Controlling Chlorine in Food Canning

BENEFITS

- Direct Chlorine Measurement
- Safety
- No Reagents Required

BACKGROUND

Large manufacturers of canned foods use chlorine as part of their food processing operation. The food is cooked in sealed metal cans by a steam cooker. When the steam cooking is complete, water is used to cool the cans. As the cans cool, a vacuum develops internally, and very minute amounts of water may be drawn into the cans. This water must be bacteria free, or it could contaminate the food and cause botulism. Chlorine is used to disinfect the water to prevent food contamination. The concentration of the chlorine must be maintained at a level high enough to disinfect the water (typically 3 - 5 ppm), but not too high, as this will cause excessive corrosion of the cooker and discoloration of the cans. An instrument system is needed to detect the concentration of chlorine in the water to control it. Figure 1 shows how chlorine is controlled in food processing applications.

INSTRUMENTATION

Installation of a Rosemount Analytical Model 1056 chlorine analyzer and a Model 499A CL chlorine sensor solves the problem. The amperometric chlorine sensor develops a current that is directly proportional to the amount of free chlorine in the water. The Model 1056 analyzer compensates for pH and temperature changes (ensuring greater accuracy in the chlorine measure) and converts the current to a ppm signal. The analyzer thus eliminates the need for acid buffers or CO_2 gas to compensate for pH changes. The (optional) pH sensor can interface with the analyzer to provide on-line pH compensation, or a pH value can be entered manually.

The sensor is mounted directly in the cooling water, without sample treatment, pumps, or extractive sampling devices. The 1056 analyzer monitors the concentration of chlorine in the water and indicates the concentration in ppm directly on the display. The analyzer has adjustable alarm setpoints that can be used to control a chlorinator. When the concentration of chlorine decreases below the low setpoint, a relay will close, sending a signal to the chlorinator that causes injection of more chlorine into the water. When the chlorine concentration exceeds the high setpoint, another relay will close, signaling the chlorinator to restrict the injection of chlorine. The chlorinator can also be controlled by the 4-20 mA current output of the analyzer or by a separate PID controller.

Since the installation of on-line chlorine monitoring, manufacturers have realized lower operating costs due to effective chlorine usage and less frequent replacement of the cooker and cooler hardware. The system also provides assurance that the cooling water is adequately disinfected.

RELATED INDUSTRY APPLICATIONS

Canned Vegetables	Dairy Products
Canned Beverages	Poultry Plants
Canned Pet Food	Fish Packing

INSTRUMENTATION

Model 1056 Dual Input Intelligent Analyzer

- Dual configurable inputs and outputs: any combination of pH/ORP/ISE, Resistivity/Conductivity, Chlorine, Oxygen, Ozone, Turbidity, Flow.
- Large, bright LCD display can be customized
- Intuitive menus with advanced diagnostics
- 4 alarm relays with timers
- Optional HART®[1] or Profibus®[2] DP

Model 499A CL Free Residual Chlorine Sensor

- Amperometric sensor eliminates wet chemical analysis
- Chemically rugged Noryl®[3] body ensures longer life in harsh municipal and industrial environments
- Simple screw-on membrane cap requires no tools for routine maintenance

Model 3900 and 3900VP General Purpose pH/ORP Sensors

- Extended sensor life provided by double junction reference.
- Rugged polyphenylene sulfide body, completely sealed to eliminate sensor leakage.
- Multiple mounting options, including ¾" and 1" insertion and 1" submersion.

[1] HART is a registered trademark of the Hart foundation.
[2] Profibus is a registered trademark of Profibus & Profinet International.
[3] Noryl is a registered trademark of General Electric.

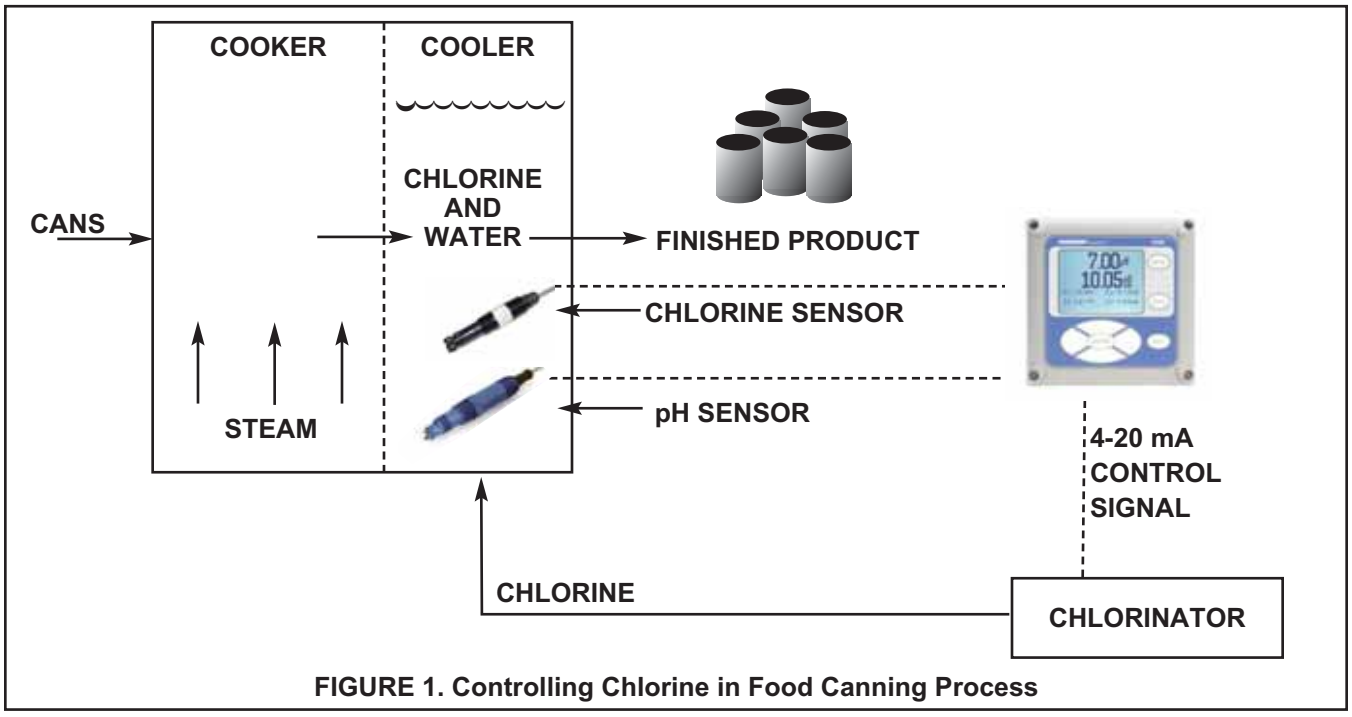

FIGURE 1. Controlling Chlorine in Food Canning Process

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