

Process Controls SalesNet

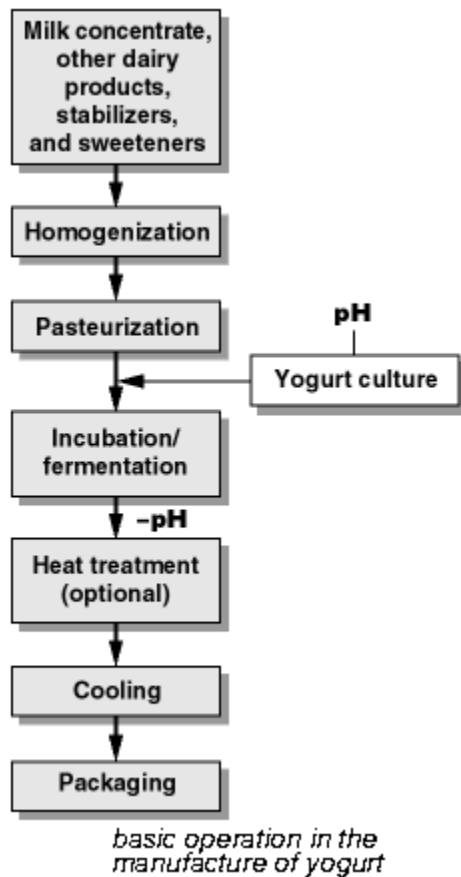
pH Applications

pH Measurement in the Manufacture of Yogurt: Ensuring Extraordinary Product Quality

Background

Yogurt is a popular, cultured dairy product produced by concentrated milk fermentation. The controlled production of lactic acid by fermentation is critical to the character of the product.

Lactic acid is responsible for the tart flavor and for destabilization of milk protein to form a gel structure. pH is an important measurement to monitor lactic acid production as well as for quality control of initial ingredients.



Yogurt production begins with the careful selection and blending of ingredients—such as milk concentrate, other dairy products, thickening agents, sweeteners and fruit—to give the proper solids and fat content, viscosity and flavor. The mix is homogenized at high pressure to prevent fat separation and assure solids dispersion. Heat treatment/pasteurization raises the temperature to 85-90°C, sufficient to destroy undesirable microorganisms and restructure the protein to improve viscosity. After cooling to 40-45°C, the sterile mix is ready for inoculation with smarter culture containing the specific lactic fermentation bacteria. Incubation can proceed either in the vat or in the package cups and take from 4 to 11 hours.

Fermentation converts lactose (milk sugar) to lactic acid, causing a pH drop into the range of 4.25-4.5. Bacterial action is then stopped by rapid cooling at the correct lactic acid level. The most readily available measurement for confirming the completion of fermentation is pH. Improper pH can be a cause of discoloration, excess free whey and excess or inadequate tartness.

pH electrode requirements

pH electrodes must meet sanitary requirements for direct contact with food. The [non-glass Durafet®](#) electrode is a major breakthrough in the availability of pH measurement for this type of application. The Durafet non-glass sanitary pH electrode now allows continuous, real-time monitoring

to accurately control fermentation.

Based on new, Ion-sensitive Field Effect Transistor (ISFET) technology, the Durafet electrode eliminates the fragile glass membrane and 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 display the 3-A symbol. In addition, the Durafet electrode response eliminates the high impedance circuitry

and vulnerability to insulation breakdown of glass membrane electrode signals. They have no ORP 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 of the end-of-fermentation point.

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 an integral 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 analyzers and two-wire transmitters](#). In addition, adapter modules are available to electronically interface the Durafet electrode to existing analyzers of nearly any manufacturer.

Simple solution

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

- The solid-state ISFET sensor is virtually unbreakable.
- Response has no sodium ion error nor ORP interference.
- Large reference junction and gel electrolyte reduce maintenance costs and increase electrode life.
- Built-in counter electrode improves measurement stability.
- The electrode easily retrofits to existing systems with sanitary flange and choice of insertion depth.

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

Recommended equipment:

- [7794 Sanitary Durafet pH electrode mounting](#)
- [9782 pH Analyzer/Controller](#)