

Xylose Lysine Deoxycholate (XLD) Agar (ISO) (NCM0021)

Intended Use

Xylose Lysine Deoxycholate (XLD) Agar (ISO) is a selective agar for the detection of *Salmonella* spp. in food, animal feed and in environmental samples from the food production area as described in ISO 6579-1:2017. Xylose Lysine Deoxycholate (XLD) Agar (ISO) is not intended for use in the diagnosis of disease or other conditions in humans.

Description

A selective, diagnostic agar for the detection of *Salmonella* spp. in food, animal feed and in environmental samples from the food production area as described in ISO 6579-1:2017. 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 centred colonies. Other organisms are able decarboxylate lysine but acid production from the fermentation of lactose and sucrose keeps the pH too acidic for H₂S production. Selectivity is achieved through the incorporation of sodium deoxycholate and phenol red acts as a pH indicator. According to ISO 6579-1:2017, subculture is performed separately from both Rappaport-Vassiliadis medium with Soya (RVS) and Muller-Kauffmann tetrathionate-novobiocin (MKTn) broth. This medium conforms to the performance and formulation requirements of ISO 6579-1:2017.

Typical Formulation

Yeast Extract	3.0 g/L
Sodium Chloride	5.0 g/L
Xylose	3.75 g/L
Lactose	7.5 g/L
Sucrose	7.5 g/L
L-Lysine Hydrochloride	5.0 g/L
Sodium Thiosulfate	6.8 g/L
Ferric Ammonium Citrate	0.8 g/L
Phenol Red	0.08 g/L
Sodium Deoxycholate	1.0 g/L
Agar	13.0 g/L

pH: 7.4 ± 0.2 at 25°C

Formula may be adjusted and/or supplemented as required to meet performance specifications.

Precaution

Refer to SDS

Preparation

1. Suspend 53.5 grams of the medium in one liter of purified water.
2. Bring rapidly to the boil with frequent stirring, and immediately transfer to a 45-50°C water bath. DO NOT OVERHEAT.
3. Pour into plates as soon as the medium has cooled.
4. Protracted boiling or prolonged holding at elevated temperature induces precipitation.

Technical Specification Sheet



Test Procedure

- For detection and enumeration and Serotyping of Salmonella - Refer to ISO 6579-1:2017
- For detection of *Salmonella* spp. (Water Quality) - Refer to ISO 19250:2010

Quality Control Specifications

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

Prepared Appearance: Prepared medium is bright red to red-orange, trace to slightly hazy.

Expected Cultural Response: Cultural response at $37 \pm 1^\circ\text{C}$ after 24 ± 3 hours incubation.

Microorganism	Approx. Inoculum (CFU)	Expected Results	
		Recovery	Reaction
<i>Enterococcus faecalis</i> ATCC® 19433	$>10^4$	Complete inhibition	N/A
<i>Enterococcus faecalis</i> ATCC® 29212	$>10^4$	Complete inhibition	N/A
<i>Escherichia coli</i> ATCC® 25922	$>10^4$	Growth or partial inhibition	Yellow colonies if recovered
<i>Escherichia coli</i> ATCC® 8739	$>10^4$	Growth or partial inhibition	Yellow colonies if recovered
<i>Salmonella enteritidis</i> ATCC® 13076	50-200	$\geq 50\%$	Red colonies with black center
<i>Salmonella typhimurium</i> ATCC® 14028	50-200	$\geq 70\%$	Red colonies with black center

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

Results

Fermentation of xylose, lactose, and sucrose generates acid, resulting in 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 pH. This alkaline pH causes the color of the medium to change back to red.

Expiration

The dehydrated medium should be discarded if it is 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 *Proteus* and *Pseudomonas*.
2. Incubation in excess of 48 hours may lead to false-positive results.

Storage

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



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References

1. ISO 6579-1:2017 Microbiology of the food chain— Horizontal method for the detection, enumeration and serotyping of *Salmonella*. Part 1: Detection of *Salmonella* spp.
2. 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.

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