

## Hektoen Enteric Agar, Granulated

**GM467**

Hektoen Enteric Agar, granulated is a differential and selective medium used for the isolation of *Salmonella* and *Shigella* species from enteric pathological specimens.

### Composition\*\*

| Ingredients             | Gms / Litre |
|-------------------------|-------------|
| Proteose peptone        | 12.000      |
| Yeast extract           | 3.000       |
| Lactose                 | 12.000      |
| Sucrose                 | 12.000      |
| Salicin                 | 2.000       |
| Bile salts mixture      | 9.000       |
| Sodium chloride         | 5.000       |
| Sodium thiosulphate     | 5.000       |
| Ferric ammonium citrate | 1.500       |
| Acid fuchsin            | 0.100       |
| Bromothymol blue        | 0.065       |
| Agar                    | 15.000      |
| Final pH ( at 25°C)     | 7.5±0.2     |

\*\*Formula adjusted, standardized to suit performance parameters

### Directions

Suspend 76.67 grams in 1000 ml distilled water. Heat to boiling to dissolve the medium completely. DO NOT AUTOCLAVE. Cool to 45-50°C. Mix well and pour into sterile Petri plates.

### Principle And Interpretation

Media that isolated a broader spectrum of enteric pathogens are less inhibitory to members of the non-pathogenic intestinal flora. Hektoen Enteric Agar was developed in 1967 by King and Metzger of the Hektoen Institute in order to increase the frequencies of isolation of *Shigella* and *Salmonella* organisms when compared with their recovery on other media frequently utilized in clinical laboratories at that time (1-3). Sodium deoxycholate has been replaced by bile salts in reduced concentration. This allows growth of *Shigella* as well as the Salmonellae. The peptone concentrations have been increased in order to offset the inhibitory effects of the bile salts (4). Hektoen Enteric Agar is currently recommended as one of several plating media for the culture of *Enterobacteriaceae* from stool specimens (5). Foods containing poultry, eggs or dairy products are the most frequent vehicles for foodborne Salmonellosis, and a variety of procedures have been developed using Hektoen Enteric Agar as part of the multi-step procedure to isolate *Salmonella* (6-9).

The increased concentration of carbohydrate and peptic digest of animal tissue helps to reduce the inhibitory effect of bile salts and indicators and allows good growth of *Salmonella* and *Shigella* species while inhibiting the normal intestinal flora. The medium contains three carbohydrates i.e lactose, sucrose and salicin for differentiation of enteric pathogens. The higher lactose concentration aids in the visualization of enteric pathogens and minimizes the problem of delayed lactose fermentation. Salicin is fermented by many coliforms including those that do not ferment lactose and sucrose. Combination of ferric ammonium citrate and sodium thiosulphate in the medium enables the detection of hydrogen sulfide production, thereby aiding in the differentiation process due to the formation of black centered colonies. The indicator system, consisting of acid fuchsin and bromothymol blue, has lower toxicity as compared to other enteric media, resulting in improved recovery of enteric pathogens. Hoben et al (10) further enhanced the selectivity of the medium by addition of novobiocin at a concentration of 15 mg/litre, which inhibits *Citrobacter* and *Proteus* species. Taylor and Schelhaut (11) found the medium valuable for differentiating pathogenic enteric organisms and for better growth of Shigellae.

Inoculate the medium with fresh faeces suspended in Ringers Solution or inoculate directly with rectal swabs. Spread out the inoculum to obtain isolated colonies and incubate at 35-37°C for 18-24 hours. Further incubation will improve differentiation between *Salmonella* and *Shigella*. *Proteus* species may resemble *Salmonella* or *Shigella*; hence further testing must be carried out for confirmation.

After incubation most plates will show an area of confluent growth. Because the streaking procedure is, in effect, a “dilution” technique, diminishing numbers of microorganisms are deposited on the streaked areas. Consequently, one or more of these areas should exhibit isolated colonies of the organisms contained in the specimen. Better isolation is obtained due to the inhibitory action of the medium.

## Quality Control

### Appearance

Cream to yellow coloured with tancast granular medium

### Gelling

Firm, comparable with 1.5% Agar gel

### Colour and Clarity of prepared medium

Green coloured, clear to slightly opalescent gel forms in Petri plates

### Reaction

Reaction of 7.67% w/v aqueous solution at 25°C. pH : 7.5±0.2

### pH

7.30-7.70

### Cultural Response

Cultural characteristics observed after an incubation at 35-37°C for 18-24 hours.

| Organism                                 | Inoculum (CFU)    | Growth    | Recovery | Colour of colony   |
|--|-------------------|-----------|----------|--|
| <b>Cultural Response</b>                 |                   |           |          |  |
| <i>Escherichia coli</i> ATCC 25922       | 50-100            | fair      | 20-30%   | orange (may have bile precipitate)                                   |
| <i>Enterobacter aerogenes</i> ATCC 13048 | 50-100            | fair-good | 30-40%   | salmon-orange  |
| <i>Enterococcus faecalis</i> ATCC 29212  | >=10 <sup>3</sup> | inhibited | 0%       |  |
| <i>Salmonella</i> Enteritidis ATCC 13076 | 50-100            | luxuriant | >=50%    | greenish blue<br>may have black centres(H <sub>2</sub> S production) |
| <i>Salmonella</i> Typhi ATCC 6539        | 50-100            | luxuriant | >=50%    | greenish blue<br>may have black centres(H <sub>2</sub> S production) |
| <i>Salmonella</i> Typhimurium ATCC 14028 | 50-100            | luxuriant | >=50%    | greenish blue<br>may have black centres(H <sub>2</sub> S production) |
| <i>Shigella flexneri</i> ATCC 12022      | 50-100            | luxuriant | >=50%    | greenish blue  |
| <i>Escherichia coli</i> ATCC 8739        | 50-100            | Fair      | 20-30%   | orange (may have bile precipitate)                                   |

## Storage and Shelf Life

Store below 30°C in tightly closed container and prepared medium at 2-8°C. Use before expiry period on the label.

## Reference

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