AuSaMicS™ Life Science

TECHNICAL DATA SHEET

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Columbia Broth Base

Tris/Cysteine-Buffered Enrichment Broth for Blood Culture & Fastidious Organism Recovery

1. PRODUCT IDENTIFICATION

Product Name	Columbia Broth Base
Catalogue Number	AS-1181
Physical Form	Dehydrated powder, free-flowing, beige to light tan
Prepared Medium	Clear to light amber liquid, free of precipitate
HS / AHECC Code	3821.00.00 — Prepared culture media for the development or maintenance of micro-organisms

2. OVERVIEW

Columbia Broth Base is a Tris/cysteine-buffered, nutritionally rich enrichment broth originally devised by Morello and Ellner (1969) as the liquid counterpart to Columbia Blood Agar Base (Ellner et al., 1966), specifically for improved recovery of microorganisms from blood cultures. The combination of pancreatic digest of casein, proteose peptone, yeast extract and beef-heart digest supplies amino acids, peptides, vitamins and carbohydrates, while an increased concentration of L-cysteine (as the reducing agent), magnesium and ferrous salts, and a Tris buffer system support faster and more luxuriant growth of both aerobic and anaerobic organisms than conventional general-purpose broths.

Unlike Columbia Agar Base, the broth formulation deliberately omits corn starch (to reduce opalescence and keep the medium optically clear for turbidity-based reading) and incorporates additional buffering salts. When supplemented with 5–10% defibrinated blood or serum, or with SPS (sodium polyanethol sulfonate) for blood-culture applications, Columbia Broth Base becomes further enriched for organisms requiring additional growth factors.

3. PRINCIPLE OF THE MEDIUM

Pancreatic digest of casein, proteose peptone No. 3, yeast extract and tryptic digest of beef heart supply nitrogen, amino acids, vitamins and growth factors. Dextrose provides a fermentable carbon/energy source. The Tris (hydroxymethyl aminomethane / Tris-HCl) buffer system maintains a stable near-neutral pH through active bacterial growth. L-cysteine hydrochloride acts as a reducing agent, lowering redox potential to favour recovery of anaerobic and fastidious organisms, while magnesium sulfate and ferrous sulfate act as essential co-factors. Sodium carbonate assists pH stabilisation and CO_2 availability, which is stimulatory for many fastidious species. Morello and Ellner demonstrated superior growth of Staphylococcus aureus, Escherichia coli, viridans streptococci and Enterococcus groups in this formulation relative to common general-purpose broths of the time.

4. TYPICAL COMPOSITION (per litre)

Ingredient	g/L
Pancreatic Digest of Casein	10.00
Yeast Extract	5.00
Proteose Peptone No. 3	5.00
Tryptic Digest of Beef Heart	3.00
Dextrose (Glucose)	2.50
Sodium Chloride	5.00
L-Cysteine Hydrochloride	0.10
Magnesium Sulfate (anhydrous)	0.10
Ferrous Sulfate	0.02
Sodium Carbonate	0.60
Tris (hydroxymethyl) Aminomethane	0.83
Tris (hydroxymethyl) Aminomethane Hydrochloride	2.86

Final pH: 7.5 ± 0.2 at 25 °C. Formula may be adjusted/standardised to meet performance parameters, consistent with industry practice.

Optional supplement: Defibrinated Sheep Blood, 50–100 mL/L (5–10%), or SPS (Sodium Polyanethol Sulfonate) at 0.01% final concentration for blood-culture applications.

5. PREPARATION

- Suspend 35.0 g of dehydrated medium in 1 L of purified or distilled water.
- Heat with gentle agitation to boiling until completely dissolved.
- If desired, add SPS to a final concentration of 0.01% for blood-culture use.
- Dispense into tubes, bottles or flasks as required.
- Sterilise by autoclaving at 121 °C (15 psi) for 15 minutes.
- Cool to 45–50 °C. For enriched broth, aseptically add 50–100 mL/L sterile defibrinated blood or serum and mix gently.
- The prepared broth should appear clear to light amber and free of precipitate.

6. INCUBATION

Inoculate aseptically and incubate at 35–37 °C, aerobically, microaerophilically, or in 5% CO2 as required by the target organism. Visible turbidity is typically observed within 18–48 hours; blood-culture applications may be held and examined for up to 7 days.

7. QUALITY CONTROL SPECIFICATION

Organism	Inoculum (CFU)	Expected Result
Staphylococcus aureus ATCC 25923	≤100 CFU	Luxuriant growth, turbidity within 18–24 h
Escherichia coli ATCC 25922	≤100 CFU	Growth, turbidity within 18–24 h
Enterococcus faecalis ATCC 29212	≤100 CFU	Growth, turbidity within 18–24 h
Clostridium perfringens ATCC 13124	≤100 CFU	Growth under anaerobic conditions
Uninoculated control	—	No growth / no turbidity

8. APPLICATIONS

- Primary recovery of microorganisms from blood cultures (aerobic and anaerobic), typically with SPS supplementation
- Enrichment of fastidious pathogens such as Haemophilus influenzae and Neisseria gonorrhoeae from blood, CSF and genital swabs
- Cultivation and maintenance of streptococci, staphylococci and Enterobacteriaceae
- Support medium for antimicrobial susceptibility testing workflows
- Base for selective enrichment broths when supplemented with antibiotics for food microbiology testing

9. STORAGE & STABILITY

Dehydrated Medium	Store at 15–30 °C in a tightly closed container, protected from moisture and light
Prepared Broth	Store at 2–8 °C in sealed containers; use within 2–4 weeks
Discard If	Turbid without inoculation, contaminated, or pH deviates from specification

10. INTENDED USE

For laboratory research and microbiological quality control use only. Not for human or veterinary consumption. Not for diagnostic use without appropriate validation.

11. LITERATURE / REFERENCES

- Morello, J.A. & Ellner, P.D. (1969). Superiority of Columbia broth in blood culture. Applied Microbiology, 17(1), 68–70.

• Ellner, P.D., Stoessel, C.J., Drakeford, E. & Vasi, F. (1966). A new culture medium for medical bacteriology. American Journal of Clinical Pathology, 45(4), 502–504.

• Reller, L.B., Murray, P.R. & MacLowry, J.D. (1982). Cumitech 1A: Blood Cultures II. American Society for Microbiology, Washington, D.C.

• Jorgensen, J.H. et al. (Eds.) (2015). Manual of Clinical Microbiology, 11th Edition, Vol. 1. American Society for Microbiology.