



## Introduction

Ion Exchange (India) Ltd. and The Energy and Resources Institute's (TERI) officially entered into a TADOX® Technology and Trademark License (TTLA) Agreement in February 2024, aimed at commercializing TERI's patented wastewater treatment technology for industrial applications.

Through this partnership, Ion Exchange aims at applying the potential of the TADOX® technology in further enhancing the life cycle cost of Ion Exchange's affordable treatment, recycle and ZLD solutions for industrial effluents, making it a significant step in addressing complex wastewater challenges while expanding customer reach.

## The INDION® TADOX® Process

The INDION® TADOX® technology is an innovation in treating complex industrial and municipal wastewater with the flexibility of integrating INDION® TADOX® at the secondary treatment stage – prior to membrane processes or at the pre-biological stage

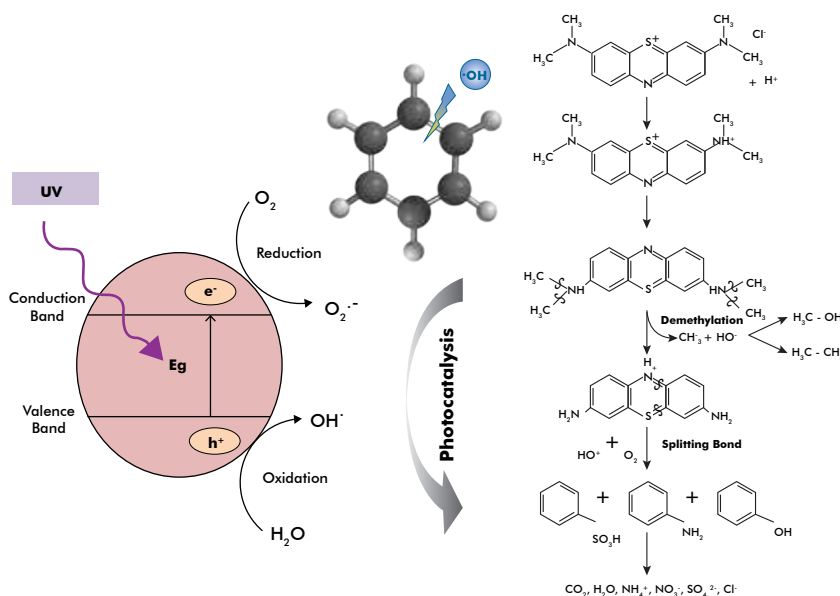
It also uses novel approaches which result in reduced use of chemicals in the overall treatment leading to reduction in quantum of sludge, preventing secondary pollution and reducing the load on downstream tertiary treatment. Being a retrofittable and integrated solution with reduced treatment times, INDION® TADOX® provides highly resource and energy-efficient treatment with 30-40% reductions in CAPEX and OPEX.

This Advanced Oxidation Process (AOP) using the principle of a unique and patented photo catalysis process leads to oxidative degradation and mineralization of targeted pollutants resulting in removal of color, dissolved organics, recalcitrant organics (RCOD) in wastewater streams.

### Advance Photocatalytic Oxidation Process

Involves in-situ generation of hydroxyl radicals, leading to oxidative degradation and mineralization of pollutants & improvement in wastewater quality parameters

Significantly lowers ZLD costs  
CAPEX by 40-50% | OPEX by 20-25%



#### Key Features

Significant Reduction

- Colour: 90 – 95%
- BOD: 70 – 90%
- COD: 75 – 90%
- Sludge: 0.4 – 2.0 kg/m<sup>3</sup> as compared to 20 – 35 kg/m<sup>3</sup>

Working principal of INDION® TADOX® for treating complex effluents

# Key Advantages

## High Efficiency

- End-to-end treatment in few hours
- When applied at pre-biological stage, it helps biological systems bear shock load, removes toxicity, colour & improves biodegradability
- Improves Membrane life, reduces load on downstream tertiary treatment / MEE
- Highly resource and energy efficient technology meeting sustainability criteria

## Clean & Green

- Ensures 75% less use of chemicals
- Very less amount of sludge formed (0.4-2.0 kg/m<sup>3</sup>) as compared to 20-35 kg/m<sup>3</sup> in conventional physicochemical processes
- Simultaneous bacterial inactivation / disinfection and anti bio-fouling
- Same technology for treatment of industrial & municipal wastewater, sewage and open drains

## Excellent treated Water Quality

- Treated water quality for point of use/reuse
- Sustainable and affordable ZLD compliance with enhanced water reuse
- Industrial wastewater treatment meeting CPCB and NGT Compliances for safe surface discharge/dilution/ZLD/Reuse
- Sewage wastewater treatment meeting compliance for land irrigation/Cooling tower make up/Green Building WWM plan

## Modular & Integrated

- Modular, integrated and retrofittable in existing and new STPs/ IETPs/CETPs
- Up to 30-35% lower CAPEX & 20-25% lower OPEX in achieving ZLD
- Stream specific and Decentralized Treatment options
- May help in augmenting capacities within existing infrastructure

# Applications

For treating complex industrial waste water, Municipal waste water, achieve affordable Zero Liquid Discharge at lowest lifecycle costs (CAPEX and OPEX)

# Industrial Wastewater Treatment

## Uttar Pradesh & Uttarakhand

### Textile CETP, Kanpur, 20KLD Plant

#### Pre -tadox®



- pH: 8.5
- Conductivity :12850 microS
- TDS : 6590 ppm
- COD: 1000 mg/L
- BOD: 112 mg/L
- BOD/COD ratio: 0.11
- Chlorides as Cl: 3823 mg/L
- Nitrate as NO<sub>3</sub>: 219.6 mg/L
- Total Nitrogen: 223 mg/L

↓ 6 h

#### Post - tadox®



- pH: 8.5
- Conductivity :8860 microS
- TDS : 4430 ppm
- COD: 256 mg/L
- BOD: 40.6 mg/L
- BOD/COD ratio: 0.16
- Chlorides as Cl: 2754 mg/L
- Nitrate as NO<sub>3</sub>: 9 mg/L
- Total Nitrogen: 10.4 mg/L

### Tannery ETP, Kanpur

#### Pre -tadox®



- pH: 8.26
- TDS : 1040 mg/L
- COD: 128 mg/L
- BOD: 7.82 mg/L
- Hexavalent Chromium (Cr<sup>6+</sup>):1.2 mg/L

↓ 2 h

#### Post - tadox®



- pH: 8.19
- TDS : 767 mg/L
- COD: 80 mg/L
- BOD: 24.62 mg/L
- Hexavalent Chromium (Cr<sup>6+</sup>):0.06 mg/L

### Slaughter House, Agra

#### Pre - tadox®



- COD: 40 mg/L
- Colored

↓ 2 h

#### Post - tadox®



- COD: 6 mg/L
- Colour less

### Pharmaceutical Industry, Rishikesh

#### Pre - tadox®



- pH: 6.2
- COD: 1200 mg/L
- BOD: 255 mg/L
- Total Nitrogen: 10.1 mg/L
- Total Ammonia: N.D
- Reactive Phosphorus: 5.5 mg/L

↓ 3 h

#### Post - tadox®



- pH: 8.1
- COD: 80 mg/L
- BOD: 11 mg/L
- Total Nitrogen: 1.0 mg/L
- Total Ammonia: 3.39 mg/L
- Reactive Phosphorus: 0.1 mg/L

Punjab, Haryana, Andhra Pradesh & Kerala

**Textile ETP, Ludhiana**

**Pre - tadox®**



- pH: 9.5
- TDS : 9410 mg/L
- TSS: 338 mg/L
- COD: 272 mg/L
- BOD: 145.6 mg/L
- Colour: 2751.8 Hazen

↓ 4 h

**Post - tadox®**



- pH: 10.12
- TDS : 8420 mg/L
- TSS: 122 mg/L
- COD: 80 mg/L
- BOD: 44.6 mg/L
- Colour: 106 Hazen

**Petrochemical Industry, Panipat 10KLD Plant**

**Pre -tadox®**



- pH: 7.84
- Turbidity :76 NTU
- TDS : 4005 ppm
- COD: 400 mg/L
- BOD: 43 mg/L
- Color: 711 Hazen

↓ 6 h

**Post - tadox®**



- pH: 9.69
- Turbidity :93 NTU
- TDS : 3680 ppm
- COD: 160 mg/L
- BOD: 2 mg/L
- Color: 18 Hazen

**Chemical Manufacturing ETP, Nellore**

**Pre - tadox®**



- COD: 800 mg/L
- BOD: 218.4 mg/L
- TKN: 0.56 mg/L
- TN: 45.52 mg/L
- NO<sub>3</sub>: 45.36 mg/L

↓ 7 h

**Post - tadox®**



- COD: 560 mg/L
- BOD: 168 mg/L
- TKN: BDL\*
- TN: BDL\*
- NO<sub>3</sub>: 0.06 mg/L
- \*Below Detection Limit

**Chemical Manufacturing ETP, Kochi**

**Pre -tadox®**



- pH: 5.4
- Conductivity :8970 micromho/cm
- TDS : 4490 ppm
- Turbidity: 356 NTU
- COD: 2720 mg/L
- BOD: 2.97 mg/L

↓ 6 h

**Post - tadox®**



- pH: 9.07
- Conductivity :1427micromho/cm
- TDS : 2852 ppm
- Turbidity: 1.17 NTU
- COD: 480 mg/L
- BOD: 1.52 mg/L

Maharashtra, Tamil Nadu & Gujarat

**Chemical Manufacturing, Raigad**

**Pre - tadox®**



- pH: 6.88
- Turbidity: 457 NTU
- COD: 3360 mg/L
- BOD: 1337 mg/L
- BOD/COD ratio: 0.39

↓ 8 h

**Post - tadox®**



- pH: 9.25
- Turbidity: 1.90 NTU
- COD: 2160 mg/L
- BOD: 927.1 mg/L
- BOD/COD ratio: 0.43

**Electronics Manufacturing, Hosur**

**Pre -tadox®**



- pH: 8.0
- COD: 80 mg/L
- BOD: 34.2 mg/L
- PO<sub>4</sub>: 12.5 mg/L
- NO<sub>3</sub>: 14.3 mg/L
- NO<sub>2</sub>: 2.3 mg/L
- TKN: 16.7 mg/L

↓ 6 h

**Post - tadox®**



- pH: 8.8
- COD: 22.1 mg/L
- BOD: 2.9 mg/L
- PO<sub>4</sub>: 0.15 mg/L
- NO<sub>3</sub>: 2.3 mg/L
- NO<sub>2</sub>: 0.8 mg/L
- TKN: 4.5 mg/L

## Oil & Gas Industry, Ahmedabad

### Pre - tadox®



- pH: 8.16
- COD: 336 mg/L
- BOD: 104 mg/L
- Oil & Grease: 588 mg/L
- TDS: 7041 mg/L
- Zn: 0.20 mg/L
- Pb: 0.40 mg/L

↓ 3 h

### Post - tadox®



- pH: 8.91
- COD: 80 mg/L
- BOD: 42 mg/L
- Oil & Grease: 31.20 mg/L
- TDS: 3357 mg/L
- Zn: 0.05 mg/L
- Pb: Nil

## MEE Condensate, Bharuch

### Pre - tadox®



- pH: 10.95
- Color: 92.21 Pt-Co
- Turbidity: 9.31 NTU
- TDS: 225 mg/L
- TSS: 167 mg/L
- COD: 2400 mg/L
- Nitrate: 65.01 mg/L
- Phosphate: 0.265 mg/L

↓ 6 h

### Post - tadox®



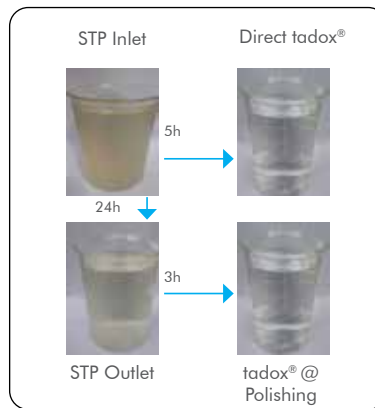
- pH: 8.01
- Color: 10.5 Pt-Co
- Turbidity: 2.02 NTU
- TDS: 144 mg/L
- TSS: 106 mg/L
- COD: 600 mg/L
- Nitrate: 45.3 mg/L
- Phosphate: 0.23 mg/L

## Municipal Wastewater, Sewage and Open Drain Treatment

### Delhi & Haryana

#### Current Conventional Treatment

Parameters	STP Inlet	STP Outlet
pH	7.2	7.2
Colour, (Pt-CO)(CU)	292.4	116.4
TDS, mg/L	342	368.0
COD, mg/L	352.00	88.00
BOD, mg/L	115.00	32.00
PO <sub>4</sub> , mg/L	4.45	0.50
NO <sub>2</sub> , mg/L	0.11	0.19
NH <sub>4</sub> , mg/L	7.20	3.20
E Coli, MPN/100ml	1.32x10 <sup>4</sup>	6.0x10 <sup>2</sup>
Total Coli, MPN/100ml	8.9x10 <sup>4</sup>	2.3x10 <sup>3</sup>



#### tadox® Treatment

Parameters	Direct TADOX	TADOX @ Polishing
pH	8.0	8.8
Colour, (Pt-CO) (CU)	1.4	<1
TDS, mg/L	91.3	119.0
COD, mg/L	21.50	24.0
BOD, mg/L	<2	<2
PO <sub>4</sub> , mg/L	0.08	0.03
NO <sub>2</sub> , mg/L	0.75	0.11
NH <sub>4</sub> , mg/L	3.40	2.10
E Coli, MPN/100ml	ND	ND
Total Coli, MPN/100ml	3	1

### STP Inlet Sewage, Gurugram

#### Pre - tadox®



- COD: 176 mg/L
- BOD: 110 mg/L
- TKN: 8.11 mg/L
- NO<sub>3</sub>-N: 16.8 mg/L
- E Coli: 149 x10<sup>4</sup> MPN/100ml

↓ 5 h

#### Post - tadox®



- COD: 10 mg/L
- BOD: 3.4 mg/L
- TKN: 2.81 mg/L
- NO<sub>3</sub>-N: 5.0 mg/L
- E Coli: 23 MPN/100ml

### Gochi Drain, Faridabad

#### Pre - tadox®



- TSS: 280 mg/L
- COD: 320 mg/L
- BOD: 64 mg/L
- PO<sub>4</sub>: 3.80 mg/L
- NH<sub>4</sub>-N: 2.33 mg/L
- Colour: 405.18 Hazen

↓ 5 h

#### Post - tadox®



- TSS: 156 mg/L
- COD: 160 mg/L
- BOD: 8 mg/L
- PO<sub>4</sub>: 0.20 mg/L
- NH<sub>4</sub>-N: 1.22 mg/L
- Colour: 68.17 Hazen

TADOX® is registered in GRIHA product catalogue for wastewater management in green buildings.

Note: The performance is indicative based on defined feed parameters used during proof of concept trials. Actual results may vary based on type and quality of feed and its constituents which can be confirmed during similar proof of concept studies in lab or pilot.



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