

# XLD (Xylose Lysine Deoxycholate) Agar

Medium proposed by TAYLOR (1965), TAYLOR and HARRIS (1965, 1967) and TAYLOR and SCHELHART (1967) for the isolation and differentiation of pathogenic Enterobacteriaceae, especially of *Shigella* and *Salmonella* species.

AOAC  
BAM  
COMPF  
EP  
SMD  
SMWW  
USP

This culture medium complies with the recommendations of the ISO 6579.

## Mode of Action

Degradation of xylose, lactose and sucrose to acid causes phenol red to change its colour to yellow. Production of hydrogen sulfide is indicated by thiosulfate and iron(III) salt, which react to form a precipitate of black iron sulfide in the colonies. Bacteria which decarboxylate lysine to cadaverine can be recognized by the appearance of a purple colouration around the colonies due to an increase in pH.

These reactions can proceed simultaneously or successively, 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. The culture medium is weakly inhibitory.

## Typical Composition (g/litre)

Yeast extract 3.0; sodium chloride 5.0; D(+)xylose 3.75; lactose 7.5; sucrose 7.5; L(+)lysine 5.0; sodium deoxycholate 1.0; sodium thiosulfate 6.8; ammonium iron(III) citrate 0.8; phenol red 0.08; agar-agar 14.5.

## Preparation

1. Weigh out 55 g of XLD Agar.
2. Add 50 ml of demin. water to a flask
3. Transfer 55 g of XLD Agar gently to flask with swirling.
4. Mix thoroughly, add remaining 950 ml demin. water, until completely suspended. Check for lumps. If present repeat mixing.
5. Heat to boiling to dissolve completely.
6. Immediately cool the medium to about 47-50 °C in a waterbath set at this temperature. Agitate flask to cool rapidly.
7. Pour plates.
8. Dry plates and check for sterility prior to use.

**Note:** preparation of large volumes, overheating and prolonged storage in water bath (47-50 °C) should be avoided.

■ **Do not autoclave.**

pH: 7.4 ± 0.2 at 25 °C.

The plates are clear and red.

Crystalline precipitate of salts may occur. To avoid this, the liquid medium needs to be filtered through a flute-formed filter.

## Experimental Procedure and Evaluation

Inoculate by spreading the material thinly on the surface of the plates.

Incubation: up to 48 hours at 35 °C aerobically.

Further tests should be performed in order to identify the colonies.

Appearance of Colonies	Microorganisms
Yellow, surrounded by yellow zones, opaque with precipitation zones	<i>Escherichia coli</i> , <i>Enterobacter</i> , <i>Aeromonas</i>
Yellow, surrounded by yellow zones, opaque, mucoid with precipitation zones	<i>Klebsiella</i>
Yellow, surrounded by yellow zones, opaque, sometimes with a black centre	<i>Citrobacter</i> (lactose-positive strains)
Yellow, surrounded by yellow zones, opaque,	<i>Serratia</i> , <i>Hafnia</i>
Yellow, surrounded by yellow zones, translucent, black centre	<i>Proteus vulgaris</i> , most <i>Proteus mirabilis</i>
Colonies have the same colour as the culture medium, translucent, sometimes with a black centre	<i>Salmonella</i>
Colonies have the same colour as the culture medium, translucent	<i>Shigella</i> , <i>Providencia</i> , <i>Pseudomonas</i>
Orange, slightly opaque	<i>Salmonella typhosa</i> (xylose-positive strains)

## Literature

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United States Pharmacopeia XXVI, Chapter "Microbial Limit Tests", 2003

# XLD (Xylose Lysine Deoxycholate) Agar

## Ordering Information

Product	Merck Cat. No.	Pack size
XLD (Xylose Lysine Deoxycholate) Agar	1.05287.0500	500 g

## Quality control (spiral plating method)

Test strains	Inoculum (cfu/ml)	Recovery rate %	Colony colour	Black centre	Colour change of medium
<i>Escherichia coli</i> ATCC 25922	$> 10^5$	none to poor	yellow	-	yellow + precipitate
<i>Enterobacter cloacae</i> ATCC 13047	$10^3$ - $10^5$	$\geq 30$	yellow	-	yellow + precipitate
<i>Klebsiella pneumoniae</i> ATCC 13883	$10^3$ - $10^5$	$\geq 30$	yellow	-	yellow + precipitate
<i>Shigella flexneri</i> ATCC 12022	$10^3$ - $10^5$	$\geq 10$	colourless	-	
<i>Shigella sonnei</i> ATCC 11060	$10^3$ - $10^5$	$\geq 10$	colourless	-	
<i>Salmonella typhimurium</i> ATCC 14028	$10^3$ - $10^5$	$\geq 30$	colourless	+	-
<i>Salmonella enteritidis</i> NCTC 5188	$10^3$ - $10^5$	$\geq 30$	colourless	+	-
<i>Proteus mirabilis</i> ATCC 14273	$10^3$ - $10^5$	$\geq 30$	yellow	+	yellow / orange
<i>Enterococcus faecalis</i> ATCC 11700	$> 10^5$	none		-	



*Klebsiella pneumoniae*  
ATCC 13883



*Salmonella enteritidis*  
NCTC 5188