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Instructions for Use

HARDY DIAGNOSTICS
A Culture of Service™

XLD AGAR, USP

Cat. no. G65	XLD Agar, USP, 15x100mm Plate, 18ml	10 plates/bag

INTENDED USE

Hardy Diagnostics XLD Agar, USP is recommended for use as a selective and differential medium for the isolation of gram-negative enteric pathogens. The *U.S. Pharmacopeia National Formulary* (USP) describes the use of XLD Agar for growth promotion and indication of *Salmonella* in the microbiological examination of nonsterile products.[2]

SUMMARY

Xylose Lysine Deoxycholate (XLD) Agar was developed by Taylor for the differentiation, isolation, and identification of enteric pathogens, and to support the growth of more fastidious enteric organisms. XLD Agar was especially designed to allow the growth of *Shigella* species, and is a proven medium for the isolation of this organism. It has also been found to be an excellent medium for isolating *Salmonella* species as well.

The selective agent in XLD Agar is sodium deoxycholate, which inhibits the growth of gram-positive organisms. The carbohydrate source is xylose which is fermented by most enterics, except for *Shigella* species; therefore, these colonies appear red on this medium. A second differential mechanism for *Salmonella* is employed by the addition of lysine. Lysine decarboxylation reverts the pH of the medium to an alkaline condition. To avoid this reversal to a *Shigella* reaction, lactose and sucrose are added in excess. The addition of sodium thiosulfate and ferric ammonium citrate as a sulfur source and indicator, respectively, allow hydrogen sulfide forming organisms to produce colonies with black centers under alkaline conditions. Organisms that ferment xylose are lysine decarboxylase-negative and do not ferment lactose or sucrose; therefore, these organisms cause an acid pH shift in the medium and form yellow colonies. Examples of such organisms are *Citrobacter* spp., *Proteus* spp., and *Escherichia coli.*

FORMULA

Ingredients per liter of deionized water:*

Lactose	7.5gm
Sucrose	7.5gm
Sodium Thiosulfate	6.8gm
L-Lysine	5.0gm
Sodium Chloride	5.0gm
Xylose	3.5gm
Yeast Extract	3.0gm
Sodium Deoxycholate	2.5gm
Ferric Ammonium Citrate	0.8gm
Phenol Red	0.08gm
Agar	13.5gm

Final pH 7.4 +/- 0.2 at 25ºC.

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

STORAGE AND SHELF LIFE

Storage: Upon receipt store at 2-8ºC. away from direct light. Media should not be used if there are any signs of deterioration (shrinking, cracking, or discoloration), contamination, or if the expiration date has passed. Product is light and temperature sensitive; protect from light, excessive heat, moisture, and freezing.

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" on the Hardy Diagnostics Technical Document website 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 *in vitro* diagnostic 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" on the Hardy Diagnostics Technical Document website for more information.

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

PROCEDURE

Specimen Collection: Consult listed references for information on sample preparation and pre-enrichment.[1,2]

Method of Use: Allow plates to warm to room temperature and the agar surface to dry before inoculating. Subculture 0.1ml of the pre-enriched sample from Rappaport Vassiliadis Enrichment Broth (Cat. no. K246) and streak the sample with a sterile loop to obtain isolated colonies. Incubate plates aerobically at 30-35ºC. for 18-48 hours. Examine growth for typical colony morphology and perform appropriate biochemical or confirmatory tests as outlined in the references.[1,2]

INTERPRETATION OF RESULTS

Salmonella spp. appear as red colonies with or without black centers. Lysine-positive organisms appear red. *Shigella* spp. also appear red. Other lysine-negative fermenters, such as *E. coli*, *Citrobacter* and *Proteus* spp. appear yellow. Consult listed references for further biochemical and confirmatory tests required for identification.[1,2]

LIMITATIONS

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

Refer to the document "Limitations of Procedures and Warranty" on the Hardy Diagnostics Technical Document website for more information.

MATERIALS REQUIRED BUT NOT PROVIDED

Standard microbiological supplies and equipment such as loops, slides, staining supplies, other culture media (Cat. no. K246), microscopes, incinerators, and incubators, etc., as well as serological and biochemical reagents, 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	
Salmonella enterica ATCC® 14028**	J	18-24hr	30-35°C	Aerobic	Growth; red colonies with black centers
Shigella flexneri ATCC® 12022**	A	24hr	35°C	Aerobic	Growth; red to pink colonies
Enterococcus faecalis ATCC® 29212**	B	24hr	35°C	Aerobic	Partial to complete inhibition; small clear colonies
Escherichia coli ATCC® 25922**	B	24hr	35°C	Aerobic	Partial to complete inhibition; yellow to yellow-red colonies

* Refer to the document "Inoculation Procedures for Media QC" on the Hardy Diagnostics Technical Document website for more information.

** Tested in accordance with USP <62>.[2]

USER QUALITY CONTROL

End users of commercially prepared 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 documents on the Hardy Diagnostics Technical Document website for more information on QC: "Introduction to Quality Control" and "Finished Product Quality Control Procedures," or see reference(s) for more specific information.

PHYSICAL APPEARANCE

XLD Agar, USP should appear clear, and red in color, and may have a slight precipitate.

REFERENCES

1. The Official Compendia of Standards. *USP-NF*. United States Pharmacopeial Convention, Rockville, MD.

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

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Ordering Information

Distribution Centers:
California · Washington · Utah · Arizona · Texas · Ohio · New York · Florida · North Carolina

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