# XLD AGAR (7166)

## Intended Use

**XLD Agar** is used for the isolation and differentiation of enteric pathogens. Conforms to Harmonized USP/EP/JP Requirements.[1,2,3]

## Product Summary and Explanation

XL (Xylose Lysine) Agar Base was developed by Taylor[4] for isolating and differentiating Gram-negative enteric bacilli. XL Agar Base was supplemented with sodium thiosulfate, ferric ammonium citrate, and sodium deoxycholate to develop a more selective medium, XLD Agar.

XLD Agar was developed principally for isolating *Shigella* spp. and *Providencia* spp., and shown to be an effective differential media.[5-7]

## Principles of the Procedure

Yeast Extract provides sources of nitrogen, carbon, and vitamins required for organism growth. Xylose, Lactose, and Sucrose, provide 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

| | |
|---|---|
| Yeast Extract | 3 g |
| Lactose | 7.5 g |
| Sucrose | 7.5 g |
| Xylose | 3.5 g |
| L-Lysine | 5 g |
| Ferric Ammonium Citrate | 0.8 g |
| Phenol Red | 0.08 g |
| Sodium Chloride | 5 g |
| Sodium Deoxycholate | 2.5 g |
| Sodium Thiosulfate | 6.8 g |
| Agar | 13.5 g |

Final pH: 7.4 ± 0.2 at 25°C

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

## Precautions

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

## Directions

1. Suspend 55 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:** Powder is homogeneous, free flowing, and light pink-beige.

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

**Expected Cultural Response:** Cultural response on XLD Agar incubated at Harmonized USP/EP/JP specified temperatures and incubation times.[1,2,3]

| Microorganism | Approx. Inoculum (CFU) | Expected Results | |
|---|---|---|---|
| | | Growth | Reaction |
| *Enterococcus faecalis* ATCC® 29212 | $10^3$ | Partial to complete inhibition | Red colonies (where recovered) |
| *Escherichia coli* ATCC® 8739 | $10^3$ | Partial to complete inhibition | Yellow to yellow-red colonies |
| *Escherichia coli* ATCC® 25922 | $10^3$ | Partial to complete inhibition | Yellow to yellow-red colonies |
| *Salmonella typhimurium* ATCC® 14028 | 10 - 100 | Good to excellent | Red colonies w/ black centers |
| *Shigella flexneri* ATCC® 12022 | 10 - 100 | Poor to good | Red colonies |

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

## Test Procedure

Stool specimens or rectal swabs may be plated directly. Selective enrichment broths, such as Selenite Broth or Tetrathionate Broth, may be use prior to streaking.[8,9] For specific procedures refer to appropriate references.

## 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.

## Storage

Store sealed bottle containing the dehydrated medium at 2 - 30°C. Once opened and recapped, place the container in a low humidity environment at the same storage temperature. Protect from moisture and light.

## Expiration

Refer to expiration date on the container. 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.

## 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.

## Packaging

| | | | |
|---|---|---|---|
| **XLD Agar** | **Code No.** | **7166A** | **500 g** |
| | | **7166B** | **2 kg** |
| | | **7166C** | **10 kg** |

## References


1. **United States Pharmacopeial Convention.** 2007. The United States pharmacopeia, 31st ed., Amended Chapters 61, 62, 111. The United States Pharmacopeial Convention, Rockville, MD.
2. **Directorate for the Quality of Medicines of the Council of Europe (EDQM).** 2007. The European Pharmacopoeia, Amended Chapters 2.6.12, 2.6.13, 5.1.4, Council of Europe, 67075 Strasbourg Cedex, France.
3. **Japanese Pharmacopoeia.** 2007. Society of Japanese Pharmacopoeia. Amended Chapters 35.1, 35.2, 7. The Minister of Health, Labor, and Welfare.

4. **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.
5. **Rollender, W., O. Beckford, R. D. Belsky, and B. Kostroff.** 1969. Comparision of xylose lysine deoxycholate agar and MacConkey agar for the isolation of Salmonella and Shigella from clinical specimens. Tech. Bull. Reg. Med. Tech. **39**(1):8-10.
6. **Pollock, H. M., and B. J. Dahlgren.** 1974. Clinical evaluation of enteric media in the primary isolation of Salmonella and Shigella. Appl Microbiol. **27**(1):197-201.
7. **Bhat, P., and D. Rajan.** 1975. Comparative evaluation of desoxycholate citrate medium and xylose lysine desoxycholate medium in the isolation of shigellae. Am. J. Clin. Pathol. **64**:399-404.
8. **P. R. Murray, E. J. Baron, M. A. Pfaller, F. C. Tenover, and R. H. Yolken (eds.).** Manual of clinical microbiology, 6th ed. American Society for Microbiology, Washington, D. C.
9. **Isenberg, H. D. (ed.).** 1992. Interpretation of aerobic bacterial growth on primary culture media, Clinical microbiology procedures handbook, vol. 1 p. 1.61-1.67. American Society for Microbiology, Washington, D.C.

## Technical Information

Contact Acumedia Manufacturers, Inc. for Technical Service or questions involving dehydrated culture media preparation or performance at (517)372-9200 or fax us at (517)372-2006.

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