BD™ XLD Agar (Xylose-Lysine-Desoxycholate Agar)

INTENDED USE

BD XLD Agar (Xylose Lysine Desoxycholate Agar) is a moderately selective and differential medium for the isolation and differentiation of gram-negative enteric pathogens (*Salmonella* and *Shigella*) from clinical specimens. It is especially suitable for the isolation of *Shigella* species.

PRINCIPLES AND EXPLANATION OF THE PROCEDURE

Microbiological method.

XLD Agar was developed by Taylor in order to increase the efficiency of the isolation and identification of enteric pathogens, particularly *Shigella*.[1] The pathogens are differentiated not only from the nonpathogenic lactose fermenters but also from many nonpathogens which do not ferment lactose or sucrose. Additionally, the medium was formulated to improve growth of *Shigella*,[1] which in other formulations often failed to grow due to the inclusion of toxic inhibitors. The results obtained in a number of clinical evaluations have supported the claim for the relatively high efficiency of XLD Agar in the primary isolation of *Shigella* and *Salmonella*.[2-6] XLD Agar is one of the media used in the Microbial Limit Tests in the USP & EP. [9, 10]

XLD Agar is both a selective and differential medium. It contains yeast extract as a source of nutrients and vitamins. It utilizes sodium desoxycholate as the selective agent and, therefore, is inhibitory to gram-positive micro-organisms. Xylose is incorporated into the medium since it is fermented by practically all enterics except for the shigellae and this property enables the differentiation of *Shigella* species. Lysine is included to enable the *Salmonella* group to be differentiated from the non pathogens since without lysine, salmonellae rapidly would ferment the xylose and be indistinguishable from nonpathogenic species. After the salmonellae exhaust the supply of xylose, the lysine is attacked via 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 sucrose are added to produce acid in excess.[1]

To add to the differentiating ability of the formulation, an H_2S indicator system, consisting of sodium thiosulfate and ferric ammonium citrate, is included for the visualization of the hydrogen sulfide produced, resulting in the formation of colonies with black centers. The non pathogenic H_2S- producers do not decarboxylate lysine; therefore, the acid reaction produced by them prevents the blackening of the colonies which takes place only at neutral or alcaline pH.[1]

REAGENTS

BD XLD Agar

Formula* Per Liter Purified Water

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

pH 7.4 +/- 0.2

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

PRECAUTIONS

IVD . For professional use only.

Do not use plates if they show evidence of microbial contamination, discoloration, drying, cracking or other signs of deterioration.

Consult **GENERAL INSTRUCTIONS FOR USE** document for aseptic handling procedures, biohazards, and disposal of used product.

STORAGE AND SHELF LIFE

On receipt, store plates in the dark at 2 to 8° C, in their original sleeve wrapping until just prior to use. Avoid freezing and overheating. The plates may be inoculated up to the expiration date (see package label) and incubated for the recommended incubation times.

Plates from opened stacks of 10 plates can be used for one week when stored in a clean area at 2 to 8° C.

USER QUALITY CONTROL

Inoculate representative samples with the following strains (for details, see **GENERAL INSTRUCTIONS FOR USE** document). Incubate plates aerobically at 35 to 37° C for 18 to 24 hours.

Strains	Growth Results
Salmonella Typhimurium ATCC 14028	Growth good to excellent; colonies red with black centers
Salmonella Abony DSM 4224	Growth good to excellent; colonies red with black centers
Shigella flexneri ATCC 12022	Growth good to excellent; colonies red
Shigella sonnei ATCC 25931	Growth good to excellent; colonies red
Enterococcus faecalis ATCC 29212	Inhibition partial to complete
Escherichia coli ATCC 25922	Inhibition partial to complete; colonies yellow to yellow-red
Proteus mirabilis ATCC 12453	Growth; colonies rose with black centers, swarming inhibited
Uninoculated	Red

PROCEDURE

Materials Provided

BD XLD Agar (Xylose-Lysine-Desoxycholate Agar) (90 mm **Stacker™** plates). Microbiologically controlled.

Materials Not Provided

Ancillary culture media, reagents and laboratory equipment as required.

Specimen Types

This is a selective differential medium for the isolation of *Salmonella* and *Shigella* from stool specimens or rectal swabs of patients suspected to have a bacterial enteric infection or from non-clinical materials (see also **PERFORMANCE CHARACTERISTICS AND LIMITATIONS OF THE PROCEDURE**).

Test Procedure

Streak the specimen as soon as possible after it is received in the laboratory. The streak plate is used primarily to isolate pure cultures from specimens containing mixed flora. Alternatively, if material is being cultured directly from a swab, roll the swab over a small area of the surface at the edge; then streak from this inoculated area.

A less selective medium such as **BD MacConkey II Agar** should also be inoculated to increase the chance of recovery when the population of gram-negative organisms is low and to provide an indication of other organisms present in the specimen.

Incubate plates, protected from light, at 35 ± 2°C for a minimum of 18 to 24 h. Colonies on XLD Agar may require 48 h incubation for full color development.

XLD Agar may be used as a medium for subculturing from Selenite F Broth.

Results
Typical colonial morphology is as follows:

Organisms	BD XLD Agar (Xylose-Lysine-Desoxycholate Agar)
E. coli	Large, flat, yellow. Some strains may be inhibited.
Enterobacter/Klebsiella	Mucoid, yellow
Proteus	Red to yellow. Most strains have black centers.
Salmonella, H_2S-positive	Red-yellow with black centers
Shigella, Salmonella, H_2S-negative	Red
Pseudomonas	Red
Gram-positive bacteria	No growth to slight growth

PERFORMANCE CHARACTERISTICS AND LIMITATIONS OF THE PROCEDURE

BD XLD Agar is used for the isolation of *Salmonella* and/or *Shigella* from human stool specimens or rectal swabs. It is especially recommended for the isolation of *Shigella*.[7,8]
A single medium is only rarely able to recover all pathogens contained in a specimen. Therefore, other media for the isolation of *Salmonella* and/or *Shigella* and possibly for other enteric pathogens must be inoculated with the specimen.
Certain *Shigella* strains may need a 42 to 48 h incubation.
Although certain diagnostic tests may be performed directly on this medium, biochemical and, if indicated, immunological testing using pure cultures is necessary for complete identification. Consult appropriate references. [3,4,7]

REFERENCES

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PACKAGING/AVAILABILITY

BD™ XLD Agar

Cat. No. 254055	Ready-to-use Plated Media, cpu 20
Cat. No. 254090	Ready-to-use Plated Media, cpu 120

FURTHER INFORMATION

For further information please contact your local BD representative.

Becton Dickinson GmbH
Tullastrasse 8 – 12
D-69126 Heidelberg/Germany
Phone: +49-62 21-30 50 Fax: +49-62 21-30 52 16
Reception_Germany@europe.bd.com

http://www.bd.com
http://www.bd.com/europe/regulatory/

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