

**"We don't study technical problems.
We solve them!"
UMTEC**



Recycling of Spent Acids

Pickling acid processing
with GALVASPLIT:

Recovery of valuable
substances from waste



Fig. 1: view of the GALVASPLIT plant at Thommen-Furler AG in La Chaux-de-Fonds

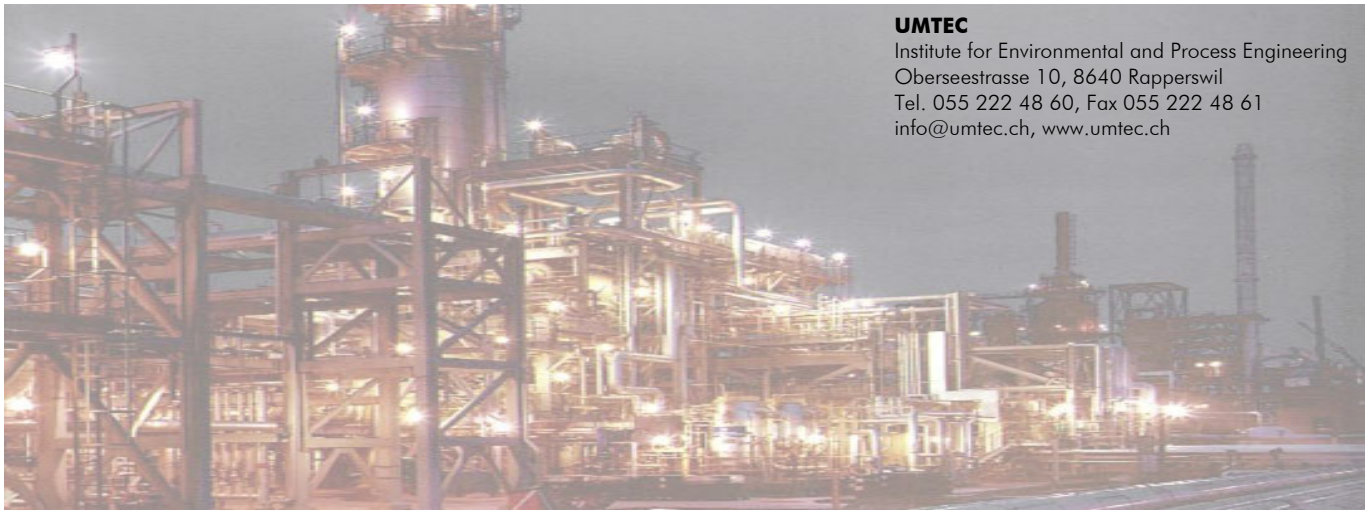
Subject: Waste water purification

Corrosion protection produces spent pickling acid - in Switzerland, very large quantities of old pickling acids result yearly from hot-galvanisation, and must be disposed of as hazardous waste.

Spent acid recycling by GALVASPLIT - The Institute for Environmental and Process Engineering UMTEC has developed the GALVASPLIT process, with recovery valuable products from the old pickling acids. The quantity of liquid waste to be disposed of is thus reduced by 80-90%.

From the test tube to a full scale industrial production plant - the process which was invented at UMTEC and was awarded in 1999 with a prestigious innovation prize has been in production since the Summer of 2004 in a large-scale technological plant at Thommen-Furler AG in La Chaux-de-Fonds.





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The problem: spent acids

Before steel parts are hot-galvanised, they must be cleaned of rust and other adhering contamination. To achieve this, the parts are submerged into a hydrochloric acid bath, the so called pickling liquor. As a consequence of pickling, the hydrochloric acid is used up and eventually the acid bath is saturated with dissolved iron. Even if the acid bath still contains a certain share of acid which has not been used up, it is no longer suitable as a pickling bath and must be replaced. Enormous quantities of these old acids occur worldwide, which must be disposed of as hazardous waste.

This situation is not only a grave economic one, but also an ecological problem for the entire hot-galvanising industry. The solution is the GALVASPLIT process which was invented at UMTEC. With this process valuable products are extracted from the spent acids.

Approx. 60% clean hydrochloric acid and approx. 30% purified iron chloride crystals are recovered from contaminated spent acids with GALVASPLIT. What remains is a residual quantity of approx. 10%, in which the non-reusable contents of the spent acid are concentrated. Thus a waste reduction of up to 90% is possible in comparison to the present situation. And best of all: the method not only makes ecological sense, but is also economically attractive.



Fig. 2: delivery of the spent acid to the plant



Fig. 3: big-bag with iron chloride from GALVASPLIT.

The solution: GALVASPLIT

GALVASPLIT is based on the principle of evaporation crystallisation: The spent acid is heated under a vacuum in a closed system. Thereby, the unconsumed part of the acid is evaporated and is recovered. By way of the evaporation, the fluid is thickened and the iron chloride contained in the old acid begins to crystallise in a very pure form. The crystals are subsequently purified and the iron chloride which is extracted is sold as a commercial product.

GALVASLIT plant in operation since summer 2004

Together with the industry partners Verzinkerei Wollerau AG and the Métraux Services SA, the method was developed further from the laboratory scale through the pilot scale, up to a large-scale technological installation. This plant started operations at Thommen-Furler AG in the summer of 2004 and has been continuously in production since. Up to 2000 tonnes of spent acid may be treated yearly by the plant: Foreign corporations have already made note of their interest in our method.

UMTEC and Métraux Services SA will also work together in the future on an optimisation of the process, as well as its extension to the processing of spent acids from other fields of industry.

The products of GALVASPLIT: purified hydrochloric acid, and iron chloride of commercial grade.

The GALVASPLIT method is a nice example of the development of new environmental technology by a university institute in cooperation with innovative industry partners, and with the financial support of the environmental technology fund BAFU.