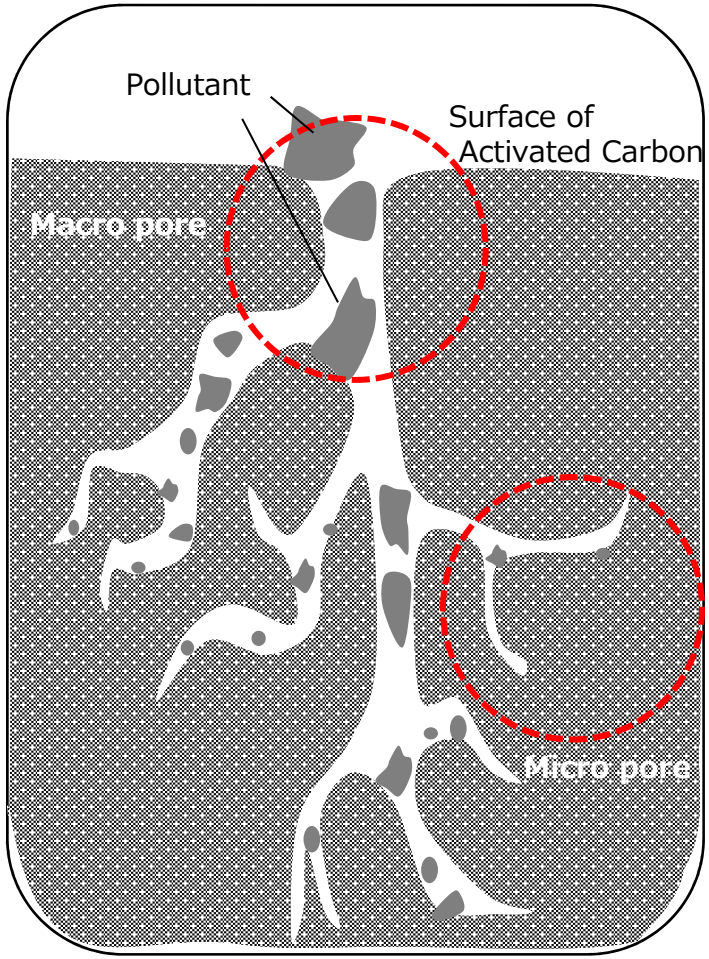
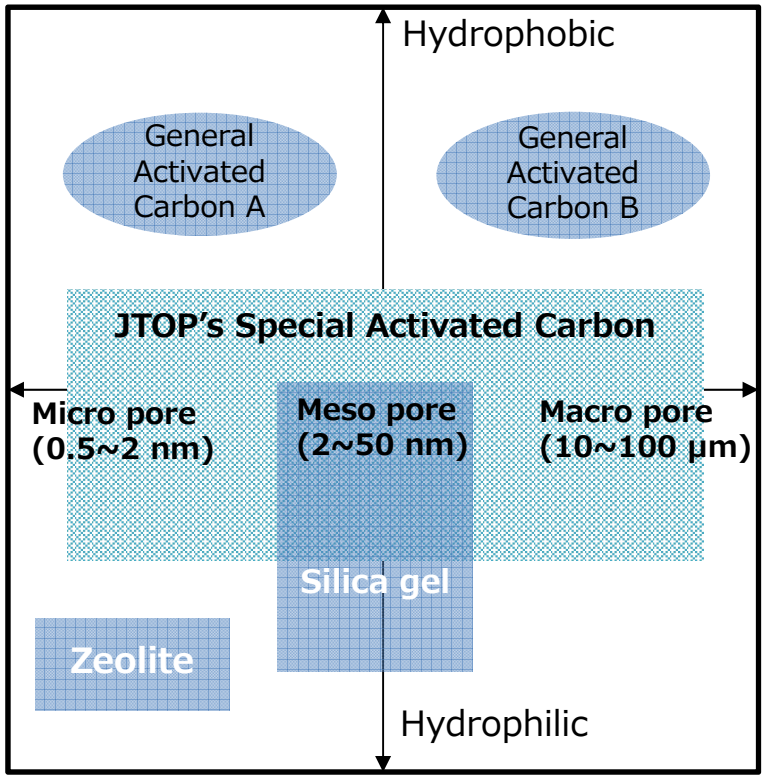
8-2. Suitable for various wastewater and exhaust gas treatment

Structure of Special Activated Carbon





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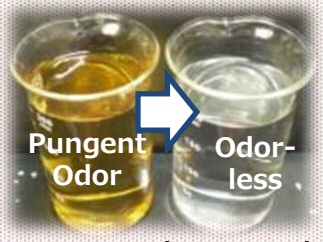
8-3. Suitable for various wastewater and exhaust gas treatment - Test result on pilot test equipment

Removal of Color

◆Colored wastewater

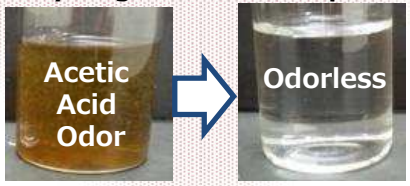
TOC: 712mg/L ➡ 276mg/L

◆Livestock drainage



TOC: 120mg/L ➡ 8mg/L

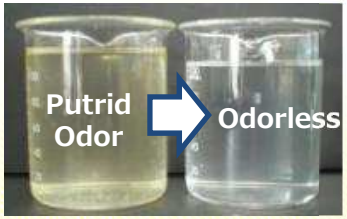
◆Pyroligneous Acid Liquid



BOD: 4,700mg/L ➡ 300mg/L

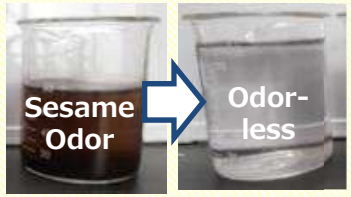
Removal of Odor

◆Industrial wastewater



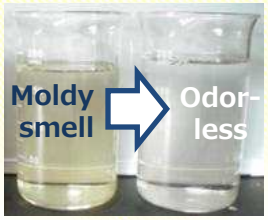
BOD:12,000mg/L➡680mg/L

◆Wastewater from manufacture of black sesame



TOC: 148mg/L ➡ 18mg/L

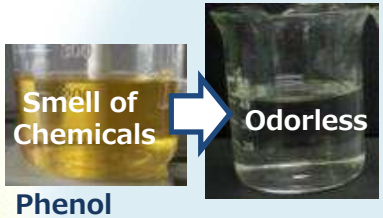
◆Cleaning drainage



TOC: 120mg/L ➡ 13mg/L

Removal of Toxic Materials

◆Factory drainage

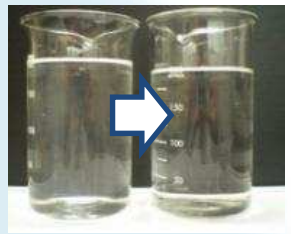


Phenol
: 14,000mg/L ➡ 0.5mg/L

◆Factory drainage

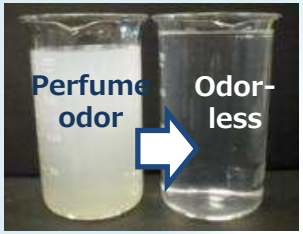
Formaldehyde
: 9,900mg/L ➡ 2,600mg/L

◆Organic Chemical Plant Wastewater



1,4-dioxane
: 150mg/L ➡ 0.4mg/L

◆Cosmetic factory drainage



Extraction with *n*-hexane
: 240mg/L ➡ 3mg/L

Removal of Turbidity

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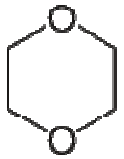
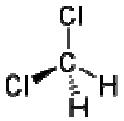
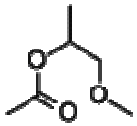
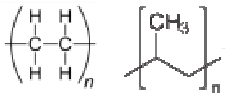
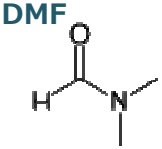
8-4. Suitable for various wastewater and exhaust gas treatment - Persistent and toxic organic matter

No.	item		Raw water mg/L	Treated water mg/L
1	**1,4-dioxane**  **- Hard to decompose in the environment** **- Difficult to remove**	- Chemical industry - Pharmaceutical industry - Fiber industry - Machine manufacturing industry	**150** **29**	**2.7** **3**
2	**Dichloromethane**  **- Subject to various laws and regulations** **- Social problem of bile duct cancer in the printing industry**	- Chemical industry - Machine and Metal product manufacturing industry - Sewerage industry	**0.25**	**Less than 0.01**
3	**PGMAC**  **Not decomposed in the environment**	- Chemical industry - Machine manufacturing industry	**COD 20,000**	**COD 100**
4	**Polyethylene / Polypropylene / Polyol**  **- Not decomposed in the environment** **- Difficult to treat with membrane or biological treatment**	- Chemical industry - Car parts manufacturing industry	**COD 250**	**COD 50**
5	**DMF**  **- Class 4 hazardous materials**	- Fiber industry - Electronic industry - Chemical industry	**TOC 1,700**	**TOC 16**

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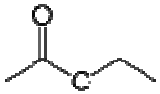
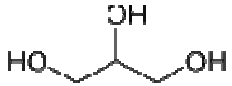
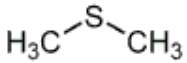
8-4. Suitable for various wastewater and exhaust gas treatment - Persistent and toxic organic matter

No.	項目		Raw water mg/L	Treated water mg/L
6	Formaldehyde 	Various social problem	9,900	2,600
	Hexamethylene-tetramine 	Decomposes in the environment to formaldehyde	8,400	2
7	Phenol 	- Subject to various laws and regulations	26,000	1.2
8	Ethyl acetate 	- Subject to various laws and regulations - Class 4 hazardous materials	1,500	Less than 0.01
	Toluene 	- Subject to various laws and regulations - Class 4 hazardous materials	34	0.031
9	Glycidol 	- Classified as a Group 2A carcinogen (**possibly carcinogenic**) by the International Agency for Research on Cancer	2,923	0
	Glycerin 	Class 4 hazardous materials	1,023	0
10	Methyl sulfate 	**Cause of bad smell**	TOC 44	TOC 5
11	Hydrogen peroxide 	- Not organic, but increases COD levels. - Decomposed into water and oxygen by the catalytic action of activated carbon!	COD 750	COD 50

UNIDO ITPO Tokyo's STePPP Sustainable Technology Promotion Platform

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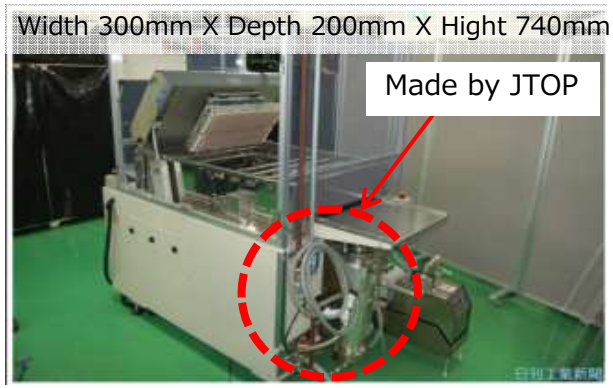
JTOP CO., LTD.

Products

Installation Examples

◆ Recycling system for liquid waste from flexographic plate making machines - Reuse of treated water



Ref. Web article of Nikkan Kogyo Shinbun, 14th Feb. 2014.

Developing Process
Developing solution is recycled

Treated water is used again as developing solution

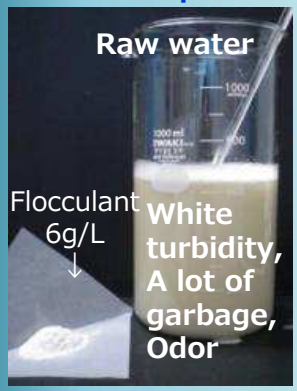
Activated carbon will be regenerated when it becomes saturated with dirt

Regeneration of AC
Automatic regeneration of AC by heated steam

Recycle of wastewater
Purifying the dirty developing solution

**The capacity of the regenerated activated carbon is as good as new AC!
Can be used repeatedly!**

Flocculant is added to the waste liquid.



TOC : 2,000mg/L

Filtration

450mg/L

Purification Treatment with AC

Less than 100mg/L

【Advantages】

- Small but high performance of purification.
- Very little effort required to regenerate AC
- Treated water can be reused.

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Our technology is registered with the UNIDO STePP.

JTOP CO., LTD.

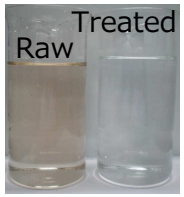
◆ Major chemical plant

- Heat decomposition of MPD

Wastewater treatment equipment

Amount of wastewater	AC Column	Volume of AC	Footprint
600m^3/day	Φ900 3 units	1m^3 / unit Total 3m^3	W 9,200mm D 1,800mm H 5,100mm

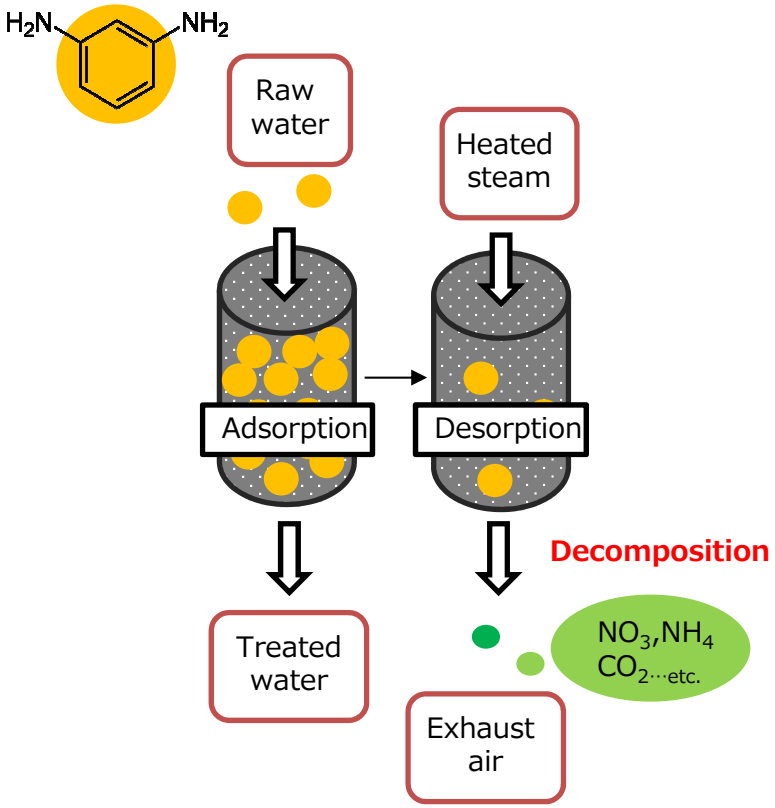
Activated Carbon treated water



	Raw	Treated	Exhaust air
MPD (mg/L)	3	N/D	N/D

Decomposition of MPD by heated steam

＊Wastewater containing MPD (phenylenediamine)



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JTOP CO., LTD.

◆ Major chemical plant

- Treatment of persistent organic matter (1,4-dioxane)

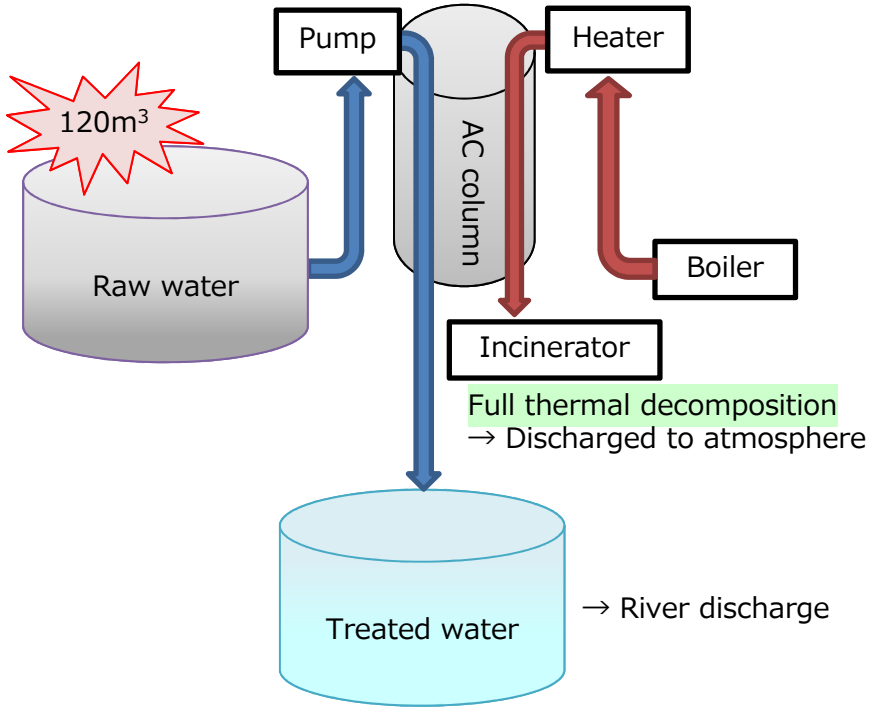
Wastewater treatment equipment

Amount of wastewater	AC Column	Volume of AC	Footprint
240 m^3/day	Φ900 2 units	1.3m^3 Total 2.6m^3	W 7,700mm D 1,800mm H 5,500mm

Activated Carbon treated water

	Raw	Treated
TOC (mg/L)	ca.130	ca. 90
1,4-dioxane (mg/L)	ca. 30	0.04

Overview



Conventional sewerage charge

Significant reduction

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JTOP CO., LTD.

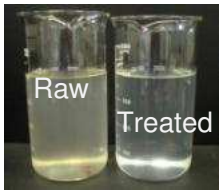
◆ Major auto parts related plant
- Cost Reduction Effect

Wastewater treatment equipment

Amount of wastewater	AC Column	Volume of AC	Footprint
100m^3/day	Φ600 3 units	330L/unit Total 990L	W3,000mm D2,600mm H2,400mm

Activated Carbon treated water

＊ Wastewater containing polyethylene / polypropylene / polyol



	Raw	Treated
COD (mg/L)	ca. 250	ca. 50

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Cost

Conventional sewerage fee

260 JPY/m^3 ※ Sewerage fee in Mie Prefecture, Japan

With JTOP equipment,

15 JPY/m^3

Average of 100m^3 of wastewater treated per day

Annual reduction of 8.9 million yen!

Cost savings of
25,000JPY/day
740,000JPY/month!

Depreciation of equipment is less than 2 years!!

JTOP CO., LTD.

◆ Major machinery manufacturing plant
- Cost Reduction Effect

Wastewater treatment equipment

Preprocessing	Amount of wastewater	AC Column	Volume of AC	Footprint
Reduced COD 10 % & turbidity By flocculant	2m^3/week	Φ600 1 unit	310L/ unit	W 6,000㎜ D 1,500㎜ H 2,900㎜

Activated Carbon treated water

＊Wastewater containing PGMAC
(Propylene Glycol 1-Monomethyl Ether)

	Raw	Treated
COD (mg/L)	ca. 20,000	Less than 100

Cost

Conventional industrial waste disposal cost

75,000JPY/m^3

With JTOP equipment,

2,800JPY/m^3

※Cost of electricity, coagulant and other consumables

Average of 2m^3 of wastewater treated per week

Annual reduction of 7 million yen!

Cost savings of
20,000JPY/day
600,000JPY/month!

Depreciation of equipment is less than 2 years!!

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JTOP CO., LTD.

◆ Major Precious Metal Factory

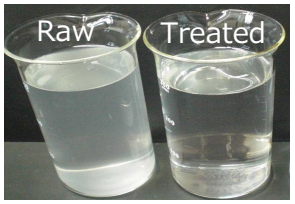
- Example of factory wastewater treatment system installation

Wastewater treatment equipment

Amount of wastewater	AC column	Volume of AC	Footprint
50m^3/day	Φ600 3 units 2 unit/ day	375 L/unit Total 1,125 L	W 4,900mm D 1,200mm H 3,800mm

Activated Carbon treated water

Wastewater containing persistent surfactant (details not disclosed)



	Raw	Treated
BOD (mg/L)	ca. 300	Less than 120
Extraction with *n*-hexane (mg/L)	ca. 15	Less than 5

Advantages

Cannot be biologically treated due to the presence of persistent organic matter

Membrane treatment is expensive due to high organic content

JTOP system was selected after considering the equipment with the lowest initial and running costs.

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JTOP CO., LTD.

Toilet wastewater circulation treatment

Video
August 31, 2017

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JTOP CO., LTD.

Installation of wastewater treatment facilities in factories overseas

◆ Taiwan

Wastewater treatment equipment

Amount of wastewater	AC column	Volume of AC	Footprint
120m^3/day	Φ900 2 units	1m^3/ unit Total2m^3	W 4,050mm D 2,600mm H 4,000mm

	Raw	Treated
COD (mg/L)	Over 100	Less than 20

◆ Indonesia

Wastewater treatment equipment

AC column

Control panel

Video of demonstration test at PT. Grand Textile, textile factory

Introduction of JTOP's research

Joint Research and National Project, etc.

Achievements in National Project and Joint Research, etc.
— Commendation

◆Received the Excellence Award at the 25th Small and Medium Enterprise Excellence Award for New Technology and New Products.

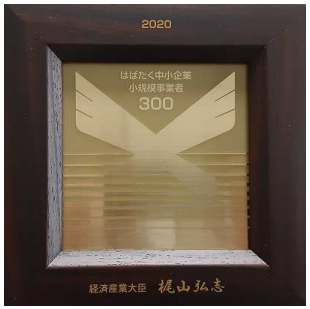
2013 Resona Foundation for Small and Medium Enterprise Promotion and Nikkan Kogyo Shimbun

◆Adopted for the "Small and Medium Enterprise New Product Purchase Program"

2014 - 2016 Osaka Prefecture Certified as a business enterprise pioneering a new business field through the production of new products
http://www.pref.osaka.lg.jp/keieishien/shinsyohin/shinshohinh26.html

◆Selected as one of the "300 Small and Medium Enterprises"

2020 Ministry of Economy, Trade and Industry, Small and Medium Enterprise Agency



Achievements in National Project and Joint Research, etc.

— Research and Development

◆Development of a Mobile Waste Activated Carbon Recycling System with a Virtuous Circulation System (Waste Virtuous Circulation System)

NEDO (New Energy and Industrial Technology Development Organization)
2013 "Innovation Practical Application Venture Support Project

◆Advanced energy-saving wastewater and waste gas treatment technology that combines automated activated carbon regeneration and Fenton hydrothermal oxidation technologies

NEDO (New Energy and Industrial Technology Development Organization)
2016 "Strategic Energy Conservation Technology Innovation Program/Energy Conservation Examination of peripheral technologies and related issues associated with key technologies for technology development projects

◆Development of energy-saving advanced treatment technology for industrial wastewater and contaminated water containing high concentrations of hazardous laboratory wastewater

NEDO (New Energy and Industrial Technology Development Organization)
2020-2022 "Strategic Energy Conservation Technology Innovation Program"

Achievements in National Project and Joint Research, etc.

— Research and Development

◆Development of advanced treatment technologies to reuse petroleum produced water

2012 Innovative Technology Research in the Field of Oil and Gas Development
JOGMEC Japan Oil, Gas and Metals National Corporation
Joint development by Hitachi Plant Technologies and JTOP

◆Development of advanced treatment technology for contaminated water containing persistent organic matter

2017 JST (Japan Science and Technology Agency)
Support Program for Optimal Deployment of Research Results
Industry-University joint research with Osaka City University

◆Harmless decomposition technology of PCBs and dioxins with low temperature and low pressure

2013-2015
Industry-University Joint R&D Project with Osaka City University
Adopted for "Kansai Urban Collaborative Research Grant""

UNIDO ITPO Tokyo's STePP Sustainable Technology Promotion Platform

Our technology is registered with the UNIDO STePP.

Achievements in National Project and Joint Research, etc.

— For SDGs

◆Feasibility study for the project to promote industrial wastewater treatment using automatic regenerative activated carbon wastewater treatment system in the Republic of Indonesia

2013 Ministry of Foreign Affairs - ODA project feasibility study

◆Dissemination and demonstration project of automated regenerative activated carbon wastewater treatment technology in the Republic of Indonesia to promote reclaimed water treatment and industrial wastewater treatment

2015-2016 JICA Private Proposal-Based Dissemination and Demonstration Project

◆Feasibility study for the introduction of water recycling technology in the textile dyeing industry in Bangladesh

2020-Ongoing JICA - SDGs business support project - Feasibility study

◆Project for Recycling Wastewater from Factories in the Textile Dyeing Industry in Vietnam

2021, 2022, 2023 Ministry of the Environment "Asian Water Environment Improvement Model Project" research project

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JTOP CO., LTD.

Achievements in National Project and Joint Research, etc.

— Commendation

"Development of advanced treatment technology for contaminated water containing persistent organic matter"

Selected for A-STEP, Adaptable and Seamless Technology Transfer Program through Target-driven R&D, by JST (Japan Science and Technology Agency) in 2017

Research and development phase program for practical application based on research results related to science and technology important to the national economy

http://www.jst.go.jp/pr/info/info1271/sankou1.html
http://www.jst.go.jp/pr/info/info1271/besshi2.html

研究成果最適展開支援プログラム（A-STEP）
課題選定結果の通知

Joint Research - Hybrid technology

Technology for completely detoxifying exhaust steam

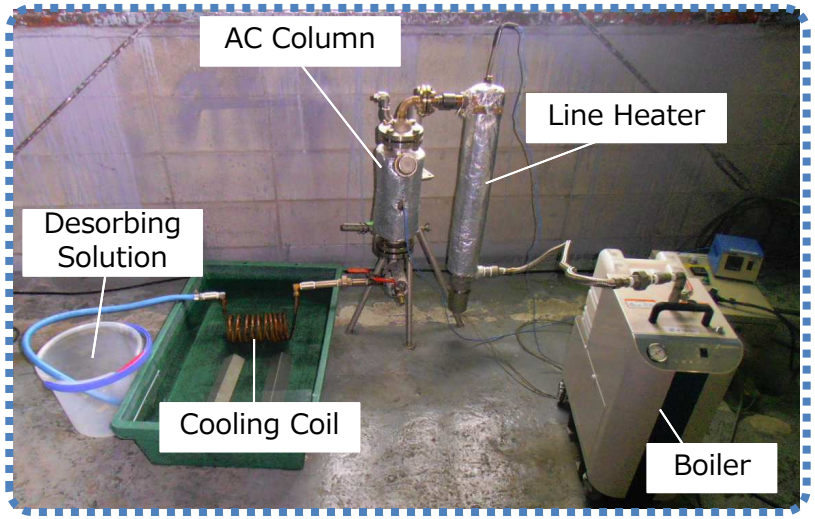
Volume Reduction Process

JTOP

Polluted water → AC Treatment → **Regeneration of AC** → Desorbing Solution

AC Treatment → Treated water

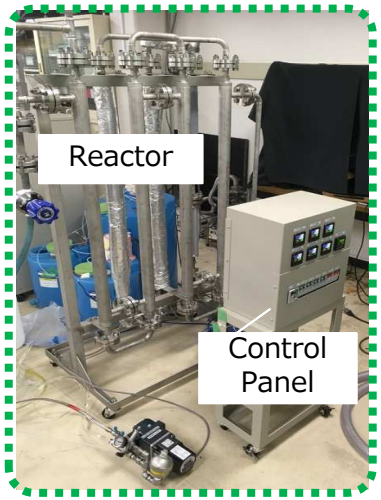
Line heater



Detoxifying Process

Osaka City University

Degradation treatment → Harmless treated water



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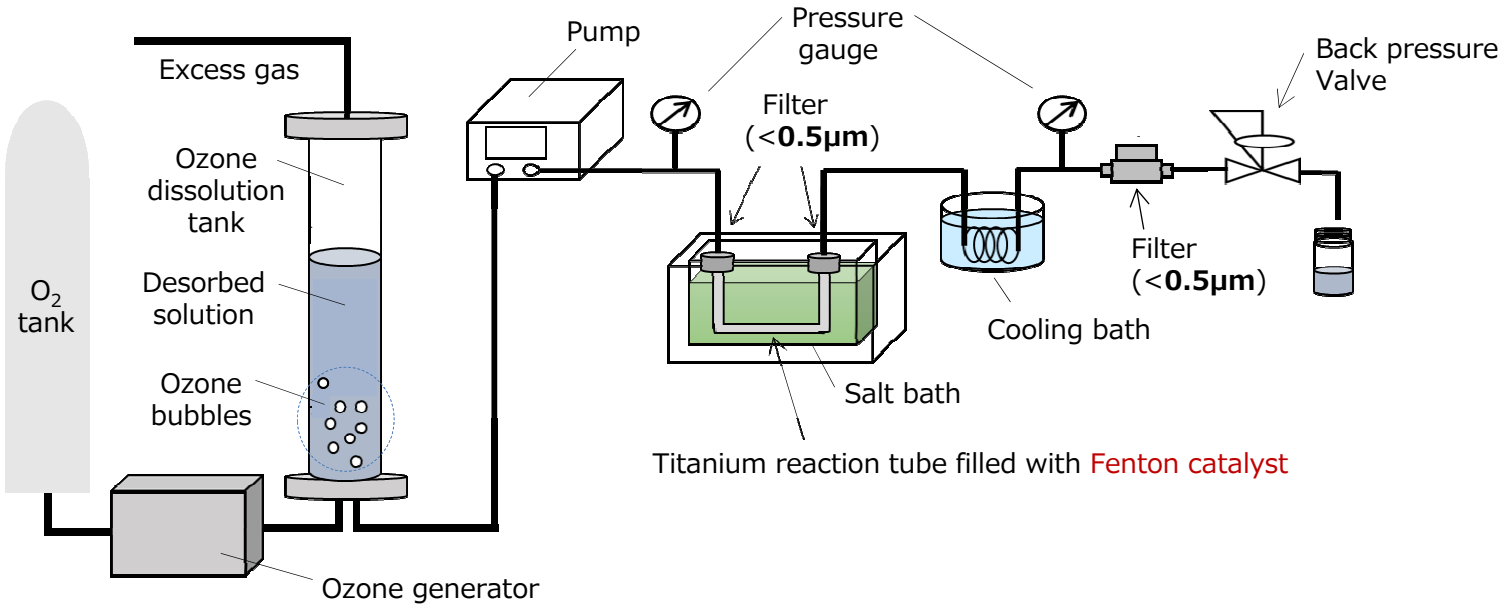
JTOP CO., LTD.

Joint Research - Fenton treatment technology
Detoxification treatment of desorbed liquid

In collaboration with Osaka City University, we are building a prototype device and conducting performance tests to develop an advanced treatment technology for persistent organic compounds contained in the concentrated desorbed solution generated during activated carbon regeneration.



Fenton Hydrothermal Oxidation Method

The Fenton reaction is accelerated by the Fenton catalyst under hydrothermal reaction conditions of 100-200℃, and the production of hydroxyl radicals (•OH), the active mainstay, is increased, which is expected to promote the oxidative decomposition of persistent organic matter.

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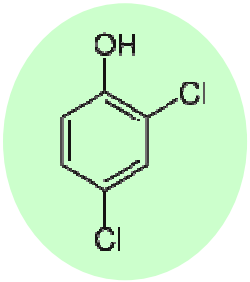
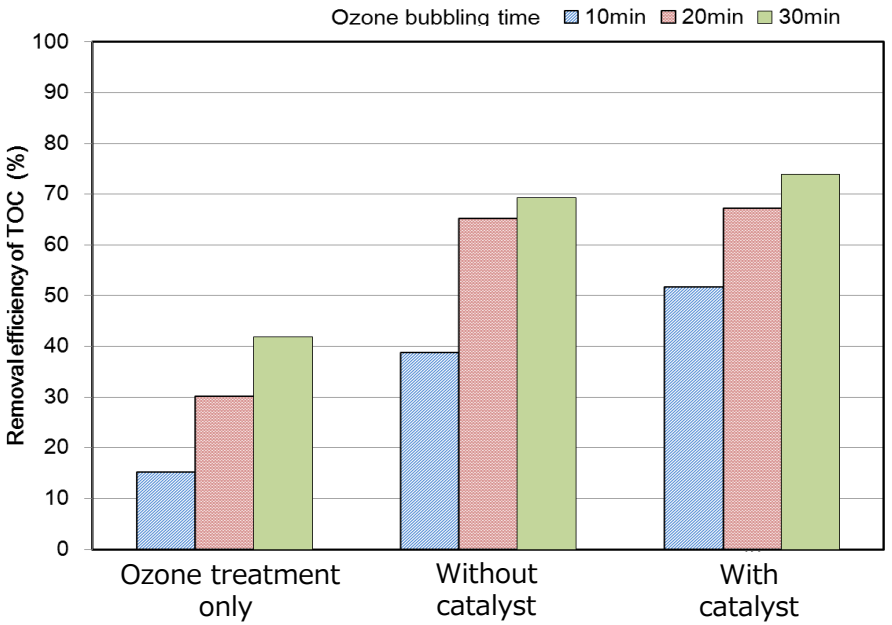
Joint Research - Detoxification treatment test
Detoxification treatment of desorbed liquid

Model desorbed solution: 1mM Dichlorophenol, 4L



Reaction condition	
Flow rate of ozone	1 L/min (140 g/Nm^3)
Bubbling time	10, 20, 30min
Flow rate of sample	3 ml/min
Amount of catalyst	0.2 g
Temperature	240 ℃
Pressure	10 MPa

Comparison of TOC removal rate



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JTOP CO., LTD.

JOGMEC oil & gas technical activity report

(3) Development of advanced water treatment technology to reuse produced oil water

The joint development by Hitachi Plant Technologies and J-Top has demonstrated the potential of repeatedly renewable special activated carbon to be effective in removing water-soluble organic matter, precious metals, and some salts. The system is compact and low-energy, and the produced water can be reused.

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JTOP CO., LTD.

Strategic Energy Conservation Technology Innovation Program - NEDO

"New Energy and Industrial Technology Development Organization"

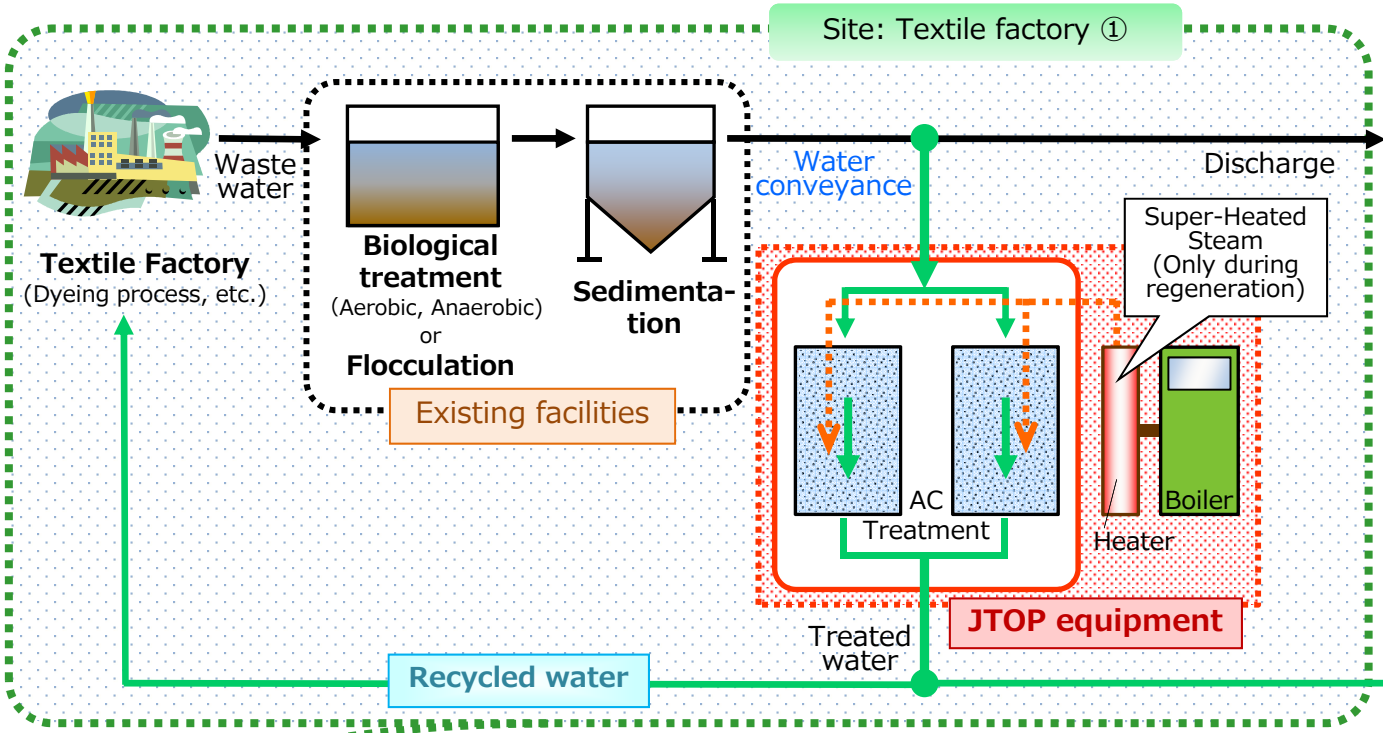
Target Technology:
Energy-saving technologies focusing on the key technologies listed in the Energy Conservation Technology Strategy

Requirements:
Energy savings of 100,000 kL/year or more (crude oil equivalent) can be expected in Japan by 2030.

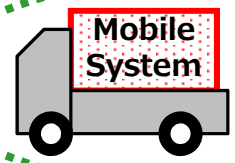
Development Phase			
Summary	Incubation R&D (within 2 years)	Practical application development (within 3 years)	Demonstration and Development (within 3 years)
Annual Limit	Utilize technology seeds and formulate development and introduction scenarios, etc. Preliminary research for practical application development and demonstration development	Development of applied technologies based on technologies, know-how, etc. Aim to commercialize the product within 3 years after the completion of this development	Aim to overcome the obstacles to commercialization, such as obtaining empirical data, and to commercialize the product as soon as possible after the completion of the main development
	Approx. 20 million yen per project NEDO subsidy rate: two-thirds	Approx. 300 million yen per project NEDO subsidy rate: two-thirds	Approx. 1 billion yen per project NEDO subsidy rate: one-half

ODA Project in Indonesia - Wastewater Recycling System

Demonstration experiment




River, waterway



The demonstration site was moved as necessary, and the demonstration tests were conducted at each site.

Demonstration Experiment Site: Textile factory ②

Demonstration Experiment Site: Batik, etc. ③

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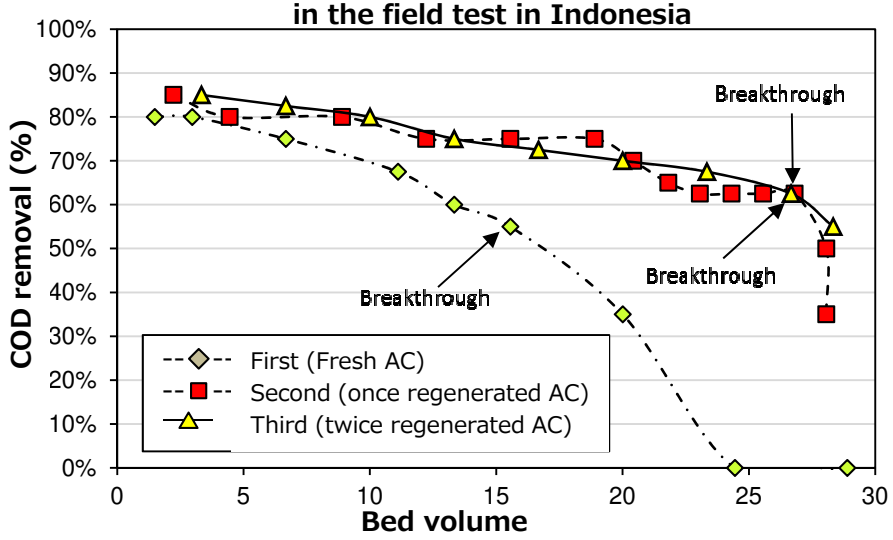
ODA Project in Indonesia - Wastewater Recycling System

Demonstration experiment at a local dyeing factory by a research team from Bandung Institute of Technology

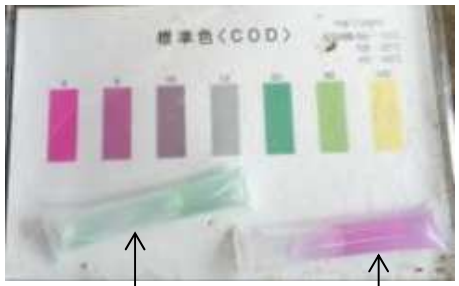
Raw water

Treated water

Bed volume dependence of COD removal rate in the field test in Indonesia



Treated water is colorless and transparent.
AC can be regenerated repeatedly.



Raw water

Treated water

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ODA Project in Indonesia - Wastewater Recycling System

Analysis results of raw and treated water at the breakthrough point of the third test (twice regenerated activated carbon)

Analysis item	Raw	Treated	Regulatory value※
pH	7.11	7.21	6.00 – 9.00
TSS (mg/L)	80	38	50
BOD_5 days 20°C (mg/L)	19.07	3.20	60
COD by $K_2Cr_2O_7$ (mg/L)	48.43	8.11	150
Phenol (mg/L)	0.01	< 0.005	0.50
Total chromium (mg/L)	< 0.03	< 0.03	1.00
Total nitrogen (mg/L)	9.76	7.93	8.00
Sulfide (mg/L)	< 0.01	< 0.01	0.3
Oil & Grease (mg/L)	2.5	< 2	3.00

※*Standard regulatory value of Permen-LH RI No.5 (2014)*

- Problem items such as COD, etc.→ **Highly removed**
- Colored → **Colorless**

Treated water was within regulatory limits for all items.

Treated water has proven to be reusable.

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http://www.unido.or.jp/en/activities/technology_transfer/technology_db/