



Avebe: Scalable techniques that recover process salts for reuse from salt-sugar rich wastewater effluent.

Problem description

Avebe is one of the largest handlers of potato-based starch products. Concerning sustainability and closed-loop production, Avebe is interested in obtaining new separation techniques. In one of their production lines, salt is added to a water-starch solution to extract valuable materials. As a result; sugar and salt-rich effluents are created as a waste product. The current, most cost-effective, approach is to dilute the wastewater stream and discharge the diluted effluent into surface water. Although this is a cheap approach, all the materials are considered waste and are lost in the process. Avebe is therefore interested in recovering and reusing the materials in the effluent, especially the salts and water. This has two benefits: One; reducing the environmental footprint and two; valuable reuse of raw materials.

Process parameters:

- 30 million cubic meters/year
- Salts in effluent: NaCl or Na₂SO₄ (0,01 to 20% concentration)
- Sugars in effluent: Reducing and oxidising sugars (Mw < 2000 Da) that are reactive and easily degrade (0.01 – 2% concentration)
- Due to the saline nature of the effluent bacterial degradation of sugars is inhibited.

Current known technique(s)

- Electrodialysis
- Reversed osmosis
- Forward osmosis
- Evaporation
- Fermentation (organisms that sustain in the saline environment)

Objective(s)

selective and cost-effective system to recover and reuse salts

- Cost-effective recovery of salt
- Selective recovery of salt (no impurities in recovered salt)
- The system needs to be reusable
- The system needs to be energy efficient e.g.



- Operate at low temperatures;
- Use low-value waste energy
- Recuperate used energy.
- Subzero processes are allowed (freeze drying
- Use a “blue” energy generation technique

Requirements

- Techniques are required to show the potential to be scalable > $3 \cdot 10^6$ m³/year (TRL > 4)
- No evaporation techniques
- Food grade recovery of salts (GMP+)
- Sugar concentration in salt solution < 0.01%
- No heavy metals