

Treatment of Waste Acids Resulting from the Semi-Conductor Industry ©



The Problem

Waste acids resulting from the semi-conductor industry

Waste acids resulting from the semi-conductor industry contain mixtures of HF, HCl, H₃PO₄, HNO₃ and H₂SO₄. They could also contain soluble ammonium salts. Currently they are treated discontinuously with lime in a pH range of 11-12. After discontinuous separation and dewatering of the resulting sludge, the water phase is then neutralized by hydrochloric acid to be disposed of into the sewer system. The disadvantages of this discontinuous process are:

- Long treatment duration
- Large space required
- High personnel costs

The Solution

A new state-of-the-art continuous treatment

Our detailed on-site investigations and simulation of unit operations in laboratory and bench scale resulted in the development of a new state-of-the-art **continuous treatment** that eliminates all above-mentioned disadvantages.

In addition the large differences in the quality of the waste acids were compensated using an integrated storage and distribution waste acids management system.

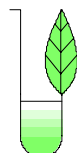
Calculation of mass and energy balances secures a perfect plant design with economical benefits for our customer.

The Process

Innovative und fully automated process

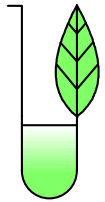
The new treatment process is a continuous process. The waste acids are treated in three reactors, where the pH is controlled in the first two reactors by adding lime. The resulting sludge is separated continuously using a combination of flotation and sedimentation technology. After sludge dewatering, the water phase is neutralized and discharged into the sewer system.

The new developed continuous process is patented at the German patent office: DE 10 2006 053 507 and published on May 15th 2008.



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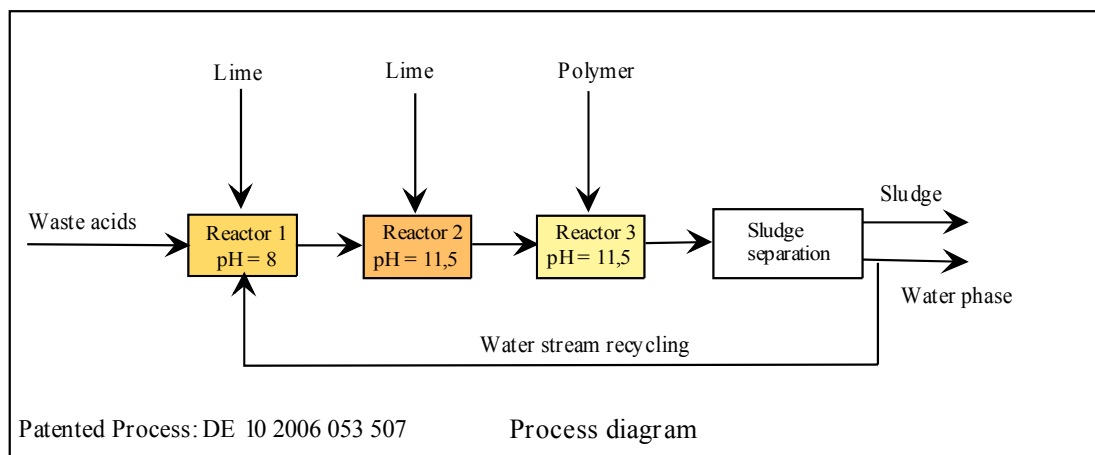
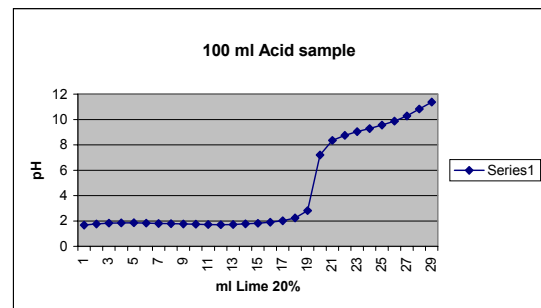
Integrated acid storage and feed system

Seven 10m³ storage tanks are connected to each others by overflow, where each one is supported with its own feed and transfer pump building together an integrated acid storage and feed system. The system allows feeding the treatment plant from each tank separately and pumping the acid within the tanks to achieve better acid homogeneity. This arrangement provides an optimum of acid storage and feed management. The treatment plant is built according to the German Water Law WHG, LAU and HBV of VAWs.



Two pH-controlled circuits

The next fig. shows the pH course of a representative acid sample during the neutralisation with lime. The problem of neutralisation within a wide pH range was solved excellently using two pH-controlled circuits. By recycling a part of the water phase after sludge separation, process stability is achieved. This also reduces chemical consumption and sludge amount. The fig. below shows a simplified diagram of the treatment process.

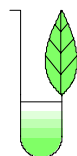


Advantages of the new process:

- ◆ Over 70% increase of time-space-efficiency
- ◆ Over 60% less labour costs
- ◆ Ca. 30% less chemicals demand
- ◆ Ca. 30% less resulting sludge

Further more we provide:

- ◆ Plants for water treatment
- ◆ Plants for wastewater treatment
- ◆ Plants for spent gas / air purification
- ◆ Plants for waste / hazardous waste remediation



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