Xylose-Lysine Deoxycholate HiVeg™ Agar (XLD HiVeg™ Agar) MV031

Intended use
Recommended for selective isolation and enumeration of *Salmonella Typhi* and other *Salmonella* species.

Composition**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Gms / Litre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yeast extract</td>
<td>4.000</td>
</tr>
<tr>
<td>L-Lysine</td>
<td>5.000</td>
</tr>
<tr>
<td>Lactose</td>
<td>7.500</td>
</tr>
<tr>
<td>Saccharose (Sucrose)</td>
<td>7.500</td>
</tr>
<tr>
<td>Xylose</td>
<td>3.500</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>5.000</td>
</tr>
<tr>
<td>Synthetic detergent No. III</td>
<td>1.500</td>
</tr>
<tr>
<td>Sodium thiosulphate</td>
<td>6.800</td>
</tr>
<tr>
<td>Ferric ammonium citrate</td>
<td>0.800</td>
</tr>
<tr>
<td>Phenol red</td>
<td>0.080</td>
</tr>
<tr>
<td>Agar</td>
<td>15.000</td>
</tr>
<tr>
<td>Final pH (at 25°C)</td>
<td>7.4±0.2</td>
</tr>
</tbody>
</table>

**Formula adjusted, standardized to suit performance parameters

Directions
Suspend 56.68 grams in 1000 ml purified/distilled water. Heat with frequent agitation until the medium boils. DO NOT AUTOCLAVE OR OVERHEAT. Transfer immediately to a water bath at 45-50°C. After cooling, mix well and pour into sterile Petri plates. It is advisable not to prepare large volumes which will require prolonged heating.

Note: Slight precipitation in the medium may occur, which is inherent property of the medium, and does not affect the performance of the medium.

Principle And Interpretation
XLD HiVeg™ Agar has been recommended for the identification of *Enterobacteriaceae* (3) and for the microbiological testing. XLD Agar was formulated by Taylor (13-17) for the isolation and differentiation of enteric pathogens including *Salmonella Typhi* from other *Salmonella* species of foods, water and dairy products (2,12,20,21). XLD HiVeg™ Agar exhibits increased selectivity and sensitivity as compared to other plating media e.g. SS HiVeg™ Agar (MV108), EMB HiVeg™ Agar (MV022) and Bismuth Sulphite HiVeg™ Agar (MV027) (14,16,18, and 4,9,11,19). The media formulation does not allow the overgrowth of other organisms over *Salmonella* and *Shigella* (7). Samples suspected of containing enteric pathogens, along with other mixed flora, are initially enriched in Modified Semisolid RV Medium Base(1).

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 not fermented by Shigellae but practically by all enterics. 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 black centers.

Please refer disclaimer Overleaf.
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 black centers. The non-pathogenic H2S producers do not decarboxylase lysine; therefore, the acid reaction produced by them prevents the blackening of the colonies (13).

XLD HiVeg™ Agar is both selective and differential medium. It utilizes synthetic detergent No. III 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 H2S, thus resembling _Shigella_ species (10).

**Type of specimen**
Clinical samples - Blood, faeces; Food and dairy samples; water samples.

**Specimen Collection and Handling**
For clinical samples follow appropriate techniques for handling specimens as per established guidelines (6,8).
For food and dairy samples, follow appropriate techniques for sample collection and processing as per guidelines (12,20).
For water samples, follow appropriate techniques for sample collection, processing as per guidelines and local standards.(15) After use, contaminated materials must be sterilized by autoclaving before discarding.

**Warning and Precautions :**
In Vitro diagnostic Use . Read the label before opening the container. Wear protective gloves/protective clothing/eye protection/ face protection. Follow good microbiological lab practices while handling specimens and culture. Standard precautions as per established guidelines should be followed while handling clinical specimens. Safety guidelines may be referred in individual safety data sheets.

**Limitations :**
1. Slight precipitation in the medium may occur, which is inherent property of the medium, and does not affect the performance of the medium.
2. This medium is general purpose medium and may not support the growth of fastidious organisms.
3. Some _Proteus_ strains may give red to yellow colouration with most colonies developing black centers, giving rise to false positive reactions.
4. Non-enterics like _Pseudomonas_ and _Providencia_ may exhibit red colonies.
5. _S._ Paratyphi A, _S._Choleraesuis, _S._ Pullorum and _S._ Gallinarum may form red colonies without H2S, thus resembling _Shigella_ species.

**Performance and Evaluation**
Performance of the medium is expected when used as per the direction on the label within the expiry period when stored at recommended temperature.

**Quality Control**
**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**
7.20-7.60

**Cultural Response**
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.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Inoculum (CFU)</th>
<th>Growth</th>
<th>Observed Lot value (CFU)</th>
<th>Recovery</th>
<th>Colour of Colony</th>
<th>Incubation period</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Salmonella Typhimurium</em></td>
<td>50 -100</td>
<td>luxuriant</td>
<td>25 -100</td>
<td>&gt;=50 %</td>
<td>red with black centres</td>
<td>18 -72 hrs</td>
</tr>
</tbody>
</table>

ATCC 14028 (00031*)

Please refer disclaimer Overleaf.
<table>
<thead>
<tr>
<th>Organism</th>
<th>Minimum Inhibitory Concentration</th>
<th>Minimum Kill Concentration</th>
<th>Growth Characteristics</th>
<th>Key Color</th>
<th>Time to Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em> ATCC 8739 (00012*)</td>
<td>50 -100</td>
<td>fair</td>
<td>10 -30</td>
<td>yellow</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Escherichia coli</em> ATCC 25922 (00013*)</td>
<td>50 -100</td>
<td>fair</td>
<td>10 -30</td>
<td>yellow</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Escherichia coli</em> NCTC 9002 (00014*)</td>
<td>50 -100</td>
<td>fair</td>
<td>10 -30</td>
<td>yellow</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Proteus vulgaris</em> ATCC 13315</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>grey with black centres</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Salmonella Paratyphi A</em> ATCC 9150</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>red</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Salmonella Paratyphi B</em> ATCC 8759</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>red with black centres</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Salmonella Enteritidis</em> ATCC 13076 (00030*)</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>red with black centres</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Salmonella Typhi</em> ATCC 6539</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>red</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Shigella dysenteriae</em> ATCC 13313</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>red</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Shigella flexneri</em> ATCC 12022 (00126*)</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>red</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Shigella sonnei</em> ATCC 25931</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>red</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td># Klebsiella aerogenes ATCC 13048</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>yellow</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Enterobacter cloacae</em> ATCC 13047 (00034*)</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>grey with black centres</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em> subsp. <em>aureus</em> ATCC 25923 (00034*)</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>red</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em> subsp. <em>aureus</em> ATCC 6538 (00034*)</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>yellow</td>
<td>18 - 72 hrs</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em> ATCC 29212 (00087*)</td>
<td>50 -100</td>
<td>good-luxuriant</td>
<td>25 -100</td>
<td>yellow</td>
<td>18 - 72 hrs</td>
</tr>
</tbody>
</table>

Key: *Corresponding WDCM numbers.

**Storage and Shelf Life**

Store between 10-30°C in a tightly closed container and the prepared medium at 20-30°C. Use before expiry date on the label. On opening, product should be properly stored dry, after tightly capping the bottle in order to prevent lump formation due to the hygroscopic nature of the product. Improper storage of the product may lead to lump formation. Store in dry ventilated area protected from extremes of temperature and sources of ignition. Seal the container tightly after use. Use before expiry date on the label. Product performance is best if used within stated expiry period.

**Disposal**

User must ensure safe disposal by autoclaving and/or incineration of used or unusable preparations of this product. Follow established laboratory procedures in disposing of infectious materials and material that comes into contact with clinical sample must be decontaminated and disposed of in accordance with current laboratory techniques (6,8).

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Please refer disclaimer Overleaf.
Reference
In vitro diagnostic medical device

CE Marking

Storage temperature

10°C–30°C

Do not use if package is damaged

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