

# HCl Oxidation

The HCl Oxidation technology produces a high purity chlorine, while offering an economical and highly reliable operation that uses little power and steam. The unique technology developed by Sumitomo Chemical Company offers a robust process using an active and thermally stable catalyst.

The HCl Oxidation process was piloted following Sumitomo's discovery and development of a robust catalyst. The development of a bench-scale process was followed by a demonstration plant. The first commercial plant was brought onstream in 2003. Seven trains have been commissioned, with a capacity up to 120 ktpy and a total production capacity of 760 ktpy as of 2019. These units have produced more than 3,500 kilotons of chlorine product.

## HCl Oxidation process scheme

### REACTION

A fixed-bed tubular reactor converts oxygen ( $O_2$ ) and hydrogen chloride gas (HCl) to chlorine ( $Cl_2$ ) and steam. Recycled oxygen from the downstream separation reduces the fresh  $O_2$ -feedstock rate.

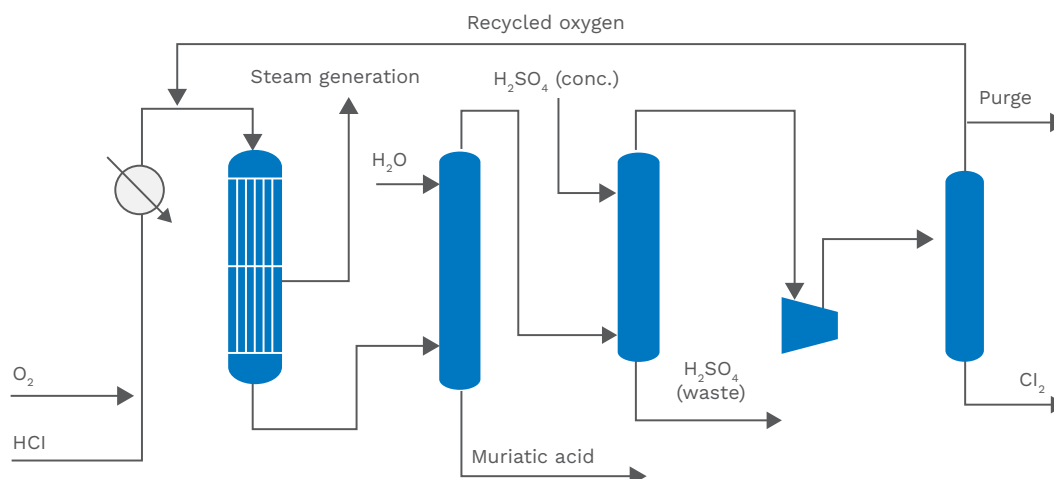
### WASHING

The reactor effluent is cooled and washed to remove unreacted HCl which is sold as aqueous muriatic acid by-product. The HCl-free reactor effluent gas is then dried with sulfuric acid to remove any moisture.

### SEPARATION

The moisture-free reactor effluent is then compressed and separated into a chlorine product and  $O_2$  recycle stream. The high-purity chlorine product is vaporized and superheated for use in the chemical complex.

## HCl Oxidation process scheme



## HCl Oxidation technology highlights

### LOW VARIABLE OPERATING COST

- Unit consumption of electrical power is very low compared to unit consumption by the electrolysis method
- Total power and steam consumption per ton of chlorine produced is less than competing technologies

### SUPERIOR TECHNOLOGY

- Produces chlorine with comparable purity to that produced by brine electrolysis but with lower operating costs
- High catalyst activity and long life

### CATALYST HIGHLIGHTS

- Sumitomo has discovered that higher activity can be achieved using RuO<sub>2</sub> type catalysts
- Further studies revealed an improvement in catalyst activity by supporting the RuO<sub>2</sub> on TiO<sub>2</sub>
- The catalyst possesses outstanding thermal conductivity. This improvement reduces hot spots in the catalyst layer and has allowed the use of a fixed bed reactor system

## Exclusive licensor

Technip Energies has an exclusive collaboration agreement with Sumitomo Chemical Company to license this hydrogen chloride (HCl) oxidation technology.



**Badger Process Technology**  
Dana Johnson  
dana.johnson@ten.com  
+1 617 748 7220

Erik Moy  
erik.moy@ten.com  
+1 617 748 7262

[www.ten.com](http://www.ten.com)