PRODUCT SPECIFICATION SHEET

Xylose-Lysine-Deoxycholate Agar (XLD Agar) (DM297)

Intended Use
Xylose-Lysine-Deoxycholate Agar (DM297) is recommended for selective isolation and enumeration of Salmonella typhi and other Salmonella species.

Product Summary and Explanation
Xylose-Lysine-Deoxycholate Agar was originally formulated by Taylor[(1)] for the isolation and identification of shigellae from stool specimens. It has since been found to be a satisfactory medium for the isolation and presumptive identification of both salmonellae and shigellae[(2)] It relies on xylose fermentation, lysine decarboxylation and production of hydrogen sulphide for the primary differentiation of shigellae and salmonellae from non-pathogenic bacteria. The pathogens are differentiated not only from the nonpathogenic lactose fermenters but also from many non-pathogens which do not ferment lactose or sucrose. Additionally, the medium was formulated to increase the frequency of growth of the more fastidious pathogens[(3)] which in other formulations have often failed to grow due to the inclusion of excessively toxic inhibitors. Rapid xylose fermentation is almost universal amongst enteric bacteria, except for members of the Shigella, Providencia and Edwardsiella genera1. Xylose is thus included in the medium so that Shigella spp. maybe identified by a negative reaction. XLD Agar is both selective and differential medium. It utilizes sodium deoxycholate as the selective agent and therefore it is inhibitory to gram-positive microorganisms. Some *Proteus* strains may give red to yellow colouration with most colonies developing black centers, giving rise to false positive reactions. Non-enterics like *Pseudomonas* and *Providencia* may exhibit red colonies. *S. Paratyphi A* , *S. Choleraesuis* , *S. Pullorum* and *S. Gallinarum* may form red colonies without H_2S, thus resembling *Shigella* species. [(19)]

Principles of the Procedure
Yeast Extract provides sources of nitrogen, carbon, and vitamins required for organism growth. Xylose, Lactose, and Sucrose, provides sources of fermentable carbohydrate. Xylose is fermented by most enteric organisms except *Shigella* spp. and *Providencia* spp. Lysine is added to differentiate *Salmonella*. As Xylose is exhausted, *Salmonella* spp organisms decarboxylate lysine causing a reversion to alkaline conditions. Alkaline reversion by other lysine-positive organisms is prevented by excess acid production from fermentation of lactose and sucrose. Sodium Thiosulfate and Ferric Ammonium Citrate act as selective agents, allowing visualization of hydrogen sulfide production under alkaline conditions. Sodium Deoxycholate is also a selective agent. Phenol Red is an indicator. Sodium Chloride maintains the osmotic balance in the medium. Agar is the solidifying agent.

Formula / Liter

Ingredients	Gms / Liter
Xylose	3.50
L-Lysine	5.00
Lactose monohydrate	7.50
Sucrose	7.50
Sodium chloride	5.00
Yeast extract	3.00
Phenol red	0.08
Sodium deoxycholate	2.50
Sodium thiosulphate	6.80
Ferric ammonium citrate	0.80
Agar	15.00
Final pH: 7.4 ± 0.2 at 25°C	
Formula may be adjusted and/or supplemented as required to meet performance specifications	

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Precautions

1. For Laboratory Use only.
2. IRRITANT. Irritating to eyes, respiratory system, and skin.

Directions

1. Suspend 56.68 g of the medium in one liter of purified water.
2. Heat with frequent agitation until the medium reaches the boiling point.
3. AVOID OVERHEATING. DO NOT AUTOCLAVE.

Quality Control Specifications

Dehydrated Appearance	Light yellow to pink homogeneous free flowing powder
Prepared Medium	Red coloured clear to slightly opalescent gel forms in Petri plates
Reaction of 1.35% Solution	pH : 7.4 ± 0.2 at 25°C
Gel Strength	Firm, comparable with 1.35 % Agar gel

Expected Cultural Response: Cultural characteristics observed after an incubation at 35 - 37°C for 18 - 48 hours.

Sr. No.	Organisms	Results to be achieved					
		Inoculum (CFU)	Growth	Observed Lot value(CFU)	Recovery	Colour of Colony	Incubation period
1.	*Salmonella Typhimurium ATCC 14028*	50 -100	Luxuriant	25 -100	>=50 %	Red with black centres	18 -72 hrs
2.	*Salmonella Abony NCTC 6017*	50 -100	Good-luxuriant	25 -100	>=50 %	Red with black centres	18 -72 hrs
3.	*Escherichia coli ATCC 8739*	50-100	Fair	10 -30	20 -30 %	Yellow	18 -72 hrs
4.	*Escherichia coli ATCC 25922*	50-100	Fair	10 -30	20 -30 %	Yellow	18 -72 hrs
5.	*Escherichia coli NCTC 9002*	50-100	Fair	10 -30	20 -30 %	Yellow	18 -72 hrs
6.	*Proteus vulgaris ATCC 13315*	50 -100	Good-luxuriant	25 -100	>=50 %	Grey with black centres	18 -72 hrs
7.	*Salmonella Paratyphi A ATCC 9150*	50 -100	Good-luxuriant	25 -100	>=50 %	Red	18 -72 hrs
8.	*Salmonella Paratyphi B ATCC 8759*	50 -100	Good-luxuriant	25 -100	>=50 %	Red with black centers	18 -72 hrs
9.	*Salmonella Enteritidis ATCC 13076*	50 -100	Good-luxuriant	25 -100	>=50 %	Red with black centers	18 -72 hrs
10.	*Salmonella Typhi ATCC 6539*	50 -100	Good-luxuriant	25 -100	>=50 %	Red with black centers	18 -72 hrs
11.	*Shigella dysenteriae ATCC 13313*	50 -100	Good-luxuriant	25 -100	>=50 %	Red	18 -72 hrs
12.	*Shigella flexneri ATCC 12002*	50 -100	Fair-good	15 -40	30 -40 %	Red	18 -72 hrs
13.	*Shigella sonnei*	50 -100	Fair-good	15 -40	30 -40 %	Red	18 -72 hrs

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	ATCC 25931						
14.	*Enterobacter aerogenes ATCC 13048*	50 -100	Fair	10 -30	20 -30 %	Yellow	18 -72 hrs
15.	*Enterobacter cloacae ATCC 13047*	50 -100	Fair	10 -30	20 -30 %	Yellow	18 -72 hrs
16.	*Staphylococcus aureus ATCC 25923*	>=10^3	Inhibited	0	0%	--	>=72 hrs
17.	*Staphylococcus aureus ATCC 6538*	>=10^3	Inhibited	0	0%	--	>=72 hrs
18.	*Enterococcus faecalis ATCC 29212*	>=10^3	Inhibited	0	0%	--	>=72 hrs

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

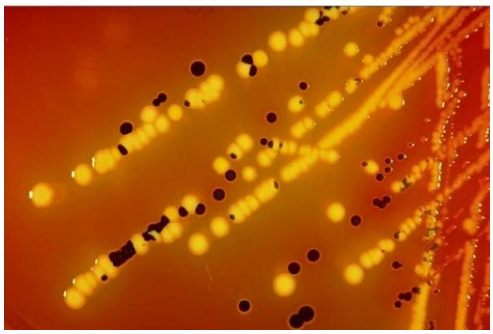
Test Procedure

Faeces or rectal swabs may be plated directly[4]or selective enrichment broths may be used prior to streaking out. Selenite Broth (DM241) or Tetrathionate Broth (DM260) may be used for salmonella enrichment.

1. Inoculate the poured, dried plates with a loopful of inoculum either from a suitable enrichment broth, from stool samples or rectal swabs.
2. Incubate the plates at 35 ± 37°C for 18 to 24 hours.

Results

Degradation of xylose, lactose and sucrose generates acid products, causing a color change in the medium from red to yellow. Hydrogen sulfide production under alkaline conditions causes colonies to develop black centers. This reaction is inhibited by the acid conditions that accompany carbohydrate fermentation. Lysine decarboxylation in the absence of lactose and sucrose fermentation causes reversion to an alkaline condition and the color of the medium changes back to red.



XLD Agar (DM297)
Escherichia coli ATCC 25922 (yellow colonies)
Salmonella typhi ATCC 6539 (black colonies)

Storage

Store the sealed bottle containing the dehydrated medium at 10 - 30°C. Once opened and recapped, place container in a low humidity environment at the same storage temperature. Protect from moisture and light.

Expiration

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Refer to the expiration date 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 stored as directed.

Limitations of the Procedure

1. Red, false-positive colonies may occur with some *Proteus* and *Pseudomonas* species.
2. Incubation in excess of 48 hours may lead to false-positive results.
3. *S.* Paratyphi *A, S.* Choleraesuis*, S. pullorum* and *S. gallinarum* may form red colonies without black centers, thus resembling *Shigella* species.
4. Some *Proteus* strains will give black-centered colonies on XLD Agar.

Packaging
Product Name : XLD Agar
Product Code : DM297
Available Pack sizes : 100gm / 500gm

References

1. Taylor W.I. (1965) Am. J. Clin. Path. 44. 471-475.
2. McCarthy M.D. (1966) N.Z. J. Med. Lab. Technol. 20. 127-131.
3. Taylor. 1965. Am. J. Clin. Pathol. *44*:471.
4. Weissman J.B., Gangarosa E.J., Schmerler A., Marier R.L. and Lewis J.N. (1975) Lancet I. 1898, 88-90.
5. MacFaddin J. F., 1985, Media for Isolation-Cultivation-Identification-Maintenance of Medical Bacteria, Vol. 1, Williams and Wilkins, Baltimore.

Further Information

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