MUG EC Broth

M1042

MUG EC Broth is used for the detection of *Escherichia coli* in water and food samples by a fluorogenic method.

Composition**

Ingredients	Gms / Litre
Casein enzymic hydrolysate	20.000
Lactose	5.000
Bile salts mixture	1.500
Dipotassium phosphate	4.000
Monopotassium phosphate	1.500
Sodium chloride	5.000
4-Methylumbelliferyl ß-D-Glucuronide (MUG)	0.050
Final pH (at 25°C)	6.9±0.2

**Formula adjusted, standardized to suit performance parameters

Directions

Suspend 37.05 grams in 1000 ml distilled water. Heat, if necessary to dissolve the medium completely. Dispense in tubes containing inverted Durham's tubes. Sterilize by autoclaving at 15 lbs pressure (121°C) for 12-15 minutes.

Principle And Interpretation

Escherichia coli is a member of faecal coliform group of bacteria. It is a member of the indigenous faecal flora of warm-blooded animals. *E.coli* is considered a specific indicator of faecal contamination and the possible presence of enteric pathogens. EC Broth was devised by Hajna and Perry (1) and further modified by addition of the fluorogenic compound MUG. MUG EC Broth is also recommended by APHA for the analysis of drinking water, surface and ground water and waste-water for the presence of *E.coli* (2). MUG permits rapid detection of *E. coli* when medium is observed for fluorescence using UV Light (3, 4). MUG also detects anaerogenic strains which may not be detected in conventional procedure (3). MUG is hydrolyzed by the enzyme #-glucuronidase possessed by *E.coli* to yield a fluorescent end product 4-Methylumbelliferone.

Casein enzymic hydrolysate provides essential nutrients. Lactose is the fermentable carbohydrate. Sodium chloride maintains osmotic equilibrium. The medium has a strong buffering system to control the pH in the presence of fermentative action. The bile salts inhibit gram-positive bacteria especially *Bacillus* species and faecal Streptococci. Mostly beta-glucuronidase activity occurs within 4 hours but some weak beta- glucuronidase-positive strains require overnight incubation (2). The fermentation of lactose by lactose fermentors leads to acidification of the medium, resulting in drop of pH. Adjustment of pH of cultures by sodium hydroxide enhanced fluorescence as observed by Maddocks and Greenman (5).Similarly Freir and Hartman (6) noticed that exposure of tubes to ammonia fumes enhanced fluorescence.

Large number of *Proteus vulgaris* if present, may suppress gas production of *E.coli* , however fluorescence permits detection of *E.coli* in pure or mixed cultures within 4 to 24 hours.

Inoculate the test water sample into PA Broth (M1186) and Lauryl Sulphate Broth (M080). After an incubation at 35-37°C for 18-24 hours, all presumptive tubes showing growth, gas or acidity is further tested using MUG EC Broth (M1042). After an incubation at 35-37°C for 4-24 hours, the presence of a bright blue fluorescence is considered as a positive response for *E. coli* .

Quality Control

Appearance

Cream to yellow homogeneous free flowing powder

Colour and Clarity of prepared medium

Yellow coloured clear solution without any precipitate

Reaction

Reaction of 3.7% w/v aqueous solution at 25°C. pH : 6.9±0.2

pH
6.70-7.10

Cultural Response
M1042: Cultural characteristics observed after an incubation at 35 - 37°C for 4 - 24 hours.

Organism	Inoculum (CFU)	Growth	Fluorescence (under uv) (at 366 nm)
Escherichia coli ATCC 25922	50-100	luxuriant	positive, throughout the tube
Enterobacter aerogenes ATCC 13048	50-100	luxuriant	negative
Staphylococcus aureus ATCC 25923	>=10^3	inhibited	
Salmonella Typhi ATCC 6539	50-100	good	negative
Shigella flexneri ATCC 12022	50-100	good	Negative

Storage and Shelf Life
Store below 30°C in tighty closed container and prepared medium below 2-8°C. Use before expiry period on the label.

Reference
1. Hajna A. A. and Perry C. A., 1943, Am. J. Public Health, 33:550.
2. Feng P. C. S. and Hartman P. A. S., 1982, Appl. Environ. Microbiol., 43:132.
3. Robinson B. J., 1984, Appl. Environ. Microbiol., 48:285.
4. Greenberg A. E., Trussell R. R. and Clesceri L. S., (Eds.), 1988, Standard Methods for the Examination of Water and Wastewater, 20th Ed., APHA, Washington, D.C.
5. Maddocks J. L. and Greenan M. J. (1975) J. Clin. Pathol. 28. 686-687.
6. Freir T. A. and Hartman P. A. (1987) Appl. Env. Microbiol. 53. 1246-1250.

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