METTLER TOLEDO APPLICATION NOTE

pH Measurement In Cheese Making, Using The Puncture Electrode LoT406-M6-DXK-S7/25.

BACKGROUND

Cheese making must be carefully controlled to ensure good quality. Measuring pH during the fermentation stage of cheese making provides direct and reliable results, enabling control of the fermentation of lactic acid by bacteria and rennet, i.e., the breakdown of lactose (sugar in milk). The pH value is influenced by the activity of the lactic acid bacteria, the temperature and many other parameters. It is very important to monitor the pH value during the fermentation stage because of the effect on the ripening process and thereby on the quality of the cheese.

THE PROCESS

When and how often pH measurement should be performed depends upon the kind of cheese being produced.

The pH of the milk is very important for soft cheeses. Usually, pH measurement in cheese begins after the curd has been completed and cut into chunks and the whey drained off. As the change in the pH value is significant for the fermentation, it is generally measured every 1 to 4 hours until the fermentation is slowed down by salting and cooling the curds.

Hard cheese and semi-hard cheese
Generally, once the whey has been drained off, the first pH measurement is taken. As fermentation of the cheese progresses, the pH value continues to drop. Usually after 1, 2, 4, 8 and 24 hours, the pH value is measured directly in the cheese. Fermentation is then slowed down by salting and cooling the cheese. The pH values depend on the type of cheese being made. If the pH value drops too much, the cheese loses too much water. During ripening, the pH increases. The quality of ripe cheese can be controlled by pH measurement.

Soft cheese
The breakdown of lactic acid is controlled by measuring the pH value every 1 to 4 hours. Another pH measurement is performed before salting the cheese. After salting, when ripening is taking place, pH measurement is made during the first two weeks. Most soft cheeses are ripened with mold from the surface or with discrete veins of mold. This is why the pH will vary at different places in the cheese in a later ripening stage; therefore the pH value is normally not measured during that period. The ripening time for soft cheese is much shorter than for hard/ semi-hard cheese.

Fresh cheese
Fresh cheese, like cottage cheese and cream cheese, is not ripened. The pH is measured to control the acidification of the milk.

Melting cheese
The pH of cheese used for the production of melting cheese is measured in order to determine what quantity of melting salts should be added. Melting salts influence the pH of cheese, and therefore its physical properties such as texture and consistency. The pH value directly controls the quality of the end product.

INSTRUMENTATION

The LoT406-M6-DXK-S7/25 puncture pH electrode provides quick, reproducible, and accurate measuring values. The needle-shaped tip of the electrode has been specially designed for puncture measurement in meats, cheeses, and other solid foods.

With Xerolyt® solid polymer reference electrolyte, refilling of the electrode with electrolyte is no longer necessary. Instead of the conventional ceramic diaphragm, an aperture allows direct contact between the medium and Xerolyt reference electrolyte. This design reduces troublesome diaphragm clogging by proteins and fats and improves the response

time. (Diaphragm clogging delays the response time, resulting in sluggish readings.)

A plastic shaft of FDA positive-listed PBT protects the electrode and provides mechanical strength when used to puncture solids.

An additional knife style attachment is available for use in firmer meats and cheeses to protect the needle tip from accidental breakage.

Mettler Toledo Process recommends the use of the Model 1120 or 1140 portable pH meter. A coaxial cable of one meter length is usually sufficient for a portable pH measuring system.

GLOSSARY

FDA	Food and Drug Administration
PBT	Polybutyleneterephthalate

PRODUCTS

1120 or 1140 Portable pH Meter

- Rugged, portable design allows use in a variety of applications and environments
- Sensor & transmitter diagnostics for process safety
- Logbook for adherence to QM documentation and procedure requirements
- FM certification for Class I, Div. 1 Environments

Lot406-M6-DXK-S7/25 Puncture pH Electrode

- Specially designed for pH measurement in meat, sausage and cheese
- Rugged, needle-shaped membrane may be used to penetrate foods for quick, accurate measurement
- Patented Xerolyt® solid polymer reference system maintains a stable potential for accurate and repeatable pH measurement and low maintenance
- Open junction eliminates reference clogging by proteins and fats, extending sensor life
- Optional knife mount for easy puncture and penetration of food surface