

# Recovery of Lactic Acid from Pickle Process Wastewater

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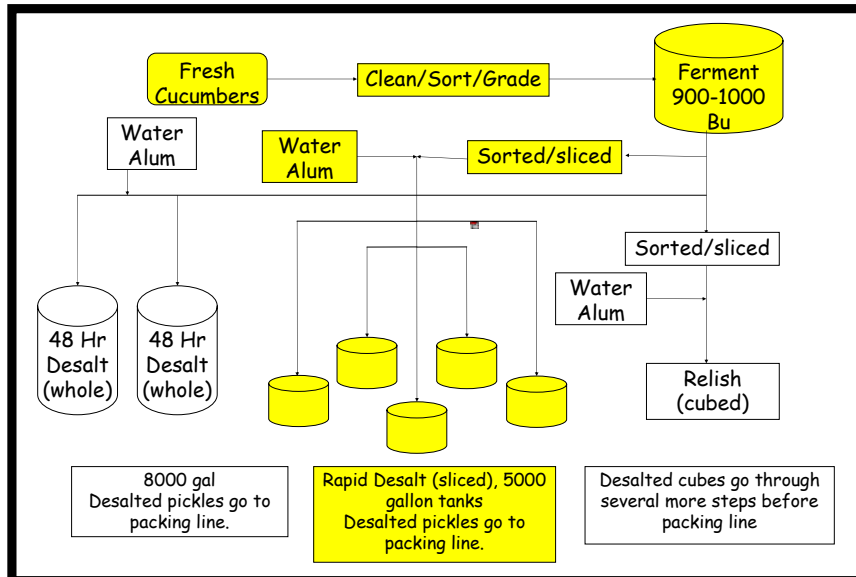
April 22nd, 2004

## Objective:

To determine if lactic acid can be removed from pickle process water in order to lower Biological Oxygen Demand (BOD) of wastewater.

## Purpose:

- Reduce BOD going to the public wastewater treatment facility and its associated cost.
- Reduce or eliminate the use of caustic to adjust pH of the process wastewater.
- To take a step toward eco-efficiency by increasing resource productivity.



### Fermented/Processed (35% of commercially processed)

- Fresh cucumbers are fermented in large tanks (>20 days) with a salt and acid brine
- Desalted
- Packed in brine with acid, flavor, color, CaCl<sub>2</sub> and salt to preserve
- No pasteurization or refrigeration necessary due to the removal of reducing sugars and the generation of lactic acid during fermentation
- Shelf life = 2 years

### Fermentation

- Tanking Inputs  
NaCl solution, reused brine, CaCl<sub>2</sub>
- Cucumber Outputs  
Glucose, fructose, malic acid, nutrients
- Within the cucumber  
Lactic acid and salt

### Desalting

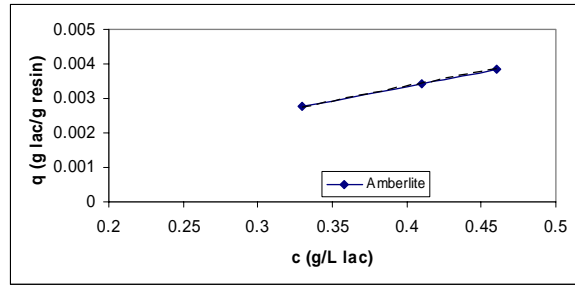
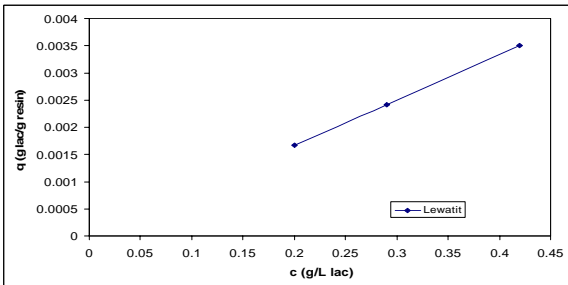
- Pickles start out at about 8% salt
- Reduce to 2-3% salt

#### Rapid Desalt

- 50:50 water to pickle ratio
- Water heated to 120 °F
- Air agitated to increase desalting rate
- Alum added to improve texture
- Time = 45 minutes
- Volume = 100-200 bushels

## Pickle Process Water Characteristics

- % Salt = 1-4%
- pH = 3.5 - 4.0
- % Lactic Acid = 0.3 - 0.6%
- Flowrate = 40,000 gal/day
- BOD = 5,000 - 15,000 mg/L

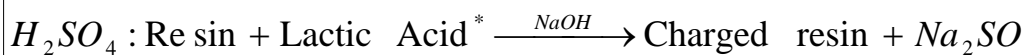


## Development of Isotherm

- To identify the lactate binding capacity of three different resins.
- Methods
  - Added 4 different dilutions of wastewater to resin.
  - After 48 hours the lactic acid concentrations were measured.

## Lactic Acid Recovery Process

- Charge the resin using 1 M NaOH.
- Pack the column by running water through the resin.
- Run wastewater through the packed column.
- Recover lactic acid by using 1 M sulfuric acid.



\* Other organic acids also present (i.e. acetic acid)

