EMB Agar, Levine Plate

Intended Use:
Recommended for the isolation, enumeration and differentiation of members of *Enterobacteriaceae* from clinical and non clinical samples.

Composition**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Gms / Litre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peptone</td>
<td>10.000</td>
</tr>
<tr>
<td>Dipotassium hydrogen phosphate</td>
<td>2.000</td>
</tr>
<tr>
<td>Lactose</td>
<td>10.000</td>
</tr>
<tr>
<td>Eosin - Y</td>
<td>0.400</td>
</tr>
<tr>
<td>Methylene blue</td>
<td>0.065</td>
</tr>
<tr>
<td>Agar</td>
<td>15.000</td>
</tr>
</tbody>
</table>

**Formula adjusted, standardized to suit performance parameters

Directions
Either streak, inoculate or surface spread the test inoculum (50-100 CFU) aseptically on the plate.

Principle And Interpretation
Levine EMB Agar was developed by Levine (6,7) and is used for the differentiation of *Escherichia coli* and *Klebsiella aerogenes* and also for the rapid identification of *Candida albicans*. This medium is recommended for the detection, enumeration and differentiation of members of the coliform group by American Public Health Association (2,8,9). Weld (10,11) proposed the use of Levine EMB Agar, with added Chlortetracycline hydrochloride, for the rapid identification of *Candida albicans* in clinical specimens. A positive identification of *Candida albicans* can be made after 24-48 hours incubation at 35-37°C in 10% carbon dioxide atmosphere, from specimens such as faeces, oral and vaginal secretions and nail or skin scraping etc. However, the typical appearance is variable.
Eosin Y and methylene blue make the medium slightly selective and inhibit certain gram-positive bacteria. These dyes serve as differential indicators in response to the fermentation of carbohydrates. This helps to differentiate between lactose-fermenters and non-fermenters in EMB Agar, Levine. The ratio of eosin-methylene blue is adjusted to approximately 6:1. Coliforms produce purplish black colonies due to uptake of methylene blue-eosin dye complex, when the pH drops. The dye complex is absorbed into the colony. Non-fermenters probably raise the pH of surrounding medium by oxidative deamination of protein, which solubilizes the methylene blue-eosin complex resulting in formation of colourless colonies. Peptone serves as source of carbon, nitrogen, long chain amino acids, vitamins and other essential growth nutrients. Lactose serves as the source of energy by being the fermentable carbohydrate. Eosin-Y and methylene blue serve as differential indicators. Phosphate buffers the medium.
The test sample can be directly streaked on the medium plates. Inoculated plates should be incubated, protected from light. However standard procedures should be followed to obtain isolated colonies. A non-selective medium should be inoculated in conjunction with EMB Agar. Confirmatory tests should be further carried out for identification of isolated colonies.

Type of specimen
Clinical samples - urine, faeces, oral and vaginal secretions and nail or skin scraping, Foodstuffs; Water samples.

Specimen Collection and Handling
For clinical samples follow appropriate techniques for handling specimens as per established guidelines (4,5).
For food and dairy samples, follow appropriate techniques for sample collection and processing as per guidelines (1,10).
For water samples, follow appropriate techniques for sample collection, processing as per guidelines and local standards (2).
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. A non-selective medium should be inoculated in conjunction with EMB Agar.
2. Some strains of *Salmonella* and *Shigella* species do not grow in the presence of eosin and methylene blue.
3. Individual organisms differ in their growth requirement and may show variable growth patterns on the medium.
4. Each lot of the medium has been tested for the organisms specified on the COA. It is recommended to users to validate the medium for any specific microorganism other than mentioned in the COA based on the user’s unique requirement.
5. Confirmatory tests should be further carried out for identification of isolated colonies.
6. It is recommended to store the plates at 24-30°C to avoid minimum condensation.

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
Sterile EMB Agar, Levine in 90mm disposable plates.

Colour
Reddish purple coloured medium with greenish cast.

Quantity of medium
25ml of medium in isposable plate

Reaction
6.90-7.30

Sterility test
Passes release criteria

Cultural Response
Cultural characteristics observed after an incubation at 35-37°C for 24-48 hours.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Inoculum (CFU)</th>
<th>Growth</th>
<th>Recovery</th>
<th>Colour of Colony</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Candida albicans</em> ATCC 10231 (00054*)</td>
<td>50-100</td>
<td>luxuriant (incubated in 10% CO₂)</td>
<td>&gt;=50%</td>
<td>colourless</td>
</tr>
<tr>
<td><em>Klebsiella aerogenes</em> ATCC 13048 (00175*)</td>
<td>50-100</td>
<td>Good</td>
<td>40-50%</td>
<td>Pink-red</td>
</tr>
<tr>
<td><em>Escherichia coli</em> ATCC 25922 (00013*)</td>
<td>50-100</td>
<td>Luxuriant</td>
<td>&gt;=50%</td>
<td>Blue-black with metallic sheen</td>
</tr>
<tr>
<td><em>Escherichia coli</em> ATCC 8739 (00012*)</td>
<td>50-100</td>
<td>Luxuriant</td>
<td>&gt;=50%</td>
<td>Blue-black with metallic sheen</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em> ATCC 27853 (00025*)</td>
<td>50-100</td>
<td>Luxuriant</td>
<td>&gt;=50%</td>
<td>Colourless</td>
</tr>
<tr>
<td><em>Salmonella Typhimurium</em> ATCC 14028 (00031*)</td>
<td>50-100</td>
<td>Luxuriant</td>
<td>&gt;=50%</td>
<td>Colourless</td>
</tr>
<tr>
<td><em>Saccharomyces cerevisiae</em> ATCC 9763</td>
<td>50-100</td>
<td>None-poor</td>
<td>&lt;=10%</td>
<td>Cream</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em> subsp. aureus ATCC 25923 (00034*)</td>
<td>50-100</td>
<td>None-poor</td>
<td>&lt;=10%</td>
<td>Colourless</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em> subsp. aureus ATCC 8538 (00032*)</td>
<td>50-100</td>
<td>None-poor</td>
<td>&lt;=10%</td>
<td>Colourless</td>
</tr>
</tbody>
</table>

Key : (*) Corresponding WDCM numbers. 
(‡) Formerly known as *Enterobacter aerogenes*

Storage and Shelf Life
On receipt store between 20-30°C 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 (4,5).

Reference

In vitro diagnostic medical device

CE Marking

Storage temperature

Do not use if package is damaged

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Revision : 02 / 2019
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