

COMING SOON!



BioPaddles™ Colony Identification App

NUT-TCC/MAC

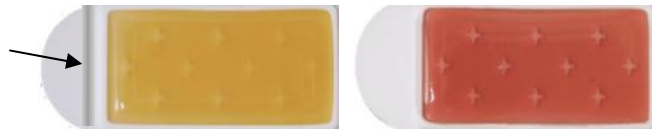
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Nutrient-TTC Agar (**NUT-TTC**)MacConkey Agar (**MAC**)

USE:

Isolation and differentiation of Gram (-) enteric bacilli. Coliform Testing / Recovery of Stressed Coliforms

Side 1: Nutrient-TTC Agar (**NUT-TTC**) (yellow)
(Side 1 is marked with an indented laser line)



Side 2: MacConkey Agar (**MAC**) (pink)

APPLICATION

In total coliform testing (TCC), the coliform organisms tested for include: total coliform, fecal coliform, and *E. coli* (*Escherichia coli*). Detection of fecal coliforms (a subset of total coliforms) or *Escherichia coli* (a subset of fecal coliforms) can indicate the potential presence of waterborne pathogens associated with fecal contamination¹.

PADDLE AGARS

Nutrient-TTC Agar (NUT-TTC) –General purpose relatively non-selective agar medium, containing two peptones, which will support the growth of a wide variety of organisms. Suitable for cultivation of both of aerobes and anaerobes. This medium contains the dye, 2,3,5- triphenyltetrazolium chloride (TTC)². Aerobic coliform bacteria species grow on this medium and can be detected by their ability to reduce TTC to a red colored formazan dye. Bacterial colonies appear as red dots on an otherwise clear yellowish medium. Agar is the solidifying agent.

MacConkey Agar (MAC) – Both selective and differential; used to differentiate between Gram negative bacteria while inhibiting the growth of most Gram positive bacteria. The medium also differentiates between lactose-fermenting coliforms Lac (+) and lactose non-fermenters Lac (-), which include potential pathogens. Addition to the nutrient agar base of bile salts and crystal violet will inhibit the growth of most Gram-positive bacteria, making MacConkey agar selective. Lactose, a fermentable carbohydrate, and neutral red, a pH indicator, are added to differentiate the lactose positive coliforms from the potentially pathogenic lactose non-fermenters. When lactose is fermented, acid products lower the pH below 6.8, with the resulting colonial growth turning pinkish-red. If an organism is unable to ferment lactose, the colonies will be colorless. Bile salts mixture and crystal violet are the selective agents, inhibiting Gram positive cocci and allowing Gram-negative

¹ United States Pharmacopeial Convention. 2007. The United States pharmacopeia, 31st ed., Amended Chapters 61, 62, 111. The United States Pharmacopeial Convention, Rockville, MD.

² Chapman, G. H. 1947. A superior culture medium for the enumeration and differentiation of coliforms. J. Bacteriol. 53:504.

organisms to grow. Sodium chloride maintains the osmotic environment. Agar and a proprietary polymer are the solidifying agents.

CULTURE CONTROLS

10-300 inoculum (CFU)

	Nutrient-TTC Agar	MacConkey Agar
<i>Enterococcus faecalis</i>	GROWTH	INHIBITED
<i>Escherichia coli</i>	GROWTH	GROWTH
<i>Proteus mirabilis</i>	INHIBITED	GROWTH & PARTIAL INHIBITION OF SWARMING
<i>Salmonella typhimurium</i>	GROWTH	GROWTH

STORAGE/EXPIRATION

Store tightly sealed BioPaddles™ in a cool, dry location (less than 68°F/20°C). Avoid temperature changes. BioPaddles™ may be refrigerated, but it is not necessary. Do not freeze. If freezing occurs, thaw (3-6 hours) under refrigeration temperatures (40°F; 4.4°C). Freezing can promote excess water loss and variation in media surface due to crystal formation. The average shelf-life is one year. Refer to expiration date (See: BBE stamped on vial). Discard if paddle agar appears oxidized (darkens from expected color). The expiration date applies to the medium in an intact container when stored as directed.

SAMPLING

Liquids: Twist to remove paddle from vial. Fill vial to 40 mL fill line with the liquid to be sampled. The 40 mL volume can be used to calculate Total Viable Count (TVC) and/or Total Colony Count (TCC). Replace paddle. Allow a contact time of 15 seconds. Remove the paddle. Empty the vial. Replace the paddle in the vial.



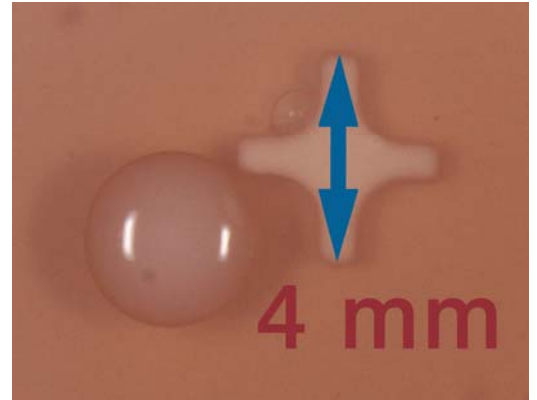
Surfaces: Twist to remove paddle from vial. Allow the paddle surface (10 cm²) to come into physical contact with the test surface. Recovery rate is about 50%. To insure an accurate recovery, gently sweep (or touch) the paddle to cover a 20 cm² area. Replace paddle in vial.

INCUBATION



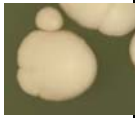
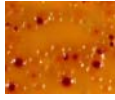

Incubate at 35 ±2C for 18-24 hours.

COLONY MEASURING

Each BioPaddles™ paddle has molded media attachment points that are 4mm in length (point-to-point). This feature provides a useful guidepost to estimating nearby colony size.








IDENTIFICATION

ORGANISM		NUT-TTC			MAC		
ORGANISM	PHYSIOLOGY ◆ Precision Test Strip Available	GROWTH	COLONY	IMAGE	GROWTH	COLONY	IMAGE
<i>Aspergillus niger</i>	<ul style="list-style-type: none"> • Catalase (+) • Ascomycete 	+++	<ul style="list-style-type: none"> • Granular • Jet black conidia w/ yellow/gray hyphae • 3-5+++cm 		INHIBITED	---	---
<i>Bacillus spp.</i>	<ul style="list-style-type: none"> • Lactose (-) • Indole (-) ◆ • Oxidase (-) ◆ • Catalase (+) ◆ • Urease () ◆ • Gram (+) Rod 	+++	---		INHIBITED	---	---
<i>Candida albicans</i>	<ul style="list-style-type: none"> • Catalase (+) • Ascomycete 	+++	<ul style="list-style-type: none"> • Cream • CVEG • 1-2mm 		INHIBITED	---	---
<i>E. coli</i>	<ul style="list-style-type: none"> • Lactose (+) • Indole (+) ◆ • Oxidase (-) ◆ • Catalase (+) ◆ • Urease (-) ◆ • Gram (-) Rod 	+++	<ul style="list-style-type: none"> • Yellow / Orange / Red • CVEG • 0.5 - 1.0mm 		+++	<ul style="list-style-type: none"> • Pink / Red • CVEG • 2-4mm 	



For *in vitro* diagnostic use only. This product should be used only by adequately trained personnel with knowledge of microbiological techniques in the laboratory.

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ORGANISM		NUT-TTC			MAC		
ORGANISM	PHYSIOLOGY ◆ Precision Test Strip Available	GROWTH	COLONY	IMAGE	GROWTH	COLONY	IMAGE
<i>Enterobacter aerogenes</i>	<ul style="list-style-type: none"> • Lactose (+) • Indole (-) ◆ • Oxidase (-) ◆ • Catalase (+) ◆ • Urease (-) ◆ • Gram (-) Rod 	+++	<ul style="list-style-type: none"> • Transparent • CVEG • 2-4mm 		+++	<ul style="list-style-type: none"> • Pink • Thick, round, raised to low-convex; Spreading • 2-3mm 	
<i>Enterococcus spp.</i>	<ul style="list-style-type: none"> • Lactose (-) • Indole (-) ◆ • Oxidase (-) ◆ • Catalase (-) ◆ • Urease (-) ◆ • Gram (+) Sphere 	INHIBITED	---	---	INHIBITED	---	---
<i>Klebsiella spp.</i>	<ul style="list-style-type: none"> • Lactose (+) • Indole (-) ◆ • Oxidase (-) ◆ • Catalase (+) ◆ • Urease (+) ◆ • Gram (-) Rod 	+++	<ul style="list-style-type: none"> • Amber • Spreading • 4-5mm 		+++	<ul style="list-style-type: none"> • Colorless / Light Pink • Spreading • 4-5mm 	
<i>Proteus spp.</i>	<ul style="list-style-type: none"> • Lactose (-) • SEE: INDOLE ◆ • Oxidase (-) ◆ • Catalase (+) ◆ • Urease (+) ◆ • Gram (-) Rod 	INHIBITED	---	---	+++	<ul style="list-style-type: none"> • Colorless; tan bulls-eye • Spreading / partial swarming • 2-3mm 	
<i>Pseudomonas aeruginosa</i>	<ul style="list-style-type: none"> • Lactose (-) • Indole (-) ◆ • Oxidase (+) ◆ • Catalase (+) ◆ • Urease (-) ◆ • Gram (-) Rod • Fluoresces blue under long-wave UV light (400-nm) 	+++	<ul style="list-style-type: none"> • Clear or colorless • Irregular; Spreading to confluent • Clear to grayish with dark centers (translucent edges) • Diffusible green-blue pigment • 2-4mm 	IMAGE PENDING	+++	<ul style="list-style-type: none"> • Cream / off-white • Irregular / Spreading • Diffusible green-blue pigment • CVEG • 2-4mm 	IMAGE PENDING

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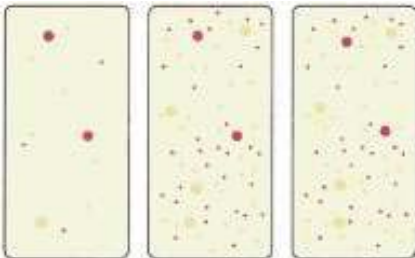
ORGANISM		NUT-TTC			MAC		
ORGANISM	PHYSIOLOGY ◆ Precision Test Strip Available	GROWTH	COLONY	IMAGE	GROWTH	COLONY	IMAGE
<i>Pseudomonas fluorescens</i>	<ul style="list-style-type: none"> Lactose (-) Indole (-) ◆ Oxidase (+) ◆ Catalase (+) ◆ Urease (-) ◆ Gram (-) Rod Fluoresces blue-green under long-wave UV light (400-nm) 	+++	<ul style="list-style-type: none"> Clear or colorless Irregular; Spreading to confluent Clear to grayish with dark centers (translucent edges) 2-4mm 		+++	<ul style="list-style-type: none"> Clear or pinkish Irregular edges Clear with dark, pinkish centers (translucent edges) 2-4mm 	
<i>Salmonella typhimurium</i>	<ul style="list-style-type: none"> Lactose (-) Indole (-) ◆ Oxidase (-) ◆ Catalase (+) ◆ Urease (-) ◆ Gram (-) Rod 	+++	<ul style="list-style-type: none"> Purple / Pink FED 0.5 - 1.0mm 	IMAGE PENDING	+++	<ul style="list-style-type: none"> Clear, transparent or amber Circular, Smooth, Flat 2-3mm 	IMAGE PENDING
<i>Salmonella epidermidis</i>	<ul style="list-style-type: none"> Lactose (-) Indole (-) ◆ Oxidase (-) ◆ Catalase (+) ◆ Urease (-) ◆ Gram (-) Rod 	+	<ul style="list-style-type: none"> Red FED 0.5 - 1.0mm 	IMAGE PENDING	PARTIAL - COMPLETE INHIBITION	---	---
<i>Serratia spp.</i>	<ul style="list-style-type: none"> Lactose (-) Indole (-) ◆ Oxidase (-) ◆ Catalase (+) ◆ Urease (+) ◆ Gram (-) Rod 	PARTIAL - COMPLETE INHIBITION	---	---	++	<ul style="list-style-type: none"> Pink / Red 2-4mm 	IMAGE PENDING
<i>Shigella spp.</i>	<ul style="list-style-type: none"> Lactose (-) Indole - mixed ◆ Oxidase (-) ◆ Catalase (+) ◆ Urease (-) ◆ Gram (-) Rod 	PARTIAL - COMPLETE INHIBITION	---	---	+++	<ul style="list-style-type: none"> Colorless or transparent / faintly pink Raised 1-3mm 	IMAGE PENDING
<i>Staphylococcus aureus</i>	<ul style="list-style-type: none"> Lactose (-) Indole (-) ◆ Oxidase (-) ◆ Catalase (+) ◆ Urease (-) ◆ Gram (+) Sphere 	PARTIAL - COMPLETE INHIBITION	---	---	PARTIAL - COMPLETE INHIBITION	---	---

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ORGANISM		NUT-TTC			MAC		
ORGANISM	PHYSIOLOGY ◆ Precision Test Strip Available	GROWTH	COLONY	IMAGE	GROWTH	COLONY	IMAGE
<i>Streptococcus spp.</i>	<ul style="list-style-type: none"> • Lactose (+) ◆ • Indole (+) ◆ • Oxidase (-) ◆ • Catalase (-) ◆ • Urease (+) ◆ • Gram (+) Sphere 	PARTIAL - COMPLETE INHIBITION	---	---	PARTIAL - COMPLETE INHIBITION	---	---
Gram (+) Bacteria		PARTIAL - COMPLETE INHIBITION	---	---	PARTIAL - COMPLETE INHIBITION	---	---
					NOTE: Color may change from pink to green.		

ENUMERATION

NUT-TTC



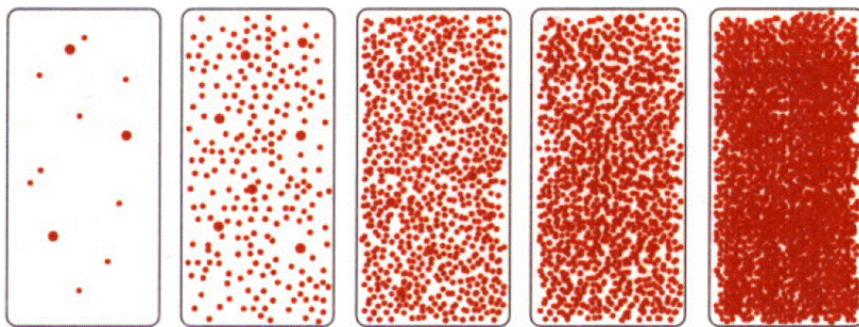
Very Light Light Moderate

MAC



Very Light Light Moderate

TVC / TCC



100 1000 10000 100000 1000000

Approximate Colony Count per 100 mL

**TVC/TCC
(Total Viable Count/
Total Colony Counts)**

Colony Counts < 1000
Count colonies
TVC/TCC Count = Count x 2.5

Colony Counts > 1000
Use chart
TVC/TCC Count = Count x 2.5

(Based on a 40 mL sample)



Example:
Inoculated NUT/TTC
paddle showing
approximately 1000
CFU/100 mL.

DISPOSAL

Twist to remove paddle from vial. Fill vial to 40 mL fill line with 1:9 dilution of household bleach (5.25% sodium hypochlorite). Replace paddle in vial. Allow 15 minute contact time. Remove paddle. Discard bleach solution. Replace paddle in vial and dispose. Alternatively, loosen cap and microwave for 30 seconds, autoclave, or incinerate.

GLOSSARY

:	
CVEG	Convex, Entire, Glossy
FED	Full, Entire, Dull
Catalase	Cat (+) contains catalase enzymes that degrade cellular H ₂ O ₂ .
Lactose	Lac (+) bacteria can ferment available lactose in the medium producing an acid which lowers the pH. Lac (-) are non-fermenting.
Indole	Biochemical test to determine the ability of an organism to split indole from the amino acid tryptophan. <i>P. vulgaris</i> is indole (+) while <i>P. mirabilis</i> is indole (-).
Oxidase	OX (+) contains cytochrome c oxidase. In contact with an indicator turns dark blue if OX (+); colorless if OX(-).
Urease	UR (+) presence of enzyme urease which hydrolyzes urea into CO ₂ & NH ₄ .
β-D-Glucuronidase	Glu (+) Found in 97% of <i>E. coli</i> strains. The presence of <i>E. coli</i> is determined when both β-D-Glucuronidase and Indole are (+), and the organism is Gram (-).
Gram	Gram reaction