MOTILITY INDOLE UREA AGAR (M.I.U.)

Medium used for differentiating Enterobacteriaceae based on motility, indole production and urease activity

TYPICAL FORMULA (g/L)

Tryptone	30.0
Sodium Chloride	5.0
Potassium Dihydrogen Phosphate	5.0
Phenol Red	0.004
Agar	3.0
Final pH 6.9 ± 0.2	

DESCRIPTION

MOTILITY INDOLE UREA AGAR (M.I.U.) is a semisolid medium designed for detection in *Enterobacteriaceae* of urease activity, motility, and indole production. It was also used in combination with Kligler Iron Agar (Code 30087) for the recognition and differentiation of *Salmonella* and *Shigella* species from colonies picked from plating media in fecal cultures (1).

PRINCIPLE

Tryptone is a pancreatic digest of casein. Casein is the main protein of milk and is a rich source of amino acid nitrogen. This hydrolysate has high tryptophan content and is therefore used in media for testing the indole reaction. Sodium chloride maintains the osmotic balance. Potassium dihydrogen phosphate buffer the medium. Phenol Red is a pH indicator. The small amount of agar makes the medium semisolid. Bacterial motility can be observed directly from examination of the tubes following incubation. Growth spreads out of the line of inoculation if the organism is motile. Highly motile organisms provide growth throughout the tube. Growth of non motile organisms only occurs along the stab line. Urease activity was observed by a change of color to red. When organisms utilize urea, ammonia is formed during incubation which makes the reaction of these media alkaline, producing a red-pink color. Consequently, urease production may be detected by the change in the phenol red indicator. Organisms that possess the enzyme “tryptophanase” degrade the amino acid tryptophan to indolepyruvic acid, from which indole can be formed through deamination.

PREPARATION

Suspend 43.0 g in 1 litre of distilled water. Heat until completely dissolved. Autoclave at 121 °C for 15 minutes. Cool to 50 °C.
Aseptically add 50 ml of Urea 40% supplement (Code 80292).

TECHNIQUE

Inoculate tubes with a pure culture by stabbing the center of the column of medium to greater than half the depth.
Incubate tubes for 18-48 hours at 35 ± 2 °C in aerobic atmosphere.

INTERPRETATION OF RESULTS

1. Motility was observed by growth extending from the line of inoculum or diffuse turbidity of the medium. Nonmotile organisms grow only along the line of inoculation.
2. Urease activity was observed by a change of color to red.
3. Indole production is indicated by the formation of a pink to red color after the addition of three or four drops of Kovac's reagent (Code 20070) to the surface of the medium. A negative reaction is indicated by the development of a yellow color.

The red color of phenol red in alkaline pH did not interfere because of the acidity of kovac's reagent. The efficacy of MOTILITY INDOLE UREA AGAR (M.I.U.) and Kligler Iron Agar (Code 30087) for presumptive recognition of *Salmonella* and *Shigella* is shown in the work of Rosa Fraile et al (1)

STORAGE

The powder is very hygroscopic: store the powder at 10-30 °C, in a dry environment, in its original container tightly closed until the expiry date indicated on the label or until signs of deterioration or contamination are evident.
Store prepared media at 2-8 °C.

WARNING and PRECAUTIONS

The product is not classified as hazardous by current legislation and does not contain harmful substances in concentrations of ≥ 1%.
The product is designed for *In vitro* diagnostic use and must be used only by properly trained operators.

DISPOSAL of WASTE

Disposal of waste must be carried out according to national and local regulations in force.

REFERENCES

1. Rosa Fraile, Vega and Gutierrez. (1980). Evaluation of Urea-Motility-Indole Medium for Recognition and Differentiation of *Salmonella* and *Shigella* Species in Stool Cultures.
2. Eder and Clark. (1970). Appl. Microbiol. 2:849.
3. Oberhofer and Hajkowski. 81970). Am. J. Clin. Pathol. 54:720
4. MacFaddin. (2000). Biochemical tests for identification of medical bacteria, 3rd ed. Lippincott Williams & Wilkins, Baltimore, Md.
5. Journal of Clinical Microbiology, Sept. (1980), p. 310-313

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PRODUCT SPECIFICATIONS

NAME
MOTILITY INDOLE UREA AGAR (M.I.U.)

PRESENTATION
Dehydrated culture medium

STORAGE
10-30°C

PACKAGING

Code	Content	Packaging
610236	500 gr	500 gr of powder in plastic bottle
610236	100 gr	100 gr of powder in plastic bottle

pH OF THE MEDIUM
6.9 ± 0.2

USE
MOTILITY INDOLE UREA AGAR (M.I.U.) is a semisolid medium designed for detection in *Enterobacteriaceae* of urease activity, motility, and indole production.

TECHNIQUE
Refer to technical sheet of the product.

APPEARANCE OF THE MEDIUM
Dehydrated medium
Appearance: free-flowing, homogeneous.
Colour: light beige
Prepared medium
Appearance: clear semisolid
Colour: light amber

SHELFLIFE
4 years

QUALITY CONTROL
1. Control of general characteristics, label and print
2. Sterility control

7 days at 25 ± 1°C, in aerobiosis
7 days at 36 ± 1°C, in aerobiosis

3. Microbiological control

Inoculum for productivity: 10-100 UFC/ml
Inoculum for specificity: ± 10^4 UFC/ml
Incubation conditions: 18-48 hours at 35 ± 2°C, aerobically

Microorganisms		Motility	Indole production	Urease reaction
Escherichia coli	ATCC 25922	+	+	-
Shigella flexneri	ATCC 9199	-	-	-
Salmonella typhi	ATCC 14028	+	-	-
Proteus mirabilis	ATCC 25933	+	-	+
Enterobacter aerogenes	ATCC 13048	+	-	-

TABLE OF SYMBOLS

LOT Batch code	Temperature limitation	Manufacturer	Contains sufficient for <n> tests	IVD *In vitro* Diagnostic Medical Device
REF Catalogue number	Keep away from heat	Use by	Caution, consult accompanying documents	

CE IVD

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