

MILK SECURITY TEST MST1

Milk test strips for neutralizers, hydrogen peroxide and urea

Most of milk samples were found to be adulterated. The neutralizers, hydrogen peroxide and urea in milk samples influence on the quality of milk and milk products. Milk security test strips are rapid and sensitive dry strips to detect milk adulteration.

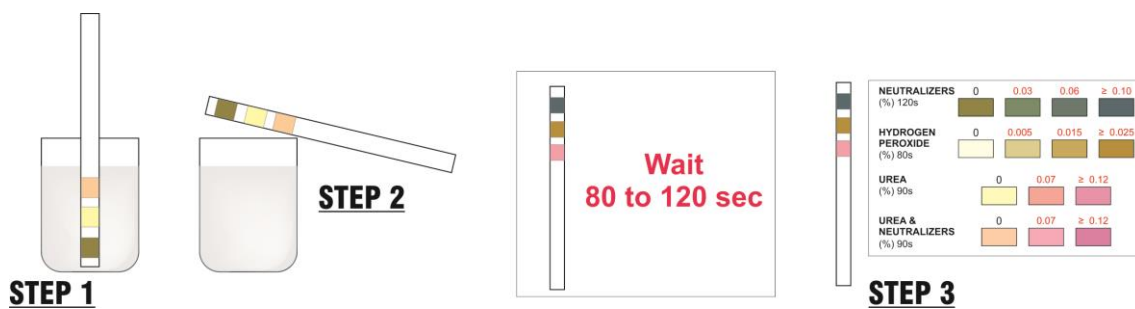
Test for neutralizers: Neutralizers like sodium bicarbonate, sodium hydroxide, sodium carbonate or hydrated lime are often added to milk. Usually they are added to milk to increase the lactometer reading. The neutralizers have influence on the values of titratable acidity and pH of milk that is why they must be checked in milk sample. The impregnate test zone with chromogens change color from green- yellow to green-blue in the presence of sodium carbonate, or sodium bicarbonate or sodium hydroxide. If the color of neutralizers test changes from green-yellow to green-blue, this means that the milk was adulterated with sodium carbonate, or sodium bicarbonate, or sodium hydroxide ($> 0.05\% \text{NaHCO}_3$; $> 0.03\% \text{Na}_2\text{CO}_3$ and $> 0.03\% \text{NaOH}$) and the result is positive (abnormal value). The color scale is 0; 0.03%; 0.06%; 0.1%. The neutralizer concentration above 0.03% is not desired. This test will be effective only if the neutralizers are present in milk. If the added neutralizers are nullified by the developed acidity, then this test will be negative. In that case, the alkaline condition of the milk for the presence of soda ash has to be estimated by another method. The neutralizers content in milk should be estimated by comparison with color scale at 120s.

Test for hydrogen peroxide: This test allows a quick and easy method to determine hydrogen peroxide in solution. The impregnate test zone with enzyme and chromogen ensured very selectivity determination of hydrogen peroxide. Hydrogen peroxide (H_2O_2) is a well-known powerful oxidizer. Its capabilities as a disinfectant are superior than chlorine (Cl_2) and chlorine dioxide (ClO_2). Hydrogen peroxide is commonly used in dairy industries. Peroxide indicator strips can be used to ensure that any residual peroxide sanitizer has been fully removed before filling. This acts as a guarantee that the area is safe and free from peroxide. Hydrogen peroxide concentration above 75 ppm (0.0075%) means that the milk was adulterated with hydrogen peroxide. The color scale is 0; 0.005% (50ppm); 0.015% (150ppm); 0.025% (250ppm). The impregnate test zone with enzyme and chromogen ensured very selective and sensitive reaction and change color from white to yellow. The colors change from white (0) to light yellow (50ppm; 0.0075%); to strong yellow-brown (150ppm; 0.015%) and to yellow-brown (250ppm; 0.025%). The hydrogen peroxide concentration above 50ppm; 0.005% (in light yellow color in the scale) is not desired. The concentration of hydrogen peroxide must be estimated at 80s.

Test for urea concentration: Urea is generally added in the preparation of milk to raise the solids-not-fat (SNF) value. It has been proven that urea added to milk at a higher concentration reduces the activity of hydrogen ions and

increases the pH of the milk. Normal values of urea in milk are from 0 to 0.07%. Urea concentration above 0.07% means that the milk was adulterated with urea. The color scale is 0; 0.07; $\geq 0.12\%$ urea. The impregnate test zone with enzyme and chromogen ensured very selective reaction and change color from yellow to pinkish red. The colors change from yellow (0) to pinkish red (0.07 and 0.12% urea). The urea concentration above 0.07% (in pinkish red color in the scale) is not desired. In the absence of neutralizers, urea must be estimated by the scale 1, at 90s. In the presence of neutralizers color intensity of the urea scale increases and urea content in milk should be estimated on a scale 2, at 90s. Neutralizers change the color indication area for urea. In case a positive result for neutralizers is received, the urea result must be compared with the second color scale (more intensive).

Parameter	Concentrations			
Neutralizers	0	0.03%	0.06%	0.10%
H ₂ O ₂	0	50ppm (0.005%)	150ppm (0.015%)	250ppm (0.025%)
Urea	0	0.07%	0.12%	



Step 1. Dip the indicator zone of the test strips in a milk sample for 3 seconds.

Step 2. Completely remove all milk drops from it by tapping the test strip on the edge of the cup.

Step 3. Compare the color of the test strip with the color scale on the label.

Recommendations:

- Test strip deep in milk sample, then **immediately** remove from milk and completely remove milk drops from the test paper by tapping the test strips on the edge of the cup. Then put the back side of test strips on filter paper or other paper for full removing of milk drops.

- Do not touch the indication area.

- When using the test take out only the necessary number of strips. Then the tube must be tightly closed (hear a click)

Storage: Express test strips should be stored in tightly closed tube in a dry and dark place, never in the refrigerator.

Expiration date: 12 months from date of production.

MILK SECURITY TEST MST2

Milk test strips for titratable acidity and pH

Description: The test strip has a green-blue indication area. Through it can be determined the titratable acidity of milk in three scales: $^{\circ}\text{Th}$ (Thörner degrees) and $^{\circ}\text{D}$ (Dornic degrees) and $^{\circ}\text{SH}$ (Soxhlet Henkel degrees).

Principle of operation: The reaction area contains a certain amount of indicators and sodium hydroxide which in the interval of the titratable acidity from 15 to 27.5 $^{\circ}\text{Th}$ (Thörner degrees), 13.5 – 24.75 $^{\circ}\text{D}$ (Dornic degrees), and 6.0 - 11.0 $^{\circ}\text{SH}$ (Soxhlet Henkel degrees) and a pH range from 6.9 to 6.0 changes color from dark blue-green, dark green, light green to yellow-green.

Conducting the operation and reporting of results: Test strip is placed in the milk sample. Then the test strip is taken out and the excess milk is removed by tapping on the edge of the cup. Taking account of the value of titratable acidity and pH is done by comparing the obtained staining with the color scale on the label after 50 - 60 sec.

Sensitivity and selectivity: The color scale for comparing fits to the following titratable acidity: 15.0, 18.0, 24.0, 27.5 $^{\circ}\text{Th}$ (Thörner degrees); 13.5, 16.2, 21.6, 24.75 $^{\circ}\text{D}$ (Dornic degrees) and 6.0, 7.2, 9.6, 11.0 $^{\circ}\text{SH}$ (Soxhlet Henkel degrees). The color scale corresponds to the following pH values: 6.9, 6.6, 6.3 and 6.0.

Test strategy: Measurement is valid in the absence of neutralizers.

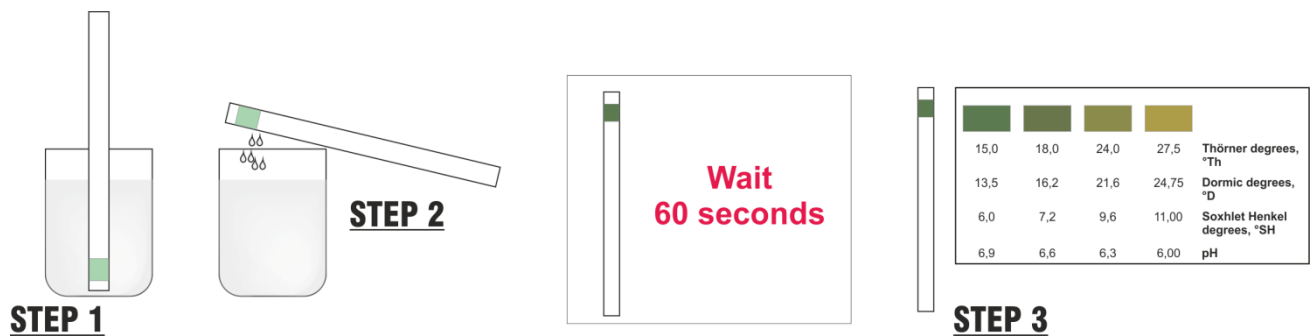
Titratable acidity: Measurement of titratable acidity (lactic acid) is a very important test used to determine the quality of raw milk. It is also defined in the production of cheese and yogurt. The titratable acidity is the percentage (%) of lactic acid in raw milk. Usually raw milk contains traces of lactic acid and has an initial natural acidity from 0.14% to 0.16%. Milk contains a large number of weak acids, weak bases and their salts, and this defines it as a buffer. There is a certain interval, in which milk has a significant acidification, but changes in the pH are not measured. Determination of acidity in this range, by titration is very important, since pH change cannot be measured with a pH test strip, or pH – meter. If this acidity is not measured, while transporting the raw milk to the factory for production of cheese and yogurt, the acidity is increasing and this proved detrimental to the quality of dairy products. Therefore, the determination of the acidity by titration of the milk is considered to be more important, and it is more real parameter in comparison with the pH.

Usually titratable acidity was determined by titration with sodium hydroxide and phenolphthalein to the establishment of the equivalent point of neutralization. Conducting titration with sodium hydroxide requires qualified personnel, precision and appropriate laboratory. Using express dry test strips for analysis of titratable acidity of milk has significant advantages over titration - fast, easy, practical analysis, undemanding qualified personnel capable of operating at a field. The percentage of acid in milk and milk products at any time is an indicator for the storage period of the milk and the way it is processed.

pH: The measured values of titratable acidity correspond to certain values of pH. Fresh cow's milk has a pH around 6.6 – 6.8. Values greater than 6.8 indicate that the milk has coagulated and a value below 6.5 indicates the presence of colostrums or bacterial contamination. When the pH is less than 6.5, this provides

an indication that significantly acidic development has occurred, due to the increased bacterial activity. Typically the pH analysis is more often used as an approval test for milk. Colostrums is more acidic when compared to normal milk, while the milk produced by cows, at the end of the lactation period and the milk produced by the ill cows, generally have higher levels of pH.

Parameter		Concentrations			
Titratable acidity	Thorner degrees, °T	15.0	18.0	24.0	27.5
	Dornic degrees, °D	13.5	16.2	21.6	24.75
	Soxlet Henkel degrees, °SH	6.0	7.2	9.6	11.0
pH		6.9	6.6	6.3	6.0



- Step 1.** Dip the indicator zone of the test strips in a milk sample for 3 seconds.
Step 2. Completely remove all milk drops from it by tapping the test strip on the edge of the cup.
Step 3. Compare the color of the test strip with the color scale on the label.

Recommendations:

- When removing a test strip from the milk sample it is necessary, to completely remove milk drops from the test paper by tapping the test strips on the edge of the cup. Then put the back side of test strips on filter paper or other paper for full removing of milk drops.
- Do not touch the indication area.
- When using the test take out only the necessary number of strips. Then the tube must be tightly closed (hear a click)

Storage: Express test strips should be stored in tightly closed tube in a dry and dark place, never in the refrigerator.

Expiration date: 6 months from date of production.