



ADVANCED DairyNews

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ADVANCED ANALYSIS FOR THE DAIRY INDUSTRY

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Model 4250 Cryoscope sets new standard for dairy industry

Advanced Instruments, a leading laboratory instrument provider to the food and dairy industry, introduced its Advanced® Model 4250 Single-Sample Cryoscope in October 2005 at the Worldwide Food Expo in Chicago. The diagnostic instrument, which



The 4250 uses the industry-preferred freezing point method to precisely determine added water in milk.

“The Model 4250 sets the standard for precision, accuracy, and ease of use. With its capability to test cow, goat, sheep, and buffalo milk, this flexible instrument is ideal for all dairy processors, including specialty milk producers.”

dairy labs use to measure the water content in milk, incorporates new design and electronic technologies that enhance usability, accuracy, and reliability.

“The Model 4250 sets the standard for precision, accuracy, and ease of use,” said Ken Micciche, Director of Marketing, Advanced Instruments. “It builds on our heritage of leadership and value by incorporating advanced electronic technologies and a new highly functional design. With its capability to test cow, goat, sheep, and buffalo milk, this flexible instrument is ideal for all dairy processors, including specialty milk producers.”

The single-sample cryoscope includes new features that enhance usability and make it easy to update: multiple language capability, on-board printer, stored test results for later recall, and downloadable software upgrades.

“Our new cryoscope’s proven, reliable technology, plus 24/7 technical support, make it a perfect fit for dairy processors requiring highly dependable, accurate verification of water levels in their milk products,” said Micciche.

The Model 4250 is available for immediate delivery from Advanced Instruments and its distributors.



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from the PRESIDENT

Welcome to our latest edition of Advanced Dairy News, where we continue our tradition of providing specific product and application information geared towards improving your dairy lab operations.

Our company is dedicated to your industry and we constantly re-invest our profits to develop new products for you. This issue features information on our newest cryoscope, the Model 4250 and an informative article explaining the differences between calculated and measured freezing point. The issue of pasteurization and food safety as it relates to cheese is also examined.

We value your input and comments —please feel free to share Advanced Dairy News with your colleagues.

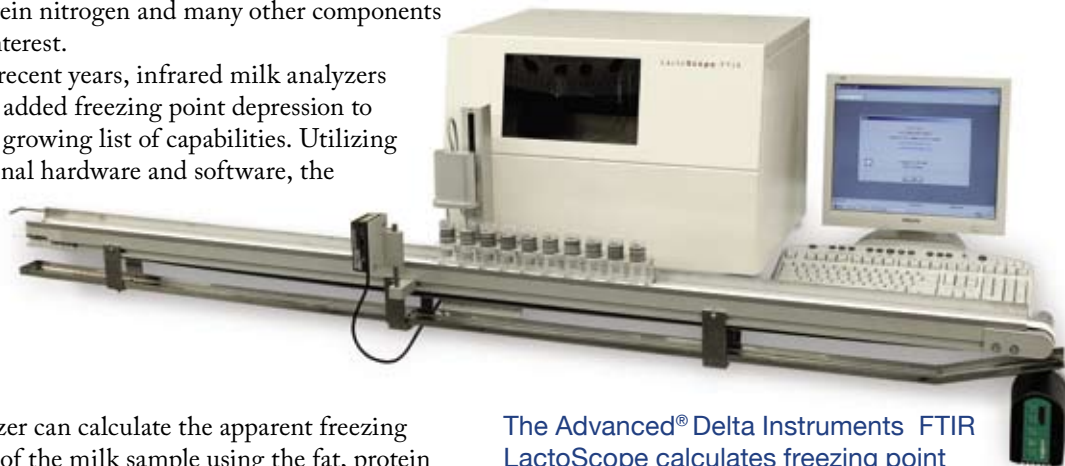
John Coughlin, President
Advanced Instruments, Inc.

Calculated Freezing Point Depression VERSUS *Cryoscopy*

The analysis of milk and dairy products is usually performed on infrared spectrometers such as the Delta Lactoscope FTIR. Infrared analyzers feature a low cost per test and are easily automated, making them attractive to high volume testing labs. These modern instruments offer precise, reliable determination of fat, protein, lactose, non-protein nitrogen and many other components of interest.

In recent years, infrared milk analyzers have added freezing point depression to their growing list of capabilities. Utilizing optional hardware and software, the

milli °C. In other words, the freezing point of milk is lower than that of pure water (water freezes at 0°C, this is why the term “freezing point depression” is used; the milk freezing point is “depressed” relative to that of pure water). If water has been added to the milk, it will raise the freezing point of the sample. For example, a value of -520 °C would definitely indicate that added water is present.



analyzer can calculate the apparent freezing point of the milk sample using the fat, protein and lactose information together with a measurement of the electrical conductivity of the sample. This capability takes advantage of the analyzer’s high-speed automated capability and minimizes the need for a separate measurement on a dedicated cryoscope.

Many users have asked how calculated freezing point depression compares with the standard cryoscope method. In this article we’ll compare the two. Freezing point depression of milk is measured to determine if water has been added. Normal whole milk will have a freezing point in the range of -530 to -540

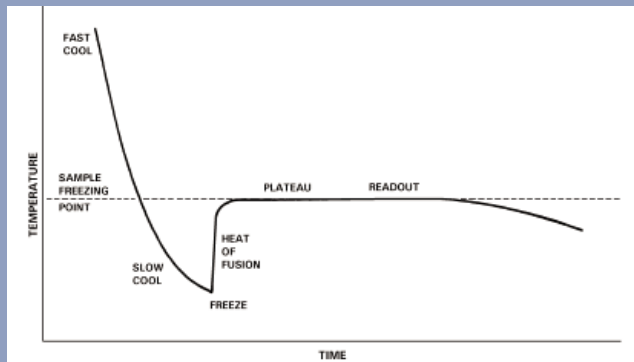
The Advanced® Delta Instruments FTIR LactoScope calculates freezing point using infrared analysis.

A cryoscope makes a direct, accurate measurement of freezing point by actually freezing the sample. The cryoscope is the only internationally accepted direct method for making this measurement.

Cryoscopes are accurate to plus or minus 2 milli °C. They can be calibrated using precision NIST traceable salt-water reagents with very accurate freezing points and the basic instrument

(continued on next page)

The quickest and most precise way to measure the freezing point of a solution is to supercool it several degrees below its freezing point, then mechanically induces the sample to freeze. The heat of fusion suddenly liberated causes the sample temperature to rise toward a plateau wherein the intrinsic sample thermodynamics maintain a temporary adiabatic liquid/solid equilibrium. The time over which equilibrium develops and is maintained is a function of the thermal characteristics of the sample — the temperature differential between the sample and its environment and the ability of the intervening materials to conduct heat. The equilibrium temperature is the freezing point of the solution.



Standard curve illustrates the principle of freezing point measurement

Calculated freezing point depression versus cryoscopy

(continued from page 2)



FTIR analysis determining the amount of fat, lactose, and solids content.

The method depends on the electrical conductivity of the sample, measured with a separate flow cell, and the measurements of fat, protein and lactose that are available from the infrared analyzer. The method assumes that the fat and lactose are within normal ranges. This “calculated” freezing point is an empirical method, not a direct measurement.

Calculated freezing point depression is not as accurate as a cryoscope; typically it's in the range of +/- 6 milli °C.

Calculated freezing point depression is not as accurate as a cryoscope; typically it's in the range of +/- 6 milli °C. Calibration is not possible using precision cryoscope reagents because these don't contain fat, protein or lactose, necessary parameters for the empirical formula. Instead, an actual milk sample is used by measuring its freezing point on a cryoscope and then using the same sample to calibrate the infrared analyzer. The cryoscope therefore becomes the reference standard. At this time there are no national or international standards pertaining to acceptance of calculated freezing point.

Properly calibrated and maintained, calculated freezing points from the infrared analyzer will correlate well with the measured results from a cryoscope. Therefore high volume testing facilities can screen all of their samples for freezing point depression, a capability that's impossible given the slow speed of a cryoscope. When the calculated results differ significantly from normal ranges, it is probable, but not guaranteed, that added water is present. In these situations, most users opt to confirm the deviations with a manual cryoscope measurement, especially if the data are to be used as a basis for rejecting the milk.

frequently asked QUESTIONS

How can I keep my cryoscope in good working condition?

Be sure to clean and replace the air filters often. Poor air flow can cause the cooling assembly to fail prematurely and produce “Test Time Out” errors, extending the time needed to complete a test. Power supplies can also fail prematurely if there is an insufficient air supply.

When should I replace my heat-transfer fluid?

You should replace your bottle of heat-transfer fluid when the fluid level drops to the line on the bottle label, or one month after the bottle is opened. Do not pour old heat transfer fluid between bottles. This will cause moisture and growth build up from the old bottle to be transferred into the new sample of heat transfer fluid, thus reducing the life of the heat transfer.

How can I use automated evaluation to check for the presence of bacteria in milk and milk products?

The BacTrac impedance analyzer is perfect for the detection of bacteria, yeasts, and molds in milk and milk products. Automated evaluation of presence-absence is possible by setting a detection limit. The limit is set and then monitored over a pre-determined duration of measurement. Positive samples change to red on the screen when the threshold is reached; negative samples appear green at the end of the measurement.

did you
KNOW?

it's CIAO TIME in Vermont

If you're ever in Woodstock, Vermont and see some water buffalo, there's a tasty reason why they're present.

Several years ago David Muller, a former Boston business executive, founded Woodstock Water Buffalo Company, a dairy dedicated to supporting sustainable agriculture and the family farm.

Every morning he walks to the barn



sheltering more than 50 Southeast Asian water buffalo, each about the size of a compact automobile. These warm-weather animals, never before domesticated in New England, now produce large quantities of milk. WWBC mozzarella is sold in restaurants and gourmet retail markets, –the cheese sells for about \$16 a pound, (continued on page 4)

did you KNOW? it's CIAO TIME in Vermont

(continued from page 3)

roughly the same price as mozzarella from Italy.

To assure authenticity, mozzarella maker Vincenzo Ferraro, 36, from the Campania region of southern Italy was hired. Vincenzo paces the lab while instructing Vermonters in the art of turning buffalo milk into perfect mozzarella cheese.

Buffalo milk is pure white because it contains no carotene — the buffalo have already processed the carotene into Vitamin A. Buffalo milk is also very thick, more like half-and-half than milk.

Measurable differences lie in the nutritional value of buffalo milk — it contains 8% to 10% fat, cow's milk has roughly 4% fat. Buffalo milk has 58% more calcium, 40% more protein, and 43% less cholesterol than cow's milk, and contains high levels of the natural antioxidant tocopherol. Perhaps the biggest difference — typical cows give milk for three to four years, while a water buffalo will produce for 12 to 14 years.

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upcoming EVENTS

International Dairy Federation
April 30 - May 3, 2006
Vilnius, Lithuania

IFT (Institute of Food Technologists)
June 25 - 27, 2006
Orlando, Florida

IAFP (International Association for Food Protection)
August 13 - 16, 2006
Calgary, AB, Canada



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ADVANCED ANALYSIS FOR THE DAIRY INDUSTRY

do you meet recent requirements? Quality control in cheesemaking

In the early days of milk pasteurization, the only tests available were based on colorimetric chemistry. These tests were blunt tools which could measure about 0.1% raw milk in the pasteurised product.

In recent years a more precise, more sensitive and more reproducible test — The Fluorophos[®] method — has found widespread use in pasteurization plants. The Fluorophos, which is 20 times more sensitive than previous test methods, is widely used to control pasteurization plants.

There is now growing interest in differentiating cheeses made from raw and pasteurized milk. There are two very different objectives behind the interest.

The first is based on food safety grounds. We know that raw milk can contain pathogens which can survive the cheesemaking process and proliferate in cheeses where the pH favours growth. The issue of listeria monocytogenes

(a pathogen found in raw milk) in mold ripened raw milk soft cheeses was raised some years ago. The organism was reported to have been the cause of abortions and expectant mothers were advised not to eat such cheeses. There have also been food poisoning outbreaks associated with raw milk cheese consumption. This has led to many countries requiring raw milk cheeses to be clearly labelled.

The second interest is commercial. In part two of this article we will discuss implications for cheese import regulators, legislators and supermarkets.

by Frank Harding O.B.E., Formerly Technical Director of the Milk Marketing Board of England and Wales.



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