ARENA BioScien

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MIO Medium (Motility Indole Ornithine Medium)

Motility Indole Ornithine Medium (MIO Medium) is used for the identification of Enterobacteriaceae on the basis of motility, indole production and ornithine decarboxylase activity.

REF: BS.1/MO01.100.0100	100 Gram	REF: BS.1/MO01.250.0250	250 Gram
REF: BS.1/MO01.500.0500	500 Gram		

CLINICAL SIGNIFICANCE

Tests for indole production, motility, and ornithine decarboxylase activity play important roles in the identification of *Enterobacteriaceae*. Ederer and Clark1 and Oberhofer and Hajkowski2 developed MIO Medium, combining all three differentiating reactions in one medium. Ederer and Clark stressed the advantages of MIO Medium in their extensive study comparing cultural reactions of *Enterobacteriaceae* on MIO Medium with reactions on classic media.

METHOD PRINCIPLE

Casein enzymic hydrolysate and peptic digest of animal tissue provide amino acids and other nitrogenous substances. Yeast extract is the source of vitamin B complex. Dextrose is the fermentable carbohydrate. Test cultures are stab-inoculated into the medium butts.
Motility and ornithine decarboxylation reactions are read before testing indole production. On addition of the Kovacs reagent, colour of the medium changes to yellow. Therefore positive ornithine decarboxylase test (purple) could be misinterpreted as negative (yellow).
Organisms ferment dextrose to form acid, which causes the pH indicator bromocresol purple to change from purple to yellow.
Organisms possessing ornithine decarboxylase enzyme, decarboxylate ornithine to putrescine which increases the pH making it alkaline, indicated by a colour change from yellow to purple throughout the medium. Decarboxylase negative reaction is indicated by yellow colour or yellow with a purple band near the top of the medium. Indole is produced from tryptophan present in casein enzymic hydrolysate. The indole produced combines with the aldehyde present in the Kovacs reagent to form a red complex

MEDIA COMPOSITION

Ingredients	gm / Liter
Peptone	10.000
Tryptone	10.000
Yeast extract	3.000
L-Ornithine hydrochloride	5.000
Dextrose (Glucose)	1.000
Bromocresol purple	0.020
Agar	2.000

Final pH (at 25°C) 6.5±0.2

PRECAUTIONS AND WARNINGS

Media to be handled by entitled and professionally educated person. Do not ingest or inhale.

Good Laboratories practices using appropriate precautions should be followed in:

- Wearing personnel protective equipment (overall, gloves, glasses,).
- Do not pipette by mouth.
- In case of contact with eyes or skin; rinse immediately with plenty of soap and water. In case of severe injuries; seek medical advice immediately.
- Respect country requirement for waste disposal.
  S56: dispose of this material and its container at hazardous or Special waste collection point.
  S57: use appropriate container to avoid environmental contamination.
  S61: avoid release in environment.

For further information, refer to the MIO medium agar material safety data sheet.

MEDIA PREPARATION, STORAGE AND STABILITY [2]

BioScien MIO Medium are stable until expiration date stated on label when properly stored 10-30°C. Hydrated MIO Medium is prepared by suspend 31.02 grams in 1000 ml purified/distilled water. Heat to boiling to dissolve the medium completely. Dispense into test tubes in 5 ml amounts. Sterilize by autoclaving at 15 lbs. pressure (121°C) for 15 minutes. Cool the tubes in an upright position. Store the prepared medium at 15-25°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.

Deterioration

The color of ***BioScien*** MIO Agar medium is Light yellow to pale green homogeneous free flowing powder, dehydrated medium Purple coloured clear to slightly opalescent gel forms in tubes as butts. If there are any physical changes for powder or signs of deterioration (shrinking, cracking, or discoloration), and contaminations for hydrated media, discard the medium.

SPECIMEN COLLECTION AND PRESERVATION

Isolated Microorganism from clinical and non-clinical samples

EQUIPMENT REQUIRED NOT PROVIDED

- Sterile cups
- Sterile petri-dishes
- Incubator
- Autoclave

CHARACTERISTICS OF THE COLONIES

Cultural characteristics observed after an incubation at 35-37°C for 40-48 hours

Organism	Inoculum (CFU)	Growth	Motility	Indole production	Ornithine Decarbo--xylation
Escherichia coli ATCC 25922	50-100	luxuriant	Positive, growth away from stabline causing turbidity	positive reaction, red ring at the interface of the medium	positive reaction, purple colour
#Klebsiella aerogenes ATCC 13048	50-100	luxuriant	positive, growth away from stabline causing turbidity	negative reaction	positive reaction, purple colour
Klebsiella pneumoniae ATCC 13883	50-100	luxuriant	negative, growth along the stabline, surrounding medium remains clear	negative reaction	negative reaction
Proteus mirabilis ATCC 25933	50-100	luxuriant	motility is temperature dependent, it is more pronounced at 20°C and almost absent at 35°C	negative reaction	positive reaction, purple colour

QUALITY CONTROL

To ensure adequate quality control, it is recommended that positive and negative control included in each run. If control values are found outside the defined range, check the system performance. If control still out of range please contact ***BioScien*** technical support.

PERFORMANCE CHARACTERISTICS [4]

Performance of the medium is expected when used as per the direction on the label within the when stored at recommended temperature.

REFERENCES

1. MacFaddin J. F., 2000, Biochemical tests for Identification of Medical Bacteria, 3rd Ed., Lippincott, Williams and Wilkins, Baltimore.
2. Ederer G. M. and Clark M., 1970, Appl. Microbiol., 20:849.
3. Oberhofer J. R. and Hajkowski R., 1970, Am. J. Clin. Pathol., 54:726.
4. Ewing W. H., 1986, Edwards and Ewings Identification of Enterobacteriaceae, 4th Ed., Elsevier Science Publishing Co., Inc., New York.
5. Isenberg, H.D. Clinical Microbiology Procedures Handbook 2nd Edition.
6. Jorgensen, J.H., Pfaller, M.A., Carroll, K.C., Funke, G., Landry, M.L., Richter, S.S and Warnock., D.W. (2015) Manual of Clinical Microbiology, 11th Edition. Vol. 1.

SYMBOLS IN PRODUCT LABELLING	
IVD — For in-vitro diagnostic use	Σ — Number of <n> test in the pack
LOT — Batch Code/Lot number	Caution
REF — Catalogue Number	Do not use if package is damaged
Temperature Limitation	Consult Instruction for use
Expiration Date	
Manufactured by	