

Sustainable Industrial Wastewater Treatment

Ferrate(VI) Makes Water Treatment Green, Efficient and Circular

For decades, Ferrate(VI) has been known as the strongest oxidant in the world for the treatment of (industrial) wastewater. Unlike frequently used chemicals for water treatment, Ferrate(VI) is environmentally friendly. Producing Ferrate(VI) in a stable and preservable form has been impossible until now. Thanks to ground-breaking research, however, the founders of Dutch start-up Ferr-Tech have developed a patented method to do so successfully. The company is the first to provide Ferrate(VI) for industrial application. By purifying wastewater with Ferrate(VI), water treatment becomes more sustainable and energy efficient, while enabling reuse of the water in the industrial process. Judith le Fèvre, co-owner of Ferr-Tech and Director Marketing & Public Affairs, provides insight into the company's goals.

CHEManager: Mrs. le Fèvre, what motivated you to found Ferr-Tech?

Judith le Fèvre: Ferr-Tech was formed after co-founder Sina Samimi wrote his master's thesis on the tenability and stability of producing Ferrate(VI). "The problem with Ferrate(VI) in the past was that it had a shelf life of only a few seconds, making it unsuitable for industrial use", Judith explains. "Sina has developed a production process to make Ferrate(VI) tenable for two months. Now, as a Dutch start-up, we are the first in the world that can offer FerSol, Ferrate(VI) in solution for industrial use to the market."

What challenges did you face so far?

J. le Fèvre: One of the biggest challenges in circular business is that to be truly circular, you have to address the entire chain. Ferr-Tech is also working on this. "We separate clean water from sludge, the waste, but it would be ideal if the sludge could also be reused, for example as a raw material for fertilizer. This is not our core business, but it would be, of course, good to close the entire chain. That is why we are participating in a European project at a dairy giant, in which it is investigated, among other

things, what the possibilities are with sludge."

In addition, Ferr-Tech is committed to further improving its own products. "We produce Ferrate(VI) in solution under the name FerSol. This product has a shelf life of two months and must be stored below 10 degrees. However, we are also developing Ferrate(VI) in cake and powder form. These products have an even longer shelf life, are even more powerful and require an even lower dosage than FerSol."

What were the most exciting experiences in Ferr-Tech's journey?

J. le Fèvre: For existing only two years, I think we got to experience a lot of exciting things already. However, in my opinion, winning the CES Innovation Award, is definitely on top of the list. The CES is the world's largest technology exhibit, located in Las Vegas. The CES Innovation Award, is one of the most prestigious awards a company in the field of technology can receive and for us, it also marks the start of conquering the US.

What are your plans for the future?

J. le Fèvre: Our goal is: clean and sufficient water for everyone. We're al-



Judith le Fèvre, Ferr-Tech

ready doing projects in Spain, France, Norway, Germany, USA and of course our home country: The Netherlands. To reach the goal, we want to get to the entire world. Next on the agenda is the middle east. Over there, you have large desalination plants where fresh water is made from salt water. We improve the water to the Reverse Osmosis so the membranes last much longer. In this way, we multiply the sustainability of these kinds of plants and reduce the total cost of ownership.

However, meanwhile we are still a start-up, and the future is unknown to everyone. Yet, this doesn't keep us from innovating and trying to reach our goal.

PERSONAL PROFILE

Judith le Fèvre is co-owner of Ferr-Tech and a driven, innovative and internationally oriented entrepreneur. With a Master's degree in Business Administration, le Fèvre manages to develop and maintain Ferr-Tech's vast and strong network. She has many years of experience in Public Affairs & Lobby, and as an independent interim manager. On top of that she also has an eye for success and a preference for working with companies like Ferr-Tech with high societal value. She loves launching new undertakings and is one of the driving forces behind establishing Ferr-Tech as a household name in the industry.

For decades, Ferrate(VI) has been known as the most powerful oxidant for the treatment of industrial (waste) water. Unlike other frequently used chemicals for water purification, it doesn't produce harmful by-products and has no negative effect on human health and ecological systems.





BUSINESS IDEA

Revolutionary Water Treatment

Ferrate(VI) is the strongest oxidant, alternative chemicals have a weaker oxidizing effect. The strength of this effect is expressed in the redox potential. The higher the value, the stronger the oxidant. Ferr-Tech's product, FerSol can be used for several essential processes in wastewater treatment and, as a result, saves a lot of energy. In addition, it reacts with dissolved substances, causing them to sink (coagulation). As a side effect it eliminates certain bacteria, fungi and viruses.

Many chemicals only have one functionality. Wastewater is treated through complex processes and installations, requiring various steps. A striking example can be found in the steel industry. Colour, iron ions and water hardness are treated by a 5-step purification process, including chlorine, metabisulfite, soda, ferrite and slaked lime (calcium hydroxide). FerSol enables a one-step purification process. By shortening these complex water treatment processes, we also reduce energy consumption.

Thanks to the powerful oxidation caused by Ferrate(VI), the particles of the residual product are strongly bound together. Thanks to this densification, less sludge is generated.

This method simplifies sludge discharge and reduces costs, while decreasing energy consumption and CO₂ emissions.

FerSol has no harmful effects on people and the environment, as demonstrated with the Ames test and the FET test. It replaces chemicals that are difficult to remove from the water and makes processes more sustainable. From now on, when removing color, odor and oil, you can efficiently use a single green chemical: FerSol. In contrast, traditional methods require various harmful chemicals. Additional steps are often necessary, such as aeration or spreading.

The major advantages are:

- It is extremely powerful and has a three-in-one function, reducing the amount of chemicals needed;
- The residue of FerSol is environmentally and human friendly;
- The reduction in sludge also reduces the CO₂-footprint by lowering transport costs. In many cases, the sludge is 80% more concentrated than with other solutions;
- It enables residual water to be reused;
- As a side effect, it eliminates bacteria, fungi and viruses.

■ Ferr-Tech, Meppel, The Netherlands
<https://ferr-tech.com>



ELEVATOR PITCH

Green. Efficient. Circular.

Ferr-Tech is, with their product FerSol, global market leader in the field of Ferrate(VI) applications for industrial (waste)water purification. Through a patented process, Ferr-Tech offers Ferrate(VI) in a liquid and stable form for use in the (waste)water industry. From their headquarters in Meppel, Ferr-Tech runs the water lab and handles high quality water tests, experiments and analyses for customers.

FerSol is the most powerful green oxidant for wastewater treatment. It is a chemical that is 63% stronger than chlorine and environmentally friendly. Ferr-Tech uses it to clean wastewater in the industry, to enable water reuse, as well as to clean crates in the Food & Beverage industry or plastic flakes in polymer recycling plants, for example.

Ferr-Tech feels the drive to contribute to the ever growing global problem of clean water scarcity and also to decrease the use of harmful chemicals.

2021

- Increased production with new production module starts in October.
- First aircargo delivery to the USA in November

2022

- Partnership VivoChem established in January
- Partnership with BÜFA Chemicals established in April
- Relocation to a bigger facility in July

Funding/Awards

2021

- August: VIA grant, EU funding
- October: MKB fund Drenthe
- October: CES Innovation Award

2022

- March: Nominee of WIS Award (outcome in September 2022)
- September: Winner of the WIS Award

Milestones

2020

- February: Ferr-Tech is founded.
- September: the company's waterlab is ready for business.



As a Dutch start-up, we are the first company to provide Ferrate(VI) for industrial applications.



Breakthrough for Ferr-Tech is the ability to keep Ferrate(VI) oxidant stable and preservable as a liquid, distributed under the name FerSol.