ACCUVIN

D- & L-Lactic Acid for Tomato

Cat. No. 615 or 620

Intended Use

The D- & L-Lactic Acid Kit is intended for measuring the combined D-Lactic Acid plus L-Lactic Acid level of tomato products as an indicator of Lactic Acid Bacteria contamination.

Methodology

D- & L-Lactic Acid is based on the change in color exhibited by a tetrazolium color indicator during a reaction involving Lactic acid and nicotine-adenine dinucleotide (NAD) in the presence of the enzymes D-Lactate dehydrogenase and L-Lactate dehydrogenase.

$$\text{D-Lactate} + \text{NAD} \xrightarrow{\text{D-LDH}} \text{pyruvate} + \text{NADH}$$

$$\text{L-Lactate} + \text{NAD} \xrightarrow{\text{L-LDH}} \text{pyruvate} + \text{NADH}$$

$$\text{NADH} + \text{Color Agent (oxidized)} \xrightarrow{\text{Diaphorase}} \text{NAD} + \text{Color Agent (reduced)}$$

Sample

Samples of tomato juice can be used as they are. Samples of tomato paste, ketchup/catsup and sauce should be diluted 1:5 prior to analysis using the Quick Dilute 1:5 tubes. The ACCUVIN D- & L-Lactic Acid patent pending test strip removes the usual interferences from colored and turbid samples. Samples do not have to be pre-filtered or treated with color removing substances such as activated carbon or polyamide powder. Sample temperature may be from 5°C - 35°C (41°F - 95°F).

Procedure

1. Squeeze upper sampler bulb. Dip sampler tip into tomato juice or diluted tomato product sample, then release sampler bulb to aspirate sample. (If you prefer to use an air displacement pipette, set sample volume at 55 µL.)
2. Transfer sample to the rectangular absorbent layer on back of test strip by squeezing sampler bulb. ***Apply slight pressure with sampler tip for about 5 seconds while dispensing sample***. Note that only sample present in the sampler tip will be dispensed. Sample in the center, overflow bulb will not be dispensed. Wait 4 min. for color development.
3. Determine sample D- & L-Lactic Acid level in mg/L by comparing the developed color to the color chart on the test strip container. If test strip color falls between two color chips read numbers on second row. Note that if a sample was diluted prior to analysis, the sample lactic acid level is 5 times the level obtained from the color chart. (***Since fluorescent lights have a green cast, color matching is best under incandescent or natural lighting.)***

Storage

Store away from direct sunlight at temperatures below 80ºF. Keep dry. Product is satisfactory until the date printed on the test strip package label.

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Summary Interpretation

The tomato is a unique fruit that provides an essential source of vitamin C, potassium and antioxidants, primarily lycopene. Approximately one third of the world's annual production of about 80,000,000 metric tons of tomatoes is processed into products such as tomato paste, tomato pulp (diced tomatoes), and tomato sauce.[1]

Lactic acid bacteria (LAB), especially of the genera *Lactobacillus* and *Leuconostoc*,[2, 3, 6] are the bacterial agents most commonly involved in the spoilage of tomato products. They have a high tolerance to the low pH values (in the range of 3.5 to 4.6[4]) found in tomato products. When present at high levels or for long periods they can unacceptably affect a product's organoleptic properties[5, 7, 8, 9, 10] through the production of lactic acid and acetic acid, diacetyl, ethanol or other chemical components.

There is a need for a simple, rapid, accurate method for measuring unacceptable contamination by LAB. The traditional method requires 72 hours, and does not provide a positive result if a previously-contaminated batch has been reprocessed.[11] Monitoring for changes in titratable acidity caused by the contaminating bacteria does not offer satisfactory sensitivity. Measuring for diacetyl and acetoin has been proposed,[2, 3] but not all LAB produce these metabolites at acceptable levels, and some other LAB species first produce them but later metabolize them, so there is no remaining evidence of ongoing contamination.[12] Analysis for uracil has also been proposed,[11] but this method requires expensive HPLC instrumentation plus there is frequently insufficient distinction between levels present in non-contaminated products and levels produced by contaminating LAB. Since all LAB produce D- and/or L-Lactic acid, monitoring for L-Lactic Acid has been suggested,[14] but measuring L-Lactic Acid plus D-Lactic Acid is the method of choice.[5, 15, 17, 19, 20]

Uncontaminated tomato fruit and tomato products contain low levels of D + L-Lactic acid, in the 0 – 200 mg/kg range.[5, 13, 14, 15] It is considered indicative of contamination when the level of these acids reaches or exceeds 300 mg/kg[5, 15, 16, 17] or 400 mg/kg.[18]

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