MAC CONKEY BROTH EP

Dehydrated culture medium

1 - INTENDED USE

Liquid medium for the detection of *Escherichia coli* in non-sterile pharmaceutical products, according to harmonized EP method and coliform organisms in foodstuffs and water samples.

2 - COMPOSITION - TYPICAL FORMULA * (AFTER RECONSTITUTION WITH 1 L OF WATER)

Pancreatic digest of gelatin	20.00 g
Lactose monohydrate	10.00 g
Dehydrated ox bile	5.00 g
Bromocresol purple	0.01 g

*The formula may be adjusted and/or supplemented to meet the required performances criteria.

3 - PRINCIPLE OF THE METHOD AND EXPLANATION OF THE PROCEDURE

Alfred Theodore MacConkey[1] in 1901 devised a liquid medium for the cultivation of "*Bacillus coli",* containing sodium taurocholate as a selective agent and litmus as an indicator. The medium was later modified by MacConkey[2,3] by replacing litmus with phenol red and by Childs and Allen[4] who introduced the less inhibitory bromocresol purple as a pH indicator.
Mac Conkey Broth EP, in its current formulation, complies with the recommendations of the harmonized method in the European Pharmacopeia.[5]
MacConkey Broth is used for cultivating Gram-negative, lactose-fermenting bacilli, as a presumptive test for coliform organisms and for detecting *E. coli* in non-sterile pharmaceutical products.
Essential growth factors are provided by pancreatic digest of gelatin which is a source of nitrogen, carbon and minerals. Lactose is the fermentable carbohydrate and a source of carbon and energy. Bromocresol purple is the pH indicator. Ox bile inhibits the growth of Gram-positive organisms. Compared to the classic formula, Mac Conkey Broth EP does not contain sodium chloride.
Acids and gases are produced from lactose fermentation: the acidity of the medium is detected by the pH indicator, which turns yellow, while the gas is evidenced by the formation of bubbles that are collected in Durham tubes.

4 - DIRECTIONS FOR DEHYDRATED MEDIUM PREPARATION

Suspend 35 g in 1000 mL of cold purified water. Mix thoroughly and warm to completely dissolve the powder. Distribute 10 mL into test tubes containing inverted Durham tube or 100 mL into flasks and sterilise by autoclaving at 121°C for 15 minutes. The Durham tubes shall not contain air bubbles after sterilization.

5 - PHYSICAL CHARACTERISTICS

Dehydrated medium appearance	violet, fine, homogeneous, free-flowing powder
Solution and prepared plates appearance	violet, limpid
Final pH at 20-25 °C	7.3 ± 0.2

6 - MATERIALS PROVIDED - PACKAGING

Product	Type	REF	Pack
Mac Conkey Broth EP	Dehydrated medium	4016792	500 g (14.3 L)

7 - MATERIALS REQUIRED BUT NOT PROVIDED

Autoclave, water-bath, sterile loops and pipettes, incubator and laboratory equipment as required, Erlenmeyer flasks, microbiological tubes and flasks, Durham tubes, ancillary culture media and reagents.

8 – SPECIMENS

Non-sterile pharmaceutical products, foodstuffs and water samples. Refer to applicable International Standards and regulations for the collection of samples. Operate in accordance with good laboratory practice for sample collection, storage and transport to the laboratory.

9 - TEST PROCEDURE

For the detection of *E. coli* in non-sterile pharmaceuticals products the technique recommended by European Pharmacopoeia should be followed.[5]
Prepare a sample using a 1 in 10 dilution in Pharmacopoeia Diluent (REF 401395) of not less than 1 g of the product to be examined. Use 10 mL or the quantity corresponding to 1 g or 1 mL of sample to inoculate the suitable amount of Tryptic Soy Broth (REF 402155). When testing orodispersible films dissolve 10 films in Pharmacopoeia Diluent. Filter the volume corresponding to 1 film through a sterile filter membrane and place in 100 mL of Tryptic Soy Broth. Mix and incubate at 30-35 °C for 18-24 h.
Shake the container, transfer 1 mL of Tryptic Soy Broth to 100 mL of Mac Conkey Broth EP and incubate at 42-44 °C for 24-48 h.
Subculture on a plate of Mac Conkey Agar (REF 401670) and incubate at 30-35 °C for 18-72 h.
For the procedure for the determination of coliforms in samples other than non-sterile pharmaceutical products see 401675 Mac Conkey Broth (Purple).

10 - READING AND INTERPRETATION

After incubation the microbial growth is evidenced by turbidity in the broth. The yellowing of the broth and the production of gas suggest the presence of *E. coli* and possibly of other coliform bacteria. Yellowing alone suggests the presence of coliforms other than *E. coli.*
Growth of colonies on MacConkey Agar indicates the possible presence of *E. coli*. This is confirmed by identification tests. According to European Pharmacopoeia the product complies with the test if no colonies are present on MacConkey Agar plates or if the identification testes are negative.

Biolife Italiana S.r.l., Viale Monza 272, 20128 Milan, Italy.
Tel. +39 02 25209.1, Fax +39 02 2576428
E-mail: export@biolifeitaliana.it; web: www.biolifeitaliana.it

11 - USER QUALITY CONTROL

All manufactured lots of the product are released for sale after the Quality Control has been performed to check the compliance with the specifications. However, the end user can perform its own Quality Control in accordance with the local applicable regulations, in compliance with accreditation requirements and the experience of the Laboratory. Here below are listed some test strains useful for the quality control.

CONTROL STRAINS	INCUBATION T°/ T - ATM	EXPECTED RESULTS
E. coli ATCC 8739	42-44°/ 24 H-A	good growth with gas, the medium turns yellow
S. aureus ATCC 6538	42-44°/ 48 H-A	inhibited

A: aerobic incubation; ATCC is a trademark of American Type Culture Collection

12 – PERFORMANCES CHARACTERISTICS

Prior to release for sale, a representative sample of all lots of dehydrated Mac Conkey Broth EP (Test Batch:TB) is assesed for productivity and selectivity by comparing the results with a previously approved Reference Batch (RB).
Productivity is tested by dilution to extinction method, by inoculating 1 mL of appropriate decimal dilutions of target organisms in test tubes, incubating at 42-44°C and at 37°C for 24 hours and recording the highest dilution showing growth/gas/yellow colour in Reference Batch (Gr_{RB}) and in Test Batch (Gr_{TB}). Productivity is tested with the following strains *E. coli* ATCC 8739, *E. coli* ATCC 25922, *E. aerogenes* ATCC 13048, *K. pneumoniae* ATCC 27736, *C. freundii* ATCC 43864, S. Typhimurium ATCC 14028. The productivity index Gr_{RB}-Gr_{TB} for each test strain shall be ≤ 1. Selectivity is tested by dilution to extinction method, by inoculating 1 mL of appropriate decimal dilutions of Gram-positive organisms in test tubes, and recording the highest dilution showing growth. Selectivity is tested with the following strains: *S. aureus* ATCC 6538 and *E. faecalis* ATCC 19433. *S. aureus* is totally inhibited while *E. faecalis* is partially inhibited.

13 - PRECAUTIONS AND WARNINGS

- This culture medium is for microbiological control and for professional use only; it is to be used by adequately trained and qualified laboratory personnel, observing approved biohazard precautions and aseptic techniques.
- Dehydrated media must be handled with suitable protection. Before use, consult the Safety Data Sheet.
- This culture medium contains raw materials of animal origin. The *ante* and *post mortem* controls of the animals and those during the production and distribution cycle of the raw materials, cannot completely guarantee that this product doesn't contain any transmissible pathogen. Therefore, it is recommended that the culture medium be treated as potentially infectious, and handled observing the usual specific precautions: do not ingest, inhale, or allow to come into contact with skin, eyes, mucous membranes. Download the TSE Statement from the website www.biolifeitaliana.it, describing the measures implemented by Biolife Italiana for the risk reduction linked to infectious animal diseases.
- Apply Good Manufacturing Practice in the production process of prepared media.
- All laboratory specimens should be considered infectious.
- The laboratory area must be controlled to avoid contaminants such as medium powder or microbial agents.
- Sterilize all biohazard waste before disposal. Dispose the unused medium and the sterilized medium inoculated with samples or microbial strains in accordance with current local legislation.
- Do not use the culture medium as active ingredient for pharmaceutical preparations or as production material intended for human and animal consumption
- The Certificates of Analysis and the Safety Data Sheet of the product are available on the website www.biolifeitaliana.it.
- The information provided in this document has been defined to the best of our knowledge and ability and represents a guideline for the proper use of the product but without obligation or liability. In all cases existing local laws, regulations and standard procedures must be observed for the examination of samples collected from human and animal organic districts, for environmental samples and for products intended for human or animal consumption. Our information does not relieve our customers from their responsibility for checking the suitability of our product for the intended purpose.

14 - STORAGE CONDITIONS AND SHELF LIFE

Upon receipt, store at +10°C /+30°C away from direct light in a dry place. If properly stored, it may be used up to the expiration date. Do not use beyond this date. Avoid opening the bottle in humid places. After use, the container must be tightly closed. Discard the product if the container and/or the cap are damaged, or if the container is not well closed, or in case of evident deterioration of the powder (colour changes, hardening, large lumps).
The user is responsible for the manufacturing and quality control processes of prepared media and the validation of their shelf life, according to the type and the applied storage conditions (temperature and packaging).

15 – REFERENCES

1. MacConkey A. Zentralbl. Bakteriol. 1901; 29:740.
2. MacConkey A. Lactose-Fermenting Bacteria in Faeces. J Hyg (Lond) 1905; Jul;5(3):333-79
3. MacConkey A. Bile Salt Media and their advantages in some Bacteriological Examinations. J Hyg (Lond) 1905; 8:322.
4. Childs E, Allen LA. Improved methods for determining the most probable number of Bacterium coli and of Streptococcus faecalis. J Hyg Camb 1953; 51:468.
5. European Pharmacopoeia 11th Edition, 2022, Vol. 1; 2.6.13 Microbiological Examination of non-sterile products: test for specified micro-organisms: 01/2021:20631.

TABLE OF APPLICABLE SYMBOLS

REF or REF Catalogue number	LOT Batch code	Manufacturer	Store in a dry place	Use by
Temperature limitation	Contents sufficient for <n> tests	Consult Instructions for Use	Keep away from direct light	

REVISION HISTORY

Version	Description of changes	Date
Revision 1	Updated layout and content	2022/09

Note: minor typographical, grammatical, and formatting changes are not included in the revision history.

Biolife Italiana S.r.l., Viale Monza 272, 20128 Milan, Italy.
Tel. +39 02 25209.1, Fax +39 02 2576428
E-mail: export@biolifeitaliana.it; web: www.biolifeitaliana.it