

Process Controls SalesNet

pH Applications

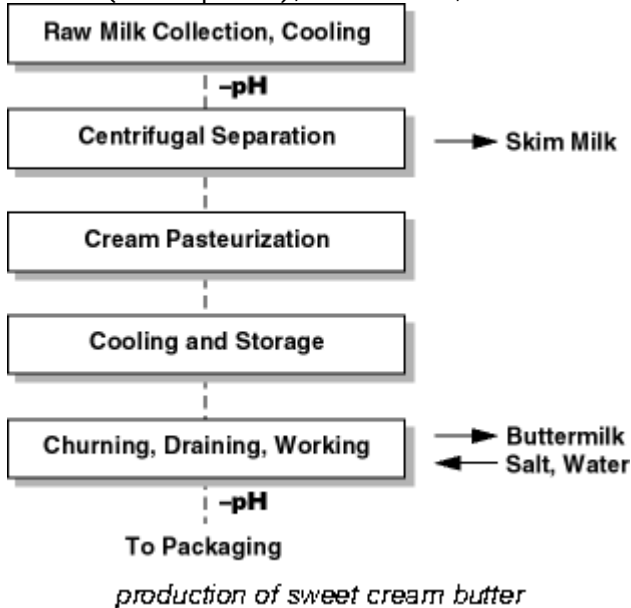
pH Measurement in Butter Making

New Non-glass pH Electrode Capabilities

- Reliable Durafet® solid state pH electrode is designed for dairy sanitary service.
- Authorized to use 3-A symbol
- Ion-Sensitive Field Effect Transistor (ISFET) sensor eliminates fragile glass membrane
- Fits standard tri-clamp or equivalent flanges
- Fast, 1-second response is typical
- Measurement is accurate, with no sodium or ORP interference.

Background

Buttermaking is the process of converting (churning) cream, an emulsion of butterfat-in-serum (water phase), into butter, an emulsion of serum in butterfat.



Typically the cream contains about 40% butterfat and the finished butter contains about 80%. Other ingredients include water, non-fat milk solids (curd) and salt. In Europe, the butterfat content is slightly higher and no salt is added. pH measurement can be significant in the process.

The steps of buttermaking are outlined in the accompanying figures. The pH of raw milk is typically between 6.5 and 6.8. pH measurement can be used to detect the presence of lactic acid which developed by microbial action, which lowers the pH and affects the flavor. In some cases depressed pH in milk or cream can be corrected by neutralizing with sodium carbonate or sodium hydroxide. The raw milk is centrifugally separated into cream and skim milk. Next the cream is pasteurized using either a batch heat

treatment or the more prevalent continuous HTST (high temperature, short time) process.

The cream is then cooled and usually stored overnight before churning. A few batch type churns are still used but most butter is made with continuous churns which rapidly agglomerate the butterfat into popcorn size granules. A byproduct is buttermilk, which is drained off. Then, the desired amounts of water and salt are worked in. In large modern plants, the finished butter goes directly to packaging machines for consumer size packages. It has been found that butter has an optimum flavor at a final pH near 5.

For the production of cultured cream butter, which is preferred in some areas of the world, appropriate bacteria culture is added to the cream following pasteurization. This culturing or controlled cream ripening process can be accurately monitored with pH measurement as the acid develops.

pH Electrode Requirements

pH electrodes must meet sanitary requirements for direct contact with food. The non-glass, Durafet electrode is a major breakthrough for pH measurement in this type of application. Based on new ISFET (ion-sensitive field effect transistor) technology, it eliminates the fragile glass membrane, the associated risk of breakage and liabilities of glass contamination of product and costly downtime. The electrode design complies with 3-A Sanitary Standards and is authorized to use the 3-A symbol.

In addition, Durafet electrode response eliminates the high impedance circuitry and vulnerability to insulation breakdown of glass membrane electrode signals. They have no ORP (oxidation-reduction potential) interference and negligible sodium ion error at high pH. They have exceptionally fast pH response—typically within 1 second. This assures close monitoring and control.

Long life of the solid state pH sensor is complemented by a reference electrode section with large surface area junction and gel electrolyte. The large junction area resists clogging and eases cleaning. No pressurization of the reference electrode is required. The probe also includes a temperature compensator to provide a compensated pH signal compatible with a variety of instrumentation.

Durafet electrodes can be used with the full line of Honeywell pH analyzers and two-wire transmitters. In addition, adapter modules are available to electronically interface the Durafet electrode to most other types of analyzers.

A simple solution.

Tomorrow's standards that Honeywell is setting today with the Durafet pH electrode include:

- Solid-state ISFET sensor is virtually unbreakable.
- Response has no sodium ion error or ORP interference.
- Flush reference junction and gel electrolyte reduce maintenance costs and increase electrode life.
- Built-in counter electrode improves measurement stability.
- Easily retrofits to existing systems, with sanitary flange and choice of insertion depth.

The sanitary Durafet pH electrode is another example of Honeywell's technology giving you a simple solution that increases productivity, ensures product quality, saves time, and increases process profitability.