# Lye Peeling of Fruits and Vegetables

## Background

Many fruits and vegetables are prepared for peeling and canning by exposure to caustic (NaOH). To ensure adequate and consistent peeling, the concentration of caustic in the treatment bath must be maintained at an effective strength. At the same time, if the caustic bath is too strong the fruit or vegetable can be damaged.

## Process

The typical process consists of an open tank of caustic heated to 170–220 °F (76–105 °C) by live steam. The target caustic concentration can vary from 3 to 15 %. Exposure time for the product is usually 5 minutes or less, after which the product is placed on moving grates and washed by high pressure nozzles to remove entrained caustic.

A significant amount of caustic is carried out by the product, so the bath must be continually replenished to maintain an adequate volume of caustic solution and a caustic concentration at the target value. This could involve addition of water, based on level control, as well as makeup caustic, based on the conductivity measurement. The best place to start is to look at how the bath behaves and how concentration is maintained manually.

## The Measurement

Due to its resistance to fouling, toroidal conductivity is the best measurement technique here. The conductivity sensor is typically mounted in the holding tank (Figure 1). Relatively clean processes may use the 228 sensor, but applications with potential for heavy coating should use the large bore 226 sensor.

As the bath ages, there is a buildup of salts, which are leached out of the peels and carried in with dirt and other suspended contaminants. This buildup causes an increase in the background conductivity.

Since the background increase cannot be distinguished from the conductivity due to the caustic, the conductivity set point (or calibration curve for a concentration measurement) may need to change as the bath ages. This effect will be smaller for higher caustic concentrations and for shorter intervals between bath replacement.

## Concentration Measurement

In general, when there is background conductivity, the conductivity versus concentration curve will not be the same as the standard curve for caustic (NaOH) in distilled water, due to buildup of salts in the bath. The curve must be developed from operating data, i.e. conductivity and titrated caustic concentrations. Data should be taken over the life of at least three (3) baths; the age of the bath and any additions to the bath should be noted, in addition to the conductivity and titrated caustic concentration. Once a curve has been developed, the on-line measurement can usually be corrected for salt build-up by standardization following a routine laboratory titration.

## Important Considerations

- Select the toroidal conductivity sensor based on how heavily the bath is loaded with suspended solids.
- When evaluating how to control bath concentration and volume, how the bath behaves and how it is manually controlled should be thoroughly examined.
- When setting up a concentration measurement, data should be taken over the life of three (3) baths to determine the relationship between conductivity and concentration.

# Instrumentation

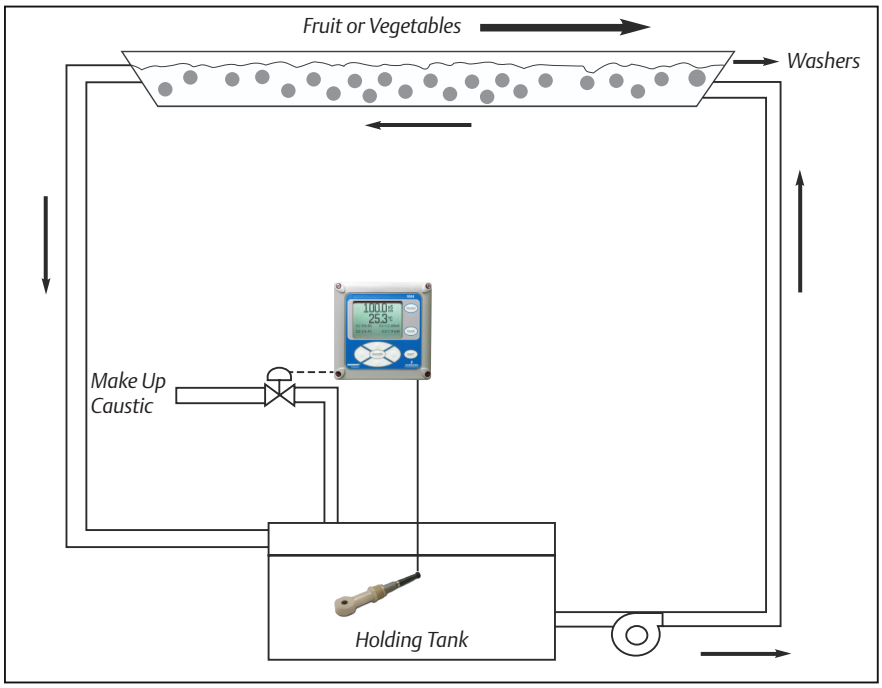
## 226 and 228 Toroidal Conductivity Sensors

- Toroidal (inductive) principle of measurement and construction
- Chemically-resistant materials of construction

## 1066 Toroidal Conductivity Analyzer

- 4–20 mA output with superimposed HART® or FOUNDATION™ Fieldbus communications protocol
- Clear, Large, easy-to-read display
- Customizable percent concentration curve
- Automatic/manual temperature compensation ensures accurate monitoring and control
- **Intuitive menu screens** with advanced diagnostics and user help screens

**Figure 1 - Lye Peeling of Fruits and Vegetables**

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**Emerson Process Management**
Rosemount Analytical
2400 Barranca Parkway
Irvine, CA 92606 USA
Toll Free + 1 855 724 2638
T +1 949 747 8500
F +1 949 474 7250
**liquid.csc@emerson.com**

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EMERSON™ Process Management