



API HCl SALTS PROCESSED DIRECTLY WITH HCl GAS

"Gas/liquid reactions to make solid API salts no longer need to be a bottleneck. Continuous processing enables safe, direct gas usage and delivers a more economical, predictable path to high-purity API salts."

THE CHALLENGE

Producing API hydrochloride salts is a critical step in many pharmaceutical processes. Traditional batch hydrochlorinations often create operational and compliance challenges:

- **Strict safety and regulatory compliance:** Large volumes of gaseous HCl require strict safety measures and complex permitting procedures, limiting throughput and increases CAPEX.
- **Complex workup and high OPEX:** Using HCl or alternative hydrochlorinating agents, the API dissolves into water, requiring energy-intensive downstream workup (evaporation, crystallization, drying). Precipitation occurs unpredictably, creating solids that are difficult to control in batch reactors.
- **Inefficient heat control:** HCl hydrochlorinations is highly exothermic. Batch systems cannot remove heat quickly and uniformly. It is slowing production rates and increasing operational risk.

THE SOLUTION

The hydrochlorination step is performed in a continuous gas-liquid reactor skid based on Flowid's SpinPro dynamic flow reactor technology. Continuous operation enabled:

Reduced reactive material.

Easy product workup by in-line filtering.

Rapid heat removal in exothermic reactions.

The solution simplifies the overall processing, reducing OPEX and CAPEX. Processing is simplified at both the feedstock and the workup stages: Direct use of HCl gas at the start of the line, and readily obtaining the product through filtration at the end of the line.



KEY RESULTS

- Production capacity: 1,000-10,000 tons per year per unit
- Reagent: Direct use of HCl gas in a controlled way
- Workup: Pure API.HCl obtained immediately by in-line filtration
- Investments/costs: Lower CAPEX and OPEX



STRUCTURED SCALE-UP APPROACH

Flowid applies a phased methodology to introduce flow technology:

1. Chemical & Technical Feasibility: Evaluation of chemistry and equipment fit
2. Proof of Concept: Validation at lab scale with the SpinPro
3. Pilot Skid: Continuous unit
4. Production Skid: SpinPro R3 or R4
5. Commissioning, maintenance and service level agreements

Flowid - Expect more from your chemistry!

If you are considering converting your process to flow or evaluating a retrofit for this step, feel free to reach out to us.