Technical Information

Xylose-Lysine Deoxycholate Agar (XLD Agar)

Product Code: DM 1031

Application: Xylose-Lysine Deoxycholate Agar (XLD Agar) is a selective medium recommended for the isolation and enumeration of *Salmonella Typhi* and other *Salmonella* species.

Composition**

Ingredients	Gms / Litre
Yeast extract	3.000
L-Lysine	5.000
Lactose	7.500
Sucrose	7.500
Xylose	3.500
Sodium chloride	5.000
Sodium deoxycholate	2.500
Sodium thiosulphate	6.800
Ferric ammonium citrate	0.800
Phenol red	0.080
Agar	15.000
Final pH (at 25°C)	7.4±0.2

**Formula adjusted, standardized to suit performance parameters

Principle & Interpretation

XLD Agar was formulated by Taylor [1-5] for the isolation and differentiation of enteric pathogens including *Salmonella Typhi* from other *Salmonella* species.

XLD Agar has been recommended for the identification of in members of *Enterobacteriaceae* [7] and for the microbiological testing of foods, water and dairy products [8-12]. XLD Agar is highly selectivity and sensitivity as compared to other plating media e.g. SS Agar (DM1108), EMB Agar (DM1022) and Bismuth Sulphite Agar (DM1027) [2, 4, 6, and 13-16]. The media formulation prevents the overgrowth of other organisms over *Salmonella* and *Shigella* [17]. Samples suspected of containing enteric pathogens, along with other mixed flora, are initially enriched in Modified Semisolid RV Medium Base (DM2482) [18].

The medium contains yeast extract, which provides nitrogen and vitamins required for growth. Though the sugars xylose, lactose and sucrose provide sources of fermentable carbohydrates, xylose is mainly incorporated into the medium since it is fermented by all enteric except Shigella. This helps in the differentiation of *Shigella* species. Sodium chloride maintains the osmotic balance of the medium. Lysine is included to differentiate the *Salmonella* group from the non-pathogens. *Salmonellae* rapidly ferment xylose and exhaust the supply. Subsequently lysine is decarboxylated by the enzyme lysine decarboxylase to form amines with reversion to an alkaline pH that mimics the *Shigella* reaction. However, to prevent this reaction by lysine-positive coliforms, lactose and sucrose are added to produce acid in excess. Degradation of xylose, lactose and sucrose to acid causes phenol red indicator to change its colour to yellow. Bacteria that decarboxylate lysine to cadaverine can be recognized by the appearance of a red colouration around the colonies due to an increase in pH. These reactions can proceed simultaneously or successively, and this may cause the pH indicator to exhibit various shades of colour or it may change its colour from yellow to red on prolonged incubation. To add to the differentiating ability of the formulation, an H2S indicator system, consisting of sodium thiosulphate and ferric ammonium citrate, is included for the visualization of hydrogen sulphide produced, resulting in the formation of colonies with Suspend 56.68 grams in 1000 ml distilled water. Heat with frequent agitation until the medium boils. DO NOT AUTOCLAVE OR OVERHEAT. Transfer immediately to a water bath at 50°C. After cooling, pour into sterile Petri plates. It is advisable not to prepare large volumes that will require prolonged heating black centers. The non-pathogenic H2S producers do not decarboxylase lysine; therefore, the acid reaction produced by them prevents the blackening of the colonies (1). 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].

Methodology

Suspend 56.68 grams of powder media in 1000 ml distilled water. Shake well & heat with frequent agitation until the medium boils. DO NOT AUTOCLAVE OR OVERHEAT. Transfer immediately to a water bath at 50°C. After cooling, pour into sterile Petri plates. It is advisable not to prepare large volumes that will require prolonged heating.

Quality Control

Physical Appearance
Light yellow to pink homogeneous free flowing powder

Gelling
Firm, comparable with 1.5% Agar gel

Colour and Clarity of prepared medium
Red coloured clear to slightly opalescent gel forms in Petri plates

Reaction
Reaction of 5.67% w/v aqueous solution at 25°C . pH : 7.4±0.2

pH range 7.20-7.60

Cultural Response/Characteristics
DM 1031: Cultural response was observed after an incubation at 35-37°C for specified time. Recovery rate is considered as 100% for bacteria growth on Soyabean Casein Digest Agar.

Organism	Inoculum (CFU)	Growth	Observed Lot value (CFU)	Recovery	Colour of Colony	Incubation temperature
Salmonella Typhimurium ATCC 14028	50-100	Luxuriant	25-100	>=50%	Red with black centres	18-72 hrs
Salmonella Abony NCTC 6017	50-100	Good-Luxuriant	25-100	>=50%	Red with black centres	18-72 hrs
Escherichia coli ATCC 8739	50-100	Fair	10-30	20-30%	Yellow	18-72 hrs
Escherichia coli ATCC25922	50-100	Fair	10-30	20-30%	Yellow	18-72 hrs
Escherichia coli NCTC 9002	50-100	Fair	10-30	20-30%	Yellow	18-72 hrs
Proteus vulgaris ATCC 13315	50-100	Good-Luxuriant	25-100	>=50%	Grey with black centres	18-72 hrs
Salmonella Paratyphi A ATCC 9150	50-100	Good-Luxuriant	25-100	>=50%	Red	18-72 hrs
Salmonella Paratyphi B ATCC 8759	50-100	Good-Luxuriant	25-100	>=50%	Red with black centers	18-72 hrs
Salmonella Enteritidis ATCC 13076	50-100	Good-Luxuriant	25-100	>=50%	Red with black centers	18-72 hrs
Salmonella Typhi ATCC 6539	50-100	Good-Luxuriant	25-100	>=50%	Red with black centers	18-72 hrs
Shigella dysenteriae ATCC 13313	50-100	Good-Luxuriant	25-100	>=50%	Red	18-72 hrs
Shigella flexneri ATCC 12002	50-100	Fair-good	15-40	30-40%	Red	18-72 hrs
Shigella sonnei ATCC 25931	50-100	Fair-good	15-40	30-40%	Red	18-72 hrs
Enterobacter aerogenes ATCC 13048	50-100	Fair	10-30	20-30%	Yellow	18-72 hrs

Storage and Shelf Life

Dried Media: Store below 30°C in tightly closed container and use before expiry date as mentioned on the label.
Prepared Media: 2-8^0 in sealable plastic bags for 2-5 days.

Further Reading

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