MacConkey Agar

M008S

Intended use

MacConkey Agar is used for isolation , identification and enumeration of lactose fermenting and lactose non-fermenting enteric bacteria.It is recommended by BIS committee under the specifications IS:5887(Part I and Part II) -1976.

Composition**

Ingredients	Gms / Litre
Peptone	20.000
Lactose	10.000
Bile salts	5.000
Sodium chloride	5.000
Neutral red	0.070
Agar	15.000
Final pH (at 25°C)	7.5±0.2

**Formula adjusted, standardized to suit performance parameters

Directions

Suspend 55.07 grams in 1000 ml distilled water. Heat to boiling with gentle swirling to dissolve the medium completely. Sterilize by autoclaving at 15 lbs pressure (121°C) for 15 minutes. Avoid overheating. Cool to 45-50°C and pour into sterile Petri plates. The surface of the medium should be dry when inoculated.

Principle And Interpretation

MacConkey Agar is recommended for isolation, identification and enumeration of *Staphylococcus aureus* and Faecal Streptococci.(1)MacConkey Agar is the earliest selective and differential medium for cultivation of enteric microorganisms from a variety of clinical specimens (2,3). Subsequently MacConkey Agar and Broth have been recommended for use in microbiological examination of foodstuffs (4) and for direct plating / inoculation of water samples for coliform counts (5). These media are also accepted by the Standard Methods for the Examination of Milk and Dairy Products (6) and pharmaceutical preparations (7).

Peptone provides nitrogeneous and carbonaceous compounds long chain amino acids, vitamins and other essential growth nutrients. Original medium contains protein, bile salts, sodium chloride and two dyes. The selective action of this medium is attributed to crystal violet and bile salts, which are inhibitory to most species of gram positive bacteria. Gram-negative bacteria usually grow well on the medium and are differentiated by their ability to ferment lactose. Lactose fermenting strains grow as red or pink and may be surrounded by a zone of acid precipitated bile. The red colour is due to production of acid from lactose, absorption of neutral red and a subsequent colour change of the dye when the pH of medium falls below 6.8. Lactose non-fermenting strains, such as *Shigella* and *Salmonella* are colourless and transparent and typically do not alter appearance of the medium. *Yersinia enterocolitica* may appear as small, non-lactose fermenting colonies after incubation at room temperature.Bacteria causing food poisoning are also isolated on MacConkey Agar, such as *Staphylococcus aureus* and Faecal Streptococci.

Type of specimen

Food and dairy samples ; Water samples

Specimen Collection and Handling

For food and dairy samples, follow appropriate techniques for sample collection and processing as per guidelines (4,6,10).
For water samples, follow appropriate techniques for sample collection, processing as per guidelines and local standards.(5)
After use, contaminated materials must be sterilized by autoclaving before discarding.

Warning and Precautions :

In Vitro diagnostic Use only. Read the label before opening the container. Wear protective gloves/protective clothing/eye protection/ face protection. Follow good microbiological lab practices while handling specimens and culture. Standard precautions as per established guidelines should be followed while handling clinical specimens. Safety guidelines may be referred in individual safety data sheets

Performance and Evaluation

Performance of the medium is expected when used as per the direction on the label within the expiry period when stored at recommended temperature.

Quality Control

Appearance
Light yellow to pink homogeneous free flowing powder

Gelling
Firm, comparable with 1.5% Agar gel.

Colour and Clarity of prepared medium
Light red coloured clear to slightly opalescent gel forms in Petri plates

Reaction
Reaction of 5.5% w/v aqueous solution at 25°C. pH : 7.5±0.2

pH

7.30-7.70

Cultural Response
Cultural characteristics observed after an incubation at 35 - 37°C for 18 - 24 hours.

Cultural Response

Organism	Inoculum (CFU)	Growth	Recovery	Colour of Colony
Cultural Response				
Escherichia coli ATCC 25922 (00013*)	50-100	luxuriant	>=50%	pink to red with bile precipitate
# Klebsiella aerogenes ATCC 13048 (00175*)	50-100	luxuriant	>=50%	pale pink to red
Enterococcus faecalis ATCC 29212 (00087*)	50-100	fair to good	30-40%	pale pink to red
Proteus vulgaris ATCC 13315	50-100	luxuriant	>=50%	colourless
Salmonella Paratyphi A ATCC 9150	50-100	luxuriant	>=50%	colourless
Shigella flexneri ATCC 12022 (00126*)	50-100	fair to good	30-40%	colourless
Salmonella Paratyphi B ATCC 8759	50-100	luxuriant	>=50%	colourless
Salmonella Enteritidis ATCC 13076 (00030*)	50-100	luxuriant	>=50%	colourless
Salmonella Typhi ATCC 6539	50-100	luxuriant	>=50%	pink to red
Staphylococcus aureus subsp. *aureus ATCC 25923* (00034*)	>=10^3	inhibition	0%	

Key : *Corresponding WDCM numbers. # Formerly known as *Enterobacter aerogenes*

Storage and Shelf Life

Store between 10-30°C in a tightly closed container and the prepared medium at 20-30°C. Use before expiry date on the label. On opening, product should be properly stored dry, after tightly capping the bottle inorder to prevent lump formation due to the hygroscopic nature of the product. Improper storage of the product may lead to lump formation. Store in dry ventilated area protected from extremes of temperature and sources of ignition Seal the container tightly after use. Use before expiry date on the label.
Product performance is best if used within stated expiry period.

Disposal

User must ensure safe disposal by autoclaving and/or incineration of used or unusable preparations of this product. Follow established laboratory procedures in disposing of infectious materials and material that comes into contact with clinical sample must be decontaminated and disposed of in accordance with current laboratory techniques (8,9).

Reference

1. Bureau of Indian Standards IS :5887 (Part II)- 1976, reaffirm 1986.
2 MacConkey, 1905, J. Hyg., 5:333.
3. MacConkey, 1900, The Lancet, ii:20.
4. Speck M.(Ed), 1985, Compendium of methods for the Microbiological Examination of Foods, 2nd ed., APHA, Washington , D.C.
3. Baird R.B., Eaton A.D., and Rice E.W., (Eds.), 2015, Standard Methods for the Examination of Water and Wastewater, 23rd ed., APHA, Washington, D.C.
6. Wehr H. M. and Frank J. H., 2004, Standard Methods for the Microbiological Examination of Dairy Products, 17th Ed., APHA Inc., Washington, D.C.
7. The United States Pharmacopoeia XXI and the National Formulary, 16th ed., 1985, United States Pharmacopoeial Convention, Inc, Washington, D.C.
8. Isenberg, H.D. Clinical Microbiology Procedures Handbook. 2nd Edition.
9. Jorgensen,J.H., Pfaller , M.A., Carroll, K.C., Funke, G., Landry, M.L., Richter, S.S and Warnock., D.W. (2015)
10. Salfinger Y., and Tortorello M.L. Fifth (Ed.), 2015, Compendium of Methods for the Microbiological Examination of Foods, 5th Ed., American Public Health Association, Washington, D.C.