MANNITOL SALT AGAR (MSA)

APPLICATION	Mannitol Salt Agar is used for selective isolation of pathogenic Staphylococci from pharmaceutical products in accordance with Microbial Limit Test by harmonized method of USP/EP
PRINCIPLE AND INTERPRETATION	Staphylococci are widespread in nature, although they are mainly found on the skin, skin glands and mucous membranes of mammals and birds. The coagulase-positive species i.e *Staphylococcus aureus* is well documented as a human opportunistic pathogen. Staphylococci have the unique ability of growing on a high salt containing media. Isolation of coagulase-positive staphylococci on Phenol Red Mannitol Agar supplemented with 7.5% NaCl was studied by Chapman . The resulting Mannitol Salt Agar Base is recommended for the isolation of coagulase positive staphylococci from cosmetics, milk, food and other specimens [1][2][3] The additional property of lipase activity of *Staphylococcus aureus* can be detected by the addition of the Egg Yolk Emulsion. The lipase activity can be visualized as yellow opaque zones around the colonies [4].It is also used in the performance of microbial limit tests for the selective isolation of *Staphylococcus.* The formulation is in accordance with the harmonization of USP/EP[5]. The medium contains beef extract, pancreatic digest of casein and peptic digest of animal tissue which makes it very nutritious as they provide essential growth factors and trace nutrients. Many other bacteria except Staphylococci are inhibited by 7.5% sodium chloride. Mannitol is the fermentable carbohydrate fermentation of which leads to acid production, detected by phenol red indicator. *S.aureus* ferment mannitol and produce yellow coloured colonies surrounded by yellow zones. Coagulase-negative strains of *S.aureus* are usually mannitol non-fermenters and therefore produce pink to red colonies surrounded by red-purple zones. Presumptive coagulase-positive yellow colonies of *S.aureus* should be confirmed by performing the coagulase test [tube or slide] . Lipase activity of *S.aureus* can be detected by supplementing the medium with egg yolk emulsion. A possible *S.aureus* must be confirmed by the coagulase test. Also the organism should be subcultured to a less inhibitory medium not containing excess salt to avoid the possible interference of salt with coagulase testing or other diagnostic tests (e.g. Nutrient Broth[6]. Few strains of *S.aureus* may exhibit delayed mannitol fermentation. Negative results should therefore be re-incubated for an additional 24 hours before being discarded[7].
MEDIUM COMPOSITION*	Peptic Digest of animal tissue ……..5.00 g/l Pancreatic digest of casein ……..……5.00g/l Beef Extract ……..……1.00 g/l Sodium chloride ……75.00 g/l D-Mannitol ……10.00 g/l Phenol Red ……0.025 g/l Agar ……..15.000 g/l Final pH 7.4± 0.2 *Adjusted and/or supplemented to meet performances criteria
STORAGE	+2°/+25°C Protect from light, excessive heat, moisture and freezing

[1] Murray P.R., Baron J.H., Pfaller M.A., Jorgensen J.H. and Yolken R.H. Ed 2003, Manual of Clinical Microbiology, (thEd, American Society for Microbiology, Washington D.C.
[2] Koch P.K., 1942, Zentralbl., Bakteriol., Parasitenkd. Abt I Origi. 149:122
[3] .Chapman G.H., 1945, J. Bacteriol., 50:201
[4] Hitchins A.D., Tran T. and McCarron J.E., 1995, FDA Bacteriological Analytical Manual, 8t Ed. AOAC International, Gaithersburg, Md.
[5] European Pharmacopoeia current Edition
[6] Gunn B.A., Dunkelberg W.E. and Creitz J.R., 1972, Am. J. Clin. Pathol., 57:236
[7] MacFaddin J.F., 1985, Media for Isolation-Cultivation-Identification-Maintenance of medical bacteria, vol. 1, Williams and Wilkins, Baltimore.

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<table>
<tr><td>QUALITY CONTROL</td><td>
<table>
<tr><td colspan="3">Growth Promotion Test: 10-100 viable microorganisms[8]</td></tr>
<tr><td>Control strain</td><td>Incubation Conditions</td><td>Specifications</td></tr>
<tr><td>S. aureus
ATCC 6538</td><td>18 h
at 32.5 ± 2.5°C</td><td>Good to luxuriant growth. Colonies yellow coloured</td></tr>
<tr><td>S.epidermidis
ATCC 12228</td><td>18 h
at 32.5 ± 2.5°C</td><td>Good growth. Colonies red coloured</td></tr>
<tr><td>E. coli
ATCC 8739</td><td>72 h
at 32.5 ± 2.5°C</td><td>Inhibited</td></tr>
<tr><td colspan="2">Sterility control</td><td>No growth</td></tr>
<tr><td colspan="2">Appearance</td><td>Red coloured, clear to slightly opalescent gel forms in plates</td></tr>
</table>
</td></tr>
<tr><td>BARCODE</td><td>Data matrix code is composed of 20 digits:

Digits 1→2 Media code
Digits 3→7 Batch number
Digits 8→9 Sub-batch number
Digits 10→14 Progressive number
Digits 15→20 Espiri Date (DDMMYY)</td></tr>
<tr><td>GENERAL WARNING NOTES</td><td>Device must be handled according to asepsis precautions, of utilization of culture media is strictly referred to the type of analysis that must be done. Please refer to specific norms and procedures. Do not use if device is broken. Do not use if media shows accidental contamination signs. Do not utilize after expiry date. Let device reach room temperature before utilizing. Results interpretation must be done by qualified personnel, who must consider context of use.
Disposal of waste must be carried out according to national and local regulations in force.</td></tr>
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This product is available in:

- **Non Gamma irradiated media plates**

MODEL	PRODUCT CODE	ORDER CODE	DESCRIPTION	SHELF LIFE
Ø90mm	MU118/10	MU118/10.100 (100 pcs/pack)	**Filling volume:** 24ml **Packaging**: single wrapped (S.W.)	4 months

[8] For *E.coli* ≥100 viable microorganisms