Xylose Lysine Deoxycholate (XLD) Agar
SKU: 700003040, 700003041, 700003042, 700003043, 700004399
NCM0027

Intended Use
Xylose Lysine Deoxycholate Agar is used for the isolation and differentiation of enteric pathogens. Conforms to Harmonized USP/EP/JP Requirements. XLD Agar is not intended for use in the diagnosis of disease or other conditions in humans.

Description
A medium recommended by the Harmonized Pharmacopeia for isolation and identification of *Salmonella* from non-sterile products. Conforms to USP/EP/JP performance specification. Originally formulated by Taylor to differentiate enteric pathogens, the agar is widely used as the preferred differential medium for *Salmonella spp.* The medium is void of peptones but instead uses yeast extract as a carbon, nitrogen and vitamin source and xylose, lactose and sucrose are fermentable carbohydrates. *Salmonella* are able to ferment xylose to produce acid but not lactose or sucrose. When the xylose is exhausted *Salmonella* will decarboxylate lysine shifting the pH back to neutral. At near neutral pH, *Salmonella* can reduce sodium thiosulfate producing hydrogen sulfide which creates a complex with ferric ammonium citrate to produce black or black centered colonies. Other organisms can decarboxylate lysine but acid production from the fermentation of lactose and sucrose keeps the pH too acidic for H_2S production. Selectivity is achieved through the incorporation of sodium deoxycholate and phenol red acts as a pH indicator. According to the Harmonized Pharmacopeia, Rappaport Vassiliadis Salmonella Enrichment Broth (400000807) is used as a selective enrichment broth, with subculture performed onto Xylose Lysine Deoxycholate (XLD) agar.

Typical Formulation

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

pH: 7.4 ± 0.2 at 25°C
Formula is adjusted and/or supplemented as required to meet performance specifications.

Precaution
Refer to SDS

Preparation
1. Suspend 55 grams of the medium in one liter of purified water.
2. Heat with frequent agitation until the medium reaches the boiling point. Once boiling has been reached remove from the heat immediately.
3. AVOID OVERHEATING. DO NOT AUTOCLAVE
4. Cool to 45-50°C.

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5. Pour into plates as soon as the medium has cooled.
6. Protracted boiling or prolonged holding at elevated temperature induces precipitation.
   Note: It is advisable to not prepare large volumes which will require prolonged heating.

Test Procedure

Selective enrichment broths, such as Rappaport Vassiliadis Salmonella Enrichment Broth, NCM0103 or 400000807 (for USP/EP/JP method) or Tetrathionate Broth (400000799), may be used prior to streaking. For specific procedures refer to appropriate references.

Quality Control Specifications

Dehydrated Appearance: Powder is homogeneous, free flowing, and light beige to slight pink.

Prepared Appearance: Prepared medium is red, clear with no precipitate.

Expected Cultural Response: Cultural response on XLD Agar incubated at Harmonized USP/EP/JP specified temperatures and incubation times.

MICROORGANISM	CULTURE ID	APPROX. INOCULUM (CFU)	EXPECTED RESULTS		ACTUAL RESULTS	
			Growth	Reaction	Growth	Reaction
Enterococcus faecalis	ATCC 29212	>10^3	Complete inhibition	---	Meets Expected Result	
Escherichia coli	ATCC 8739	>10^3	Partial to complete inhibition	Yellow to yellow-red colonies	Meets Expected Result	
Escherichia coli	ATCC 25922	>10^3	Partial to complete inhibition	Yellow to yellow-red colonies	Meets Expected Result	
Salmonella typhimurium	ATCC 14028	10-100	10-100	Red colonies w/ black centers	Meets Expected Result	
Shigella sonnei	NCTC 8574	10-100	10-100	Red colonies	Meets Expected Result	
Salmonella enteritidis	ATCC 13076	10-100	10-100	Red colonies w/ black centers	Meets Expected Result	
Salmonella abony	NCTC 6017	10-100	10-100	Red colonies w/ black centers	Meets Expected Result	

The organisms listed are the minimum that should be used for quality control testing.

Results

Degradation of xylose, lactose, and sucrose generates acid products, causing a color change in the colonies and in the medium from red to yellow.

Hydrogen sulfide production under alkaline conditions results in colonies with black centers. This reaction is inhibited by the acid conditions that accompany carbohydrate fermentation.

Lysine decarboxylation, in the absence of lactose and sucrose fermentation, results in a reversion to an alkaline condition. This alkaline condition causes the color of the medium to change back to red.

Expiration

Refer to expiration stamped on the container. The dehydrated medium should be discarded if not free flowing, or if the appearance has changed from the original color expiry applies to medium in its intact container when store as directed

Limitations of the Procedure

1. Some strains may be encountered that grow poorly or fail to grow on this medium.
2. Red, false-positive colonies may occur with *Proteus* and *Pseudomonas*.
3. Incubation in excess of 48 hours may lead to false-positive results.

Storage

Store dehydrated culture media at 2-30°C away from direct sunlight. Once opened and recapped, place container in a low humidity environment at the same storage temperature. Protect from moisture and light by keeping container tightly closed.

References

1. Taylor, W. I. 1965. Isolation of shigellae. I. Xylose lysine agars: new media for isolation of enteric pathogens. Am. J. Clin. Pathol. 44 (4):471-475.
2. European Pharmacopoeia 10th Edition (2020)
3. United States Pharmacopeia National Formulary 2018: USP 41 NF 36
4. Japanese Pharmacopeia 17th Edition (2017)

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