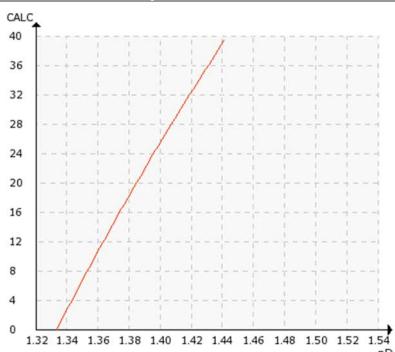


BRINE, SODIUM CHLORIDE NaCl, DI POTASSIUM PHOSPHATE K₂HPO₄, CALCIUM CHLORIDE CaCl₂

Typical end products

Co-extruded alginate, collagen or hybrid gel sausage casings and fresh sausages, cooked sausages, dry or semidry sausages, and emulsion meat sausages such as hot dogs.

Chemical Curve: Salt R.I. per Conc % b.w. at T_{REF} of 20 °C



Introduction

Sausages are manufactured by mincing or grinding meat and mixing the ground protein with various ingredients and water. The mixture is then stuffed into a casing to give it its distinctive shape and appearance and the sausage is finally treated or cured to meet the requirements of the desired final product.

Sausage casings can be natural or synthetic. Synthetic casings made of synthetic material such as

alginate, collagen or hybrid gel have better processing characteristics (better strength and uniform quality) and make it possible to produce sausages continuously in large volumes with less costs.

Application

Sausages with synthetic casings are often produced by co-extrusion. Instead of filling a casing, this method creates the casing as the sausage is produced. The meat and the casing gel are passed simultaneously through an extruder. The meat mixture or emulsion is pumped into the inner orifice while the casing suspension is applied to the outside surface of the meat mixture.

The gel usually has a high-water content, and needs to be coagulated by dehydration with a brine solution such as Sodium chloride, Di potassium phosphate or Calcium chloride to increase its mechanical properties. Therefore, after the co-extruder, the sausage is put into contact with the brine solution for removal of water by osmosis. This is done by either passing the sausages through a brine bath or by spraying brine on them.

The brine bath is salt solution, and as the sausage passes by, the amount of water increases and the brine becomes diluted. To ensure optimal product

quality, fresh salt is added to the brine either in solid form or as a solution to keep the brine at the desired concentration level.

After the brine bath, the sausage is ready to move on for packing or curing. Curing can be done e.g. by smoking, cooking or drying.

The concentration of the salt should be carefully monitored and controlled as the quality of the casing affects the consistency and quality. The concentration of brine defines the color and texture of the final sausage. Too low brine concentration results in a less firm and opaque product, while too high concentration causes the product to over dry and gives a rubbery texture to the sausage.

Instrumentation and installation

K-Patents Sanitary Process Refractometer PR-43-A monitors and controls continuously the concentration of salt in the brine, such as Sodium chloride, Di potassium phosphate or Calcium chloride for a higher consistency and quality of the final product. This provides real time information to the operators on when the addition of fresh salt is required to maintain the optimal brine concentration.

The refractometer is installed directly in the brine tank to monitor continuously the concentration of the brine as water gets transferred from the casing to the solution. A refractometer can also be installed in the liquid salt supply tank to ensure the right concentration and dosing.

K-Patents refractometer provides Ethernet or 4-20 mA output signal which can be used for real time process control for maintaining the concentration of the brine. The refractometer in the brine tank, sends measurement data to a controller connected to the salt feed valve and discharge valve. If the concentration falls below the target level, the controller opens the feed valve and adds salt solution in the brine tank until the concentration of the brine is set back to the optimal level. As the tank volume is limited, the controller also opens the discharge valve to discharge part of the diluted brine.

K-Patents refractive index technology is accurate and reliable for in-line concentration measurements. K-Patents Sanitary refractometer PR-43-AC is Sanitary 3-A and EHEDG certified to meet the highest hygiene requirements of food production.

Instrumentation	Description
A compact, rectangular device with a digital display showing two sets of values (e.g., 24.9%, 35.7%) and a small probe attached to its side.	K-Patents Sanitary Compact Refractometer PR-43-AC for hygienic installations in small pipe line sizes of 2.5 inch and smaller. The PR-43-AC refractometer is installed in the pipe bend. It is angle mounted on the outer corner of the pipe bend directly, or by a flow cell using a 3A Sanitary clamp or Varivent® connection. The user interface of the refractometer can be installed locally in the field, remotely in the control room or in both locations by connecting several user interfaces in a network.
A larger, rectangular device with a digital display showing two sets of values (e.g., 24.9%, 35.7%) and a long probe extending from its side.	K-Patents Sanitary Probe Refractometer PR-43-AP for hygienic installations in large pipes, tanks, cookers, crystallizers and kettles and for higher temperatures up to 150°C (300 °F). The PR-43-AP refractometer is installed in the pipe line or vessel through a 2.5 inch or 4-inch Sanitary clamp. The user interface of the refractometer can be installed locally in the field, remotely in the control room or in both locations by connecting several user interfaces in a network.
Automatic prism wash	Prism wash with aseptic steam: The components of a steam wash system are refractometer PR-43-AP-L42 with insertion length of 42 mm, Side flow cell SFC-HHSS-H10/15/20/25, Aseptic steam valve ASV-H/ESS-H05, and Multichannel user interface MI for automatic prism wash diagnostics and control. The wash is used in applications where flow velocity is below 1.5 m/s (5 ft/s) or where dry solids exceed 40 %.
Measurement range	Refractive index (nD) 1.3200 – 1.5300, corresponding to 0 – 100 Brix.