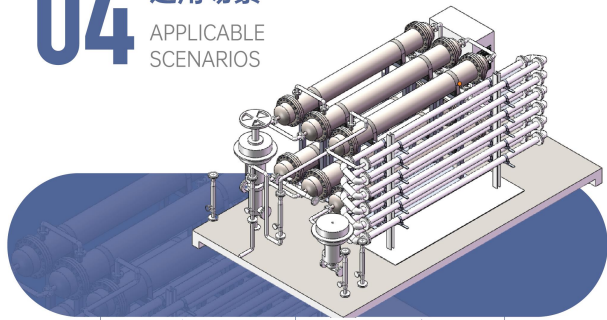


04 适用场景

APPLICABLE SCENARIOS



难生化的高浓度有机废水预处理。
Pretreatment of bio-refractory high-concentration organic wastewater.



含特定污染物的废水（如含有氰化物或游离氰的废水）解毒预处理。
Detoxification pretreatment of wastewater containing specific pollutants (such as wastewater containing organic cyanide or free cyanide).



需要热活化的氧化剂氧化反应（如过硫酸盐氧化）。
Oxidizing agent oxidation reactions (e.g., persulfate oxidation) that require thermal activation.



医药
Pharmaceutical

农药
Pesticide

化工
Chemical

焦化
Coking

市政
Municipal

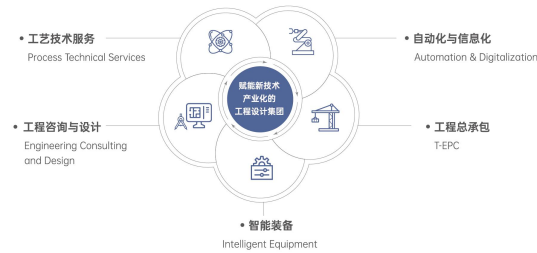
印染
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05 天俱时集团

TIANS GROUP

天俱时始创于1998年，是一家赋能新技术产业化的工程设计集团，依托先进的设计理念和国际视野，为全球客户提供工艺技术服务、工程咨询与设计、工程总承包、智能装备、自动化与信息化于一体的综合解决方案，帮助客户实现 From Lab to Fab 的产业化转化。业务涵盖精细化工、电子化学品、合成生物、生物医药、化学制药、食品健康、冶金矿山等高科技行业领域。

TIANS Engineering Technology Group Co., Ltd., founded in 1998, is an engineering design group empowering industrialization of new technologies. Based on advanced design concept and forward-looking global perspective, we provide comprehensive solutions involving process technical services, engineering consulting and design, EPC, intelligent equipment and automation & digitalization to help our clients achieving a From Lab to Fab industrialization transformation. Our business spans many high-tech fields, including fine chemical engineering, electronic chemicals, synthetic biology, bio-pharmaceutical, chemical pharmaceutical, healthy food and metallurgy & mining.



天俱时工程科技集团有限公司
中国·河北·石家庄市裕华东路550号天山科技工业园A座23-26层
400-082-6116

TIANS ENGINEERING TECHNOLOGY GROUP CO., LTD
F23-26, BUILDING A, TIANSHAN SCIENCE AND TECHNOLOGY INDUSTRIAL PARK, NO. 550, YU-HUA EAST ROAD, SHUIJIAZHANG, HEBEI, CHINA



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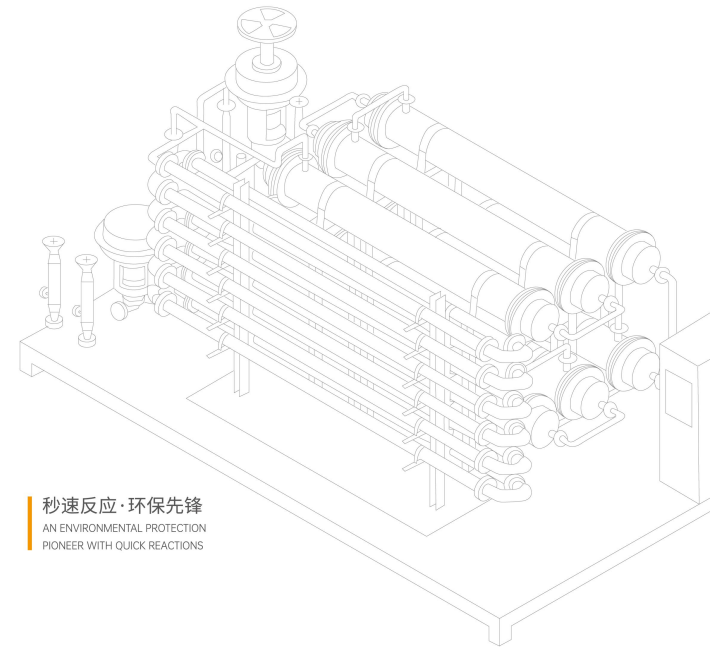


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TIANS'S 天俱时

Pipeline Wastewater Treatment Equipment

管道流氧化污水处理设备



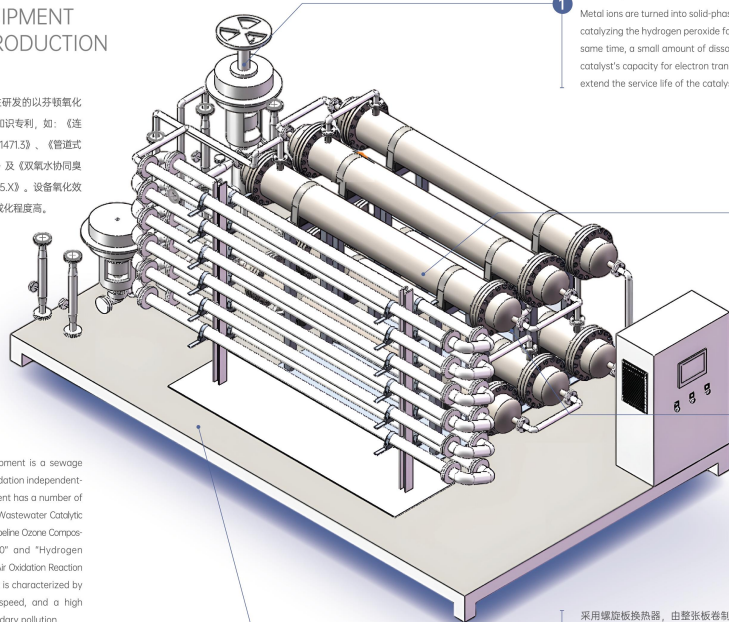
秒速反应·环保先锋
AN ENVIRONMENTAL PROTECTION
PIONEER WITH QUICK REACTIONS

01 设备介绍

EQUIPMENT INTRODUCTION

管道流氧化污水处理设备是由天倾时自主研发的以芬顿氧化为基础的污水处理装备，该设备获得多个知识专利，如：《连续流管道式废水催化处理系统 ZL202221041471.3》、《管道式臭氧复合热芬顿反应器 2022107684980》及《双氧水协同臭氧催化氧化反应系统 ZL202122801385.X》。设备氧化效率高、无二次污染风险、反应速度快、集成化程度高。

The Pipeline Wastewater Treatment Equipment is a sewage treatment equipment based on Fenton oxidation independently developed by TIANSHI Group. The equipment has a number of patents, such as "Continuous-flow Pipeline Wastewater Catalytic Treatment System ZL202221041471.3", "Pipeline Ozone Composite Thermal Fenton Reactor 2022107684980" and "Hydrogen Peroxide Synergistic Ozone Catalytic Wet Air Oxidation Reaction System ZL202122801385.X". The equipment is characterized by high oxidation efficiency, fast reaction speed, and a high degree of integration without risk of secondary pollution.



1 将金属离子固定化为固相催化剂，起主要的催化双氧水产生自由基的作用，同时辅以少量的溶解态引发剂，增强催化剂电子转移能力，减少催化剂消耗，延长催化剂使用寿命。
Metal ions are turned into solid-phase catalysts, which play the main role in catalyzing the hydrogen peroxide for the production of free radicals. At the same time, a small amount of dissolved initiators is added to enhance the catalyst's capacity for electron transfer, reduce catalyst consumption, and extend the service life of the catalyst.

2 主反应在管道式反应器中进行，反应器直径小，长径比大，返混小，接近平推流，同一位置的氧化剂浓度参数恒定，反应效果稳定。
The main reaction is carried out in a pipeline reactor. The diameter of the reactor is small, the aspect ratio is large, and the amount of back mixing is small. It is close to the plug flow. The concentration parameter of oxidants at the same position is constant, and the reaction effect is stable.

3 管道中废水与氧化剂径向混合速度极快（可以达到秒级），可大幅缩短反应时间，减少双氧水的无效分解，实现装备的高效化和集成化。
The radial mixing speed of wastewater and oxidant in the pipeline is extremely fast (reaching the second level), which can greatly shorten the reaction time, reduce the ineffective decomposition of hydrogen peroxide, and make possible efficient and integrated equipment.

4 采用螺旋板换热器，由整张板卷制而成，无焊接，无损伤，抗腐蚀、抗结垢能力强，适合于含固量较高的介质，过流宽度5mm，可充分利用蒸汽潜热，进出水温差低于20℃。
It adopts a spiral-plate heat exchanger, made of a whole rolled plate without welding or damage. It has strong anti-corrosion and anti-scaling capacity, suitable for medium with high solid content. The flow pass width is 5mm. It can make full use of the latent heat of steam, and the inlet and outlet water temperature difference is less than 20℃.

02 技术原理

TECHNICAL PRINCIPLE

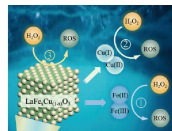


图1 连续管道流热催化氧化技术原理示意图
Figure 1 Schematic diagram of the principle of continuous pipeline flow heat catalytic oxidation technology

03 技术优势

TECHNICAL STRENGTHS

降低成本

Cost reduction

采用自主研发的高效催化剂，与传统的芬顿技术相比，铁盐的加入量减少90%以上，同时铁泥的产生量也相应减少。
It uses a self-developed high-efficiency catalyst. Compared with the traditional Fenton technology, the amount of iron salt used is reduced by over 90%, and the amount of iron sludge produced is also reduced accordingly.

提高双氧水利用率

Better utilization of hydrogen peroxide

采用自主设计制作的反应器，管道中废水与氧化剂径向混合速度极快，完全混合后进入催化层，迅速完成自由基氧化反应，减少双氧水的无效分解，提高双氧水利用率。

It uses the reactor designed and manufactured independently. The radial mixing speed of wastewater and oxidant in the pipeline is extremely fast. After thorough mixing, it enters the catalytic layer and the oxidation reaction of free radicals is quickly performed, reducing the ineffective decomposition of hydrogen peroxide and improving the utilization of hydrogen peroxide.



应用场景丰富

Rich application scenarios

相比传统芬顿技术，本技术对废水初始pH要求宽泛，且不仅可用于去除废水COD，还具备破氰作用。

Compared to the traditional Fenton technology, this technology has a broad requirement for the initial pH of wastewater. It can be used to remove COD from wastewater and also has the effect of cyanide breaking.

设备集成化易于管理

Integrated equipment for ease of management

管道反应器中氧化反应通常在2min时间内结束，可实现设备集成，占地面积小；通过自动化控制，易于管理。

The oxidation reaction in the pipeline reactor usually takes 2 minutes, which can realize equipment integration with a small footprint. Automated control contributes to easy management.