CRITERION™ MANNITOL SALT AGAR (MSA)

Cat. no. C6230	CRITERION™ Mannitol Salt Agar	233.5gm
Cat. no. C6231	CRITERION™ Mannitol Salt Agar	500gm
Cat. no. C6232	CRITERION™ Mannitol Salt Agar	2kg
Cat. no. C6233	CRITERION™ Mannitol Salt Agar	10kg
Cat. no. C6234	CRITERION™ Mannitol Salt Agar	50kg

INTENDED USE

Hardy Diagnostics CRITERION™ Mannitol Salt Agar (MSA) is recommended for use as a selective medium for the isolation of coagulase-positive mannitol-positive *Staphylococcus aureus* strains.

This dehydrated culture medium is a raw material intended to be used in the making of prepared media products, which will require further processing, additional ingredients, or supplements.

SUMMARY

Koch reported the use of a medium containing 7.5% sodium chloride as a selective agent for the isolation of staphylococci in 1942.[5] The results were confirmed and improved by Chapman in 1945 by the addition of this salt concentration to phenol red mannitol agar, as *Staphylococcus aureus* usually ferments mannitol.[3] Non-pathogenic staphylococci usually show less luxuriant growth on this medium after the incubation period.

A sodium chloride concentration of 7.5% is nearly ten times the usual concentration seen in most media. It serves to inhibit most organisms except staphylococci in mixed flora specimens. The beef extract and peptones supply the essential elements carbon, nitrogen, and sulfur. Mannitol is added to show the fermentation capabilities of the organisms. Acid production as the result of fermentation of this sugar results in the formation of colonies with a yellow zone. Those staphylococci that do not ferment mannitol show a purple or red zone around the colonies.

Mannitol Salt Agar (MSA) is recommended by the American Public Health Association for the enumeration of staphylococci in food and dairy products.[9,10]

FORMULA

Gram weight per liter:	116.7g/L
Sodium Chloride	75.0g
Proteose Peptone	10.0g
Mannitol	10.0g
Beef Extract	1.0g

Phenol Red	25.0mg
Agar	15.0g

Final pH 7.4 +/- 0.2 at 25°C.

* Adjusted and/or supplemented as required to meet performance criteria.

STORAGE AND SHELF LIFE

Store the sealed bottle(s) containing dehydrated culture medium at 2-30°C. Dehydrated culture medium is very hygroscopic. Keep lid tightly sealed. Protect dehydrated culture media from moisture and light. The dehydrated culture media should be discarded if it is not free-flowing or if the color has changed from its original pinkish-beige.

Store the prepared plated culture media at 2-8°C. The prepared tubed culture media may be stored at 2-30°C.

The expiration dating on the product label applies to the product in its intact packaging when stored as directed. The product may be used and tested up to the expiration date on the product label and incubated for the recommended quality control incubation times.

Refer to the document "Storage" for more information.

PRECAUTIONS

This product may contain components of animal origin. Certified knowledge of the origin and/or sanitary state of the animals does not guarantee the absence of transmissible pathogenic agents. Therefore, it is recommended that these products be treated as potentially infectious, and handle observing the usual universal blood precautions. Do not ingest, inhale, or allow to come into contact with skin.

This product is for laboratory use only. It is to be used only by adequately trained and qualified laboratory personnel. Observe approved biohazard precautions and aseptic techniques. All laboratory specimens should be considered infectious and handled according to "standard precautions." The "Guidelines for Isolation Precautions" is available from the Centers for Disease Control and Prevention at www.cdc.gov/ncidod/dhqp/gl_isolation.html.

For additional information regarding specific precautions for the prevention of the transmission of all infectious agents from laboratory instruments and materials, and for recommendations for the management of exposure to infectious disease, refer to CLSI document M-29: *Protection of Laboratory Workers from Occupationally Acquired Infections: Approved Guideline.*

Sterilize all biohazard waste before disposal.

Refer to the document "Precautions When Using Media" for more information.

Refer to the document SDS Search instructions on the Hardy Diagnostics' website for more information.

METHOD OF PREPARATION FOR DEHYDRATED CULTURE MEDIA

1. Suspend 116.75g of the dehydrated culture media in 1 liter of distilled or deionized water.

2. Heat to boiling and mix to dissolve completely.

3. Sterilize in the autoclave at 121°C for 15 minutes.

PROCEDURE AND INTERPRETATION OF RESULTS

For information on procedures and interpretation of results, consult listed references or refer to the prepared media Instructions for Use (IFU) for Cat. No. G40.

LIMITATIONS

It is recommended that biochemical, immunological, molecular, or mass spectrometry testing be performed on colonies from pure culture for complete identification.

Most organisms other than staphylococci are inhibited by the high salt concentration found in Mannitol Salt Agar except for some halophilic marine organisms.

Accurate counting may be difficult with molds or spreading colonies.

Rare, fastidious microorganisms may not grow on selective media formulations.

Refer to the document "Limitations of Procedures and Warranty" for more information.

MATERIALS REQUIRED BUT NOT PROVIDED

Standard microbiological supplies and equipment such as autoclaves, incinerators, and incubators, etc., are not provided.

QUALITY CONTROL

Hardy Diagnostics tests each lot of commercially manufactured media using appropriate quality control microorganisms and quality specifications as outlined on the Certificates of Analysis (CofA). The following organisms are routinely used for testing at Hardy Diagnostics:

Test Organisms	Inoculation Method*	Incubation			Results
		Time	Temperature	Atmosphere	
Staphylococcus aureus ATCC® 25923	A	24-48hr	35°C	Aerobic	Growth; yellow colonies and media at 24-48 hours
*Staphylococcus aureus*** ATCC® 6538	J	18-24hr	35°C	Aerobic	Growth; yellow colonies and media at 18-24 hours
Proteus mirabilis ATCC® 12453	B	24-48hr	35°C	Aerobic	Partial to complete inhibition
*Escherichia coli*** ATCC® 8739	B	48hr	35°C	Aerobic	Partial to complete inhibition

* Refer to the document "Inoculation Procedures for Media QC" for more information.

** Tested in accordance with USP <61> and <62>.[11,12]

USER QUALITY CONTROL

Users of dehydrated culture media should perform QC testing in accordance with applicable government regulatory agencies, and in compliance with accreditation requirements. Hardy Diagnostics recommends end users check for signs of contamination and deterioration and, if dictated by laboratory quality control procedures or regulation, perform quality control testing to demonstrate growth or a positive reaction and to demonstrate inhibition or a negative reaction, if applicable. Hardy Diagnostics quality control testing is documented on the certificates of analysis (CofA) available from Hardy Diagnostics Certificates of Analysis website. In addition, refer to the following document "Finished Product Quality Control Procedures," for more information on QC or see reference(s)

for more specific information.

PHYSICAL APPEARANCE

CRITERION™ Mannitol Salt Agar powder should appear moist, clumpy, and yellow-beige in color. The prepared media should appear clear, slightly opalescent and pinkish-red in color.

REFERENCES

1. Anderson, N.L., et al. *Cumitech 3B; Quality Systems in the Clinical Microbiology Laboratory*, Coordinating ed., A.S. Weisfeld. American Society for Microbiology, Washington, D.C.

2. Tille, P., et al. *Bailey and Scott's Diagnostic Microbiology*, C.V. Mosby Company, St. Louis, MO.

3. Chapman, G.H. 1945. *J. Bacteriol.*; 50:201.

4. Isenberg, H.D. *Clinical Microbiology Procedures Handbook*, Vol. I, II & III. American Society for Microbiology, Washington, D.C.

5. Koch, F.E. 1942. *Zentr. Bakt. Labt. Orig.*; 149:122.

6. MacFaddin, J.F. 1985. *Media for Isolation, Cultivation, Identification, Maintenance of Bacteria*, Vol. I. Williams & Wilkins, Baltimore, MD.

7. Jorgensen, et al. *Manual of Clinical Microbiology*, 8th ed. American Society for Microbiology, Washington, D.C.

8. *Quality Assurance for Commercially Prepared Microbiological Culture Media*, M22. Clinical Laboratory Standards Institute (CLSI - formerly NCCLS), Wayne, PA.

9. *Standard Methods for the Examination of Dairy Products*, APHA, Washington, D.C.

10. Vanderzant, C. and D.F. Splittstoesser, (ed.). 1992. *Compendium of Methods for the Microbiological Examination of Foods* , 3rd ed. APHA, Washington, D.C.

11. The Official Compendia of Standards. USP General Chapter <61> Microbiological Examination of Nonsterile Products: Microbial Enumeration Tests. *USP-NF*. United States Pharmacopeial Convention Inc., Rockville, MD.

12. The Official Compendia of Standards. USP General Chapter <62> Microbiological Examination of Nonsterile Products: Tests for Specified Microorganisms. *USP-NF*. United States Pharmacopeial Convention Inc., Rockville, MD.

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The Hardy Diagnostics manufacturing facility and quality management system is certified to ISO 13485.

HDQA 2207B [C]