Strip Based Test for Detection of Neutralizers in milk

Steps for detection

Immediately observe the colour change of strip

Colour Chart

Original Strip  Pure Milk  Milk Adulterated with Sodium Hydroxide at Various Levels

Dipping of strip in milk

Dairy Chemistry Division
ICAR-National Dairy Research Institute
Indian Council of Agricultural Research
Karnal -132001 (Haryana)
Strip Based Test for Detection of Neutralizers in Milk

Neutralizers (e.g. sodium hydroxide, sodium carbonate and sodium bicarbonate) are used for adulteration of milk to mask the developed acidity in milk. These are not permitted additives in milk as per FSSAI and their presence in milk indicates unhygienic storage of milk. A rapid paper based strip test has been developed for the detection of neutralizers in milk. The test involves dipping of the strip in milk samples for short duration followed by immediate visualization of colour of the strip. The yellow colour of the strip changes to dark green to blue in milk containing neutralizers while in pure milk samples, the strip colour changed to light green. The test strip responds immediately when brought in contact with milk samples. The colour on the strip is stable for about 8-10 min. The test can be used at milk reception centres and also at house - hold level.

Limit of Detection
NaOH: 30 mg/ 100 ml milk
Na₂CO₃: 50 mg/ 100 ml milk
NaHCO₃: 100 mg/ 100 ml milk

Characteristics of Strip

- **Clear distinction**: The colour distinction between adulterated and non adulterated milk is clear.
- **Quick Response Time**: Differentiation between adulterated and non adulterated milk can be made instantaneously.
- **Shelf life**: The shelf life of the strips is 8 months at room temperature.
- **Cost of Consumable**: Negligible.
- **Easy to use**: The test can be performed even by non-technical person.
- **Validation**: The method has been validated at a NABL accredited laboratory.
- **End Users**: Milk Collection Center, Reception Dock of Dairy Industries, House - hold levels.

*Financial support: Ministry of Food Processing Industries, Govt. of India*

**Contact Details**

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Strip Based Test for Detection of **Urea** in milk

**Steps for detection**

- Prepared Strip
- Dipping of strip in milk
- Observe the colour change of strip after 3 min.

**Colour Chart**

- Original Strip
- Pure Milk
- Milk Adulterated with Urea at Various Levels

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Strip Based Test for Detection of Urea in Milk

Urea is a natural component of milk. Unscrupulous people add urea to milk to fraudulently increase its solids-not-fat content. FSSAI has set the upper limit of urea in milk at 70 mg/100 ml. Milk containing urea more than 70 mg/100 ml is considered adulterated. A rapid paper based strip test has been developed for the detection of urea in milk. The test involves dipping of the strip in milk samples for short period followed by visualization of colour of the strip after 3 min. The yellow colour of the strip changes to red in urea adulterated milk samples while in pure milk samples, the strip colour either remains yellow or it turns into light pink. The intensity of red colour produced in the strip is proportional to the amount of urea present in milk sample. The test can be used at milk reception centres and also at house - hold level.

Note: The colour change in urea detection strip also occurs in presence of neutralizers. Hence, the presence of urea will be confirmed only in the absence of neutralizers - which can be ascertained by neutralizer detection strip.

Characteristics of Strip

- **Limit of Detection:** 80 mg/100 ml milk
- **Clear distinction:** The colour distinction between adulterated and non-adulterated milk is clear.
- **Quick Response Time:** Results are available in 3 minutes.
- **Shelf life:** The shelf-life is more than 5 months at refrigeration temperature.
- **Low Cost:** The cost for consumables per test is less than Rs.1.00.
- **Easy to use:** The test can be performed even by non-technical person.
- **Validation:** The method has been validated at a NABL accredited laboratory.
- **End Users:** Milk Collection Center, Reception Dock of Dairy Industries, House - hold levels.

*Financial support: Ministry of Food Processing Industries, Govt. of India*

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Strip Based Test for Detection of Glucose in milk

Steps for detection:
1. Dipping of strip in milk
2. Observe the colour change of strip after 10 min.

Colour Chart:
- Original Strip
- Pure Milk
- Milk Adulterated with Glucose at Various Levels
Strip Based Test for Detection of Glucose

Milk contains low amount of natural glucose (less than 5 mg/100 ml). Milk is adulterated with glucose (pure or crude form which is byproduct of other industry) to fraudulently increase its solids-not-fat content. As per FSSAI, glucose is not a permitted additive in milk. A rapid paper based strip test has been developed for the detection of glucose in milk. The test involves dipping the strip in a milk sample for short period followed by observing change in colour of the strip after 10 minutes. The colour changes to deep red colour in case of positive sample while for pure milk the colour remains white. The intensity of red colour produced in the strip is proportional to the amount of glucose in milk sample. The developed detection strip can also be used to detect the presence of glucose in various milk products (Khoa, Dahi etc.)

Note: The colour change in glucose detection strip also occurs in presence of glucose or H₂O₂. Hence, the presence of glucose will be confirmed only in absence of H₂O₂-which can be ascertained by H₂O₂ detection strip.

Characteristics of Strip

- **Limit of Detection**: 40 mg /100 ml milk
- **Enhanced Sensitivity**: The developed test is more sensitive than the existing liquid based test.
- **Quick results**: Results are available in 10 minutes.
- **Shelf-life**: The shelf-life is more than 3 months at refrigeration temperature.
- **Easy to use**: The test can be performed even by non-technical person.
- **Validation**: The method has been validated at a NABL accredited laboratory.
- **End Users**: Milk Collection Center, Reception Dock of Dairy Industries, House - hold levels.

*Financial support: Ministry of Food Processing Industries, Govt. of India*

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Strip Based Test for Detection of Hydrogen Peroxide in milk

Steps for detection:
1. Prepared Strip
2. Dipping of strip in milk
3. Immediately observe the colour change of strip

Colour Chart:
- Original Strip
- Pure Milk
- Milk Adulterated with Hydrogen Peroxide at Various Levels

Dairy Chemistry Division
ICAR-National Dairy Research Institute
Indian Council of Agricultural Research
Karnal -132001 (Haryana)
Strip Based Test for Detection of Hydrogen Peroxide in Milk

Milk is adulterated with hydrogen peroxide to fraudulently increase its shelf-life and is not allowed as per FSSAI Rules. A rapid paper based strip test has been developed for the detection of hydrogen peroxide in milk. The test involves dipping the strip in milk sample followed by observing change in colour of the strip immediately. The colour changes to brown in case of positive sample. The intensity of brown colour produced in the strip is proportional to the amount of hydrogen peroxide in milk sample. The colour of the strip remains white in case of pure milk. This test is easy to perform and can be done at milk reception centres and at house - hold level.

Characteristics of Strip

• **Limit of Detection**: 0.001%
• **Enhanced Sensitivity**: The developed test is more sensitive than the existing liquid based test.
• **Shelf-life**: The shelf-life is more than 5 months at refrigeration temperature.
• **Quick Response Time**: The differentiation between pure and adulterated milk can be made within 2 seconds
• **Easy to use**: The test can be performed even by non-technical person.
• **End Users**: Milk Collection Center, Reception Dock of Dairy Industries, House - hold levels.

*Financial support: Ministry of Food Processing Industries, Govt. of India*

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Strip Based Test for Detection of Maltodextrin in milk

Steps for detection:
1. Prepare Strip
2. Dipping of strip in milk
3. Observe the colour change of strip after 10 min.

Colour Chart:
- Original Strip
- Pure Milk
- Milk Adulterated with Maltodextrin at Various Levels

Dairy Chemistry Division
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Indian Council of Agricultural Research
Karnal -132001 (Haryana)
Strip Based Test for Detection of Maltodextrin in Milk

Maltodextrin is hydrolysed product of starch and is available in market with different DE values. Because of better solubility of maltodextrin and ambiguity in interpretation of iodine test for maltodextrin detection, milk is frequently adulterated with maltodextrin. Maltodextrin is not a permitted additive as per as per FSSAI Rules. A rapid paper based strip test has been developed for the detection of maltodextrin in milk. The test involves dipping the strip in a milk sample for short period followed by observing change in colour of the strip after 10 minutes. The colour changes to yellow in case of positive sample. The intensity of yellow colour produced in the strip is proportional to the amount of maltodextrin in milk sample. The developed detection strip can also be used to detect the presence of maltodextrin in various milk products (Khoa, Dahi etc.)

Note: The colour change in maltodextrin detection strip also occurs in the presence of glucose or H₂O₂. Hence, the presence of maltodextrin will be confirmed only in absence of glucose or H₂O₂ - which can be ascertained by glucose and H₂O₂ detection strips, respectively.

Characteristics of Strip

- **Limit of Detection:** 150 mg/100 ml milk
- **Enhanced Sensitivity:** The developed test is more sensitive than the existing liquid based test.
- **Quick results:** Results are available in 10 minutes.
- **Shelf-life:** The shelf-life is more than 3 months at refrigeration temperature.
- **Easy to use:** The test can be performed even by non-technical person.
- **Validation:** The method has been validated at a NABL accredited laboratory.
- **End Users:** Milk Collection Center, Reception Dock of Dairy Industries, House - hold levels.

*Financial support: Ministry of Food Processing Industries, Govt. of India*

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Strip Based Test for Detection of Sucrose in milk

Steps for detection

Observe the colour change of strip after 10 min.

Colour Chart

Original Strip  Pure Milk  Milk Adulterated with Sucrose at Various Levels

Dipping of strip in milk

Dairy Chemistry Division
ICAR-National Dairy Research Institute
Indian Council of Agricultural Research
Karnal -132001 (Haryana)
Strip Based Test for Detection of Sucrose

Sucrose is not a permitted additive in milk as per as per FSSAI Rules. Sucrose is added in the milk to fraudulently increase its solids - not-fat content. A rapid strip based test for detection of sucrose has been developed. The working of the strip involves dipping the strip in a milk sample for short period, placing it on a flat surface and observing the change in colour of the strip. The strip develops colour during 10 minutes. The intensity of the developed red colour is proportional to the concentration of sucrose. The colour of the strip remains white. The developed detection strip can also be used to detect the presence of sucrose in various milk products (Khoa, Dahi etc.) The test can be easily done at milk collection centres, reception dock of dairy plant and at house - hold level.

Note: The colour change in sucrose detection strip also occurs in presence of glucose or H₂O₂. Hence, the presence of sucrose will be confirmed only in absence of H₂O₂ and glucose which can be ascertained by H₂O₂ and glucose detection strips, respectively.

Characteristics of Strip

- **Limit of Detection:** 100 mg /100 ml milk
- **Enhanced Sensitivity:** The developed test is more sensitive than the existing liquid based test.
- **Quick results:** Results are available in10 minutes.
- **Shelf-life:** The shelf-life is more then 1 month at refrigeration temperature.
- **Easy to use:** The test can be performed even by non-technical person.
- **End Users:** Milk Collection Center, Reception Dock of Dairy Industries, House - hold levels.

*Financial support: Ministry of Food Processing Industries, Govt. of India*

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Rapid test for detection of Detergent in milk

- Detergents are added to milk to emulsify non-milk fat.
- They are considered as essential component for synthetic milk preparation.
- Detection of detergent in milk can establish the presence of synthetic milk in the milk supply.
- Anionic detergents are most widely used.
- Rapid test has been developed for detection of Anionic detergent in milk at NDRI.

1. Take 400 µl of Dye
2. Add 800 µl of Solvent
3. Close the cap & Mix by shaking
4. Add 400 µl of milk sample to be tested
5. Invert tubes 30 times
6. Observe color change in lower layer

Steps for the Detection of Detergent in milk

Interpretation: Development of blue colour in lower layer indicates adulterated sample. In pure milk, the lower layer remains pink.

Dairy Chemistry Division
ICAR-National Dairy Research Institute
Indian Council of Agricultural Research
Karnal -132001 (Haryana)
# A Rapid Test for Detection of Detergent in Milk

## Limit of Detection of Method

<table>
<thead>
<tr>
<th>Detergent Type</th>
<th>LOD* (mg/L)</th>
<th>Detergent Type</th>
<th>LOD* (mg/L)</th>
<th>Detergent Type</th>
<th>LOD* (mg/L)</th>
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</thead>
<tbody>
<tr>
<td>Labolene</td>
<td>200</td>
<td>Vim Dish Wash</td>
<td>500</td>
<td>Arial</td>
<td>600</td>
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<tr>
<td>Clinic All Clear</td>
<td>150</td>
<td>Nirma</td>
<td>300</td>
<td>Surf excel</td>
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<td>Wheel</td>
<td>300</td>
<td>Extran</td>
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<td>Ujjala Techno-bright</td>
<td>300</td>
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<td>150</td>
<td>Ghari</td>
<td>300</td>
<td>Safe Wash</td>
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<td>700</td>
<td>Fena</td>
<td>300</td>
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<td>Rin</td>
<td>300</td>
<td>Pantene</td>
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<tr>
<td>Pril</td>
<td>150</td>
<td>Tide</td>
<td>200</td>
<td>Clinic Plus</td>
<td>150</td>
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<tr>
<td>Head &amp; Shoulder</td>
<td>150</td>
<td>Lux</td>
<td>150</td>
<td>Sunsilk</td>
<td>150</td>
</tr>
</tbody>
</table>

* LOD: Limit of Detection

## Highlights of Test

- Test is simple to do and results are available in 100 seconds.
- Test does not require electricity or equipment.
- Cost per test is Rs. 1.40.
- Test is capable of detecting all the brands of detergents.
- Test is capable of detecting so called ‘synthetic milk’ added to milk.
- Test does not give false positive or false negative results.
- Test can be done in quantitative mode also.

Development of blue colour in lower layer indicate adulterated sample. In pure milk, the lower layer remains pink.

Financial Support: National Agricultural Innovation Project, ICAR, India

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A strip for detection of Sodium Chloride in milk

Steps for detection

Prepared Strip

Dipping of strip in milk

Immediately observe the colour change of strip

Colour Chart

Prepared Strip  Pure Milk  Adulterated Milk

Figure: Detection of added Sodium Chloride in milk using developed paper strip
A strip for detection of Sodium Chloride in Milk

A paper based strip test has been developed for the rapid detection of sodium chloride (common salt) in milk. Salt is added in the milk to fraudulently increase the solids-not-fat (SNF) content. The colour of the original strip is dark brown. The test involves dipping the prepared strip in milk sample for a few seconds followed by visualization of the change in colour of the strip after a few minutes. In case of pure milk, the strip remains dark brown while in case of adulterated milk, the colour of the strip changes to yellow. Result is available within 3 minutes. The developed strip can detect presence of 0.2% sodium chloride in milk. Method for preparation of strip is simple and does not involve expensive equipment. The strip can be used conveniently for detection of presence of added salt in milk at the milk reception area and also at household level.

Limit of detection
Sodium chloride: 0.2% in milk

Characteristics of strip

- **Clear distinction**: The colour distinction between adulterated and non-adulterated milk is clear.
- **Quick response time**: Differentiation between adulterated and non-adulterated milk can be made instantaneously.
- **Cost per test**: Rs. 0.25
- **Easy to use**: The test can be performed even by non-technical person.
- **End users**: Milk Collection Centre, Reception dock of Dairy Industries, House-hold levels.

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