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Minerals & Mining

FOULING PREVENTION IN ALUMINA PROCESS RECYCLE

How membrane filtration removes organic foulants from process liquor to protect equipment and improve yield

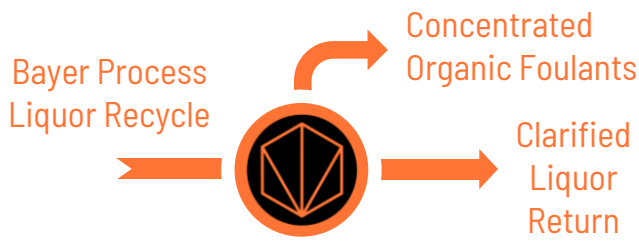
THE SITUATION

Alumina production via the Bayer process relies on a hot caustic sodium aluminate liquor recycled continuously through the process circuit. As the liquor cycles through dissolution, clarification, and precipitation, it accumulates organic impurities from the bauxite ore - humates, oxalates, and other dissolved organics - that foul heat exchangers, degrade evaporator performance, and interfere with precipitation. Current practice bleeds a liquor side-stream to remove these organics, consuming energy and discarding caustic value. Membrane filtration removes organics selectively, returning the caustic aluminate liquor to the process for continued use.

THE PROBLEM

- **Organic Fouling of Downstream Equipment** – Humates and oxalates accumulate on heat exchangers, evaporators, and crystallizers, degrading thermal efficiency and driving maintenance-intensive cleaning cycles.
- **Caustic Loss Through Side-Stream Bleeding** – Conventional oxalate management discards embedded caustic value along with the organics.
- **Production Yield Impact** – At sufficient organic loading, interference with precipitation chemistry reduces alumina hydrate yield per unit of bauxite processed.

THE SYSTEM



Membrane side-stream treatment unit installed on the Bayer process recycle liquor. Removes dissolved organic foulants in a concentrated stream and returns clarified, organic-reduced liquor to the circuit — keeping aluminate and caustic content without the losses of conventional side-stream bleed. Designed for sustained operation in the high-pH, elevated-temperature conditions of Bayer process liquor.

RESULTS DELIVERED

> 99%	Large Organics Removal
95%	TOC Removal
85%	Liquor Recovery

OUR TECHNOLOGY – Powered by ViaForge™ Resilience

Bayer process liquor combines high pH, elevated temperatures, and high dissolved solids - conditions that rapidly degrade conventional polymer membranes. ViaForge™ membrane technology is commercially proven in weak black liquor - a caustic stream with comparable pH and temperature demands - giving alumina operators confidence in the durability and longevity of the system.

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