MAL Agar

Cat. 1573

Medium used for detection and isolation of salmonella H2S positive such as S.typhi and to distinguish positive and negative mannitol enterobacteria.

Practical information

Aplications	Categories
Differentiation	Enterobacteria

Industry: Clinical

Principles and uses

MAL (mannitol-arabinose-lactose) Agar is a nutrition media which is used for isolation and detection of H2S-positive salmonella such as Salmonella typhi and to distinguish mannitol positive and negative species of the family Enterobacteriaceae.

MAL Agar was first introduced in the 1980s by Pataky, a biologist from Presov, the Slovak Republic. This medium improved and expanded conditions for the isolation and differentiation of enterobacteria that the widely used XLD Agar normally provides. This medium is relatively unknown internationally as it has not received broad coverage in professional publications.

MAL Agar is both a selective and differential medium using sodium desoxycholate as the selective agent and therefore inhibits gram-positive microorganisms. The nutritional component of the medium is provided by yeast extract. Fermentable carbohydrates such as mannitol, D-arabinose and lactose are utilized by salmonella bacteria and when exhausted, they attack lysine through the enzyme – lysine decarboxylase – with reversion to an alkaline pH which mimics the Shigella reaction. To prevent similar reversion by lysine positive coliforms, lactose and other carbohydrates were added to produce acid in excess. To increase the differentiating ability of the formulation, an H2S indicator system, consisting of sodium thiosulfate and ferric ammonium citrate, is included for the visualization of the production of hydrogen sulfide, resulting in the formation of colonies with black centers. The nonpathogenic H2S-producers do not decarboxylate lysine; therefore, the acid reaction produced by them prevents the blackening of the colonies after 18 to 24 h incubation. The phenol red is a pH changes indicator. Characteristic of this medium is the combined biochemical results of mannitol positive, D-arabinose negative, lysinedecarboxylase positive, H2S positive and lactose positive/negative, which is typical for Salmonellas but only anomalistically found with other flora.

Formula in g/L

Bacteriological agar	12,5	D-arabinose	1,5
Ferric ammonium citrate	0,8	Lactose	4
L-Lysine	5	Mannitol	4
Phenol red	0,1	Sodium chloride	5
Sodium deoxycholate	1,5	Sodium thiosulfate	4,5
Yeast extract	3		

Preparation

Suspend 41,9 grams of the medium in one liter of distilled water. Mix well and dissolve by heating with frequent agitation. Boil for one minute until complete dissolution. DO NOT OVEARHEAT. DO NOT AUTOCLAVE. Dispense into appropriate containers.

Instructions for use

Inoculate and incubate at a temperature of 35±2 ºC for 18-24 hours.

Quality control

Solubility	Appareance	Color of the dehydrated medium	Color of the prepared medium	Final pH (25ºC)
w/o rests	Fine powder	Beige	Pinky-red	7,3 ± 0,2

Microbiological test

Incubation conditions: (35±2 ºC / 18-24 h).

Microorganisms	Specification	Characteristic reaction
Salmonella enteritidis ATCC 13076	Good growth	Yellow, black centered colonies
Escherichia coli ATCC 25922	Partially inhibited	Yellow and opaque colonies
Proteus mirabilis ATCC 25933	Good growth	Translucent colonies without swarming

Storage

Temp. Min.:2 ºC
Temp. Max.:25 ºC

Bibliography

King, S. & Metzger Appl. Microbiol. 16:577. 1968. King, S. & Metzger Appl. Microbiol. 16:579, 1968.
Isenberg, Kominos & Siegel. Appl. Microbiol. 18:656. 1969. Hoben, Aston & Peterson Appl. Microbiol. 26:126. 1973.
Polloch & Dalhgren. Appl. Microbiol. 27:197. 1974. Peloxv, Lavirotte & Pons Microbia, Tomo I No. 1. 1975.
Goo et al Appl. Microbiol. 26:288, 1973.