

SIM MEDIUM (7221)

Intended Use

SIM Medium is used for the differentiation of microorganisms on the basis of hydrogen sulfide production, indole production, and motility.

Product Summary and Explanation

Semisolid media have been used extensively in the determination of bacterial motility.¹ The production of hydrogen sulfide, indole formation, and motility are useful diagnostic tests in the identification of *Enterobacteriaceae*, especially *Salmonella* spp. and *Shigella* spp.

In 1940, Sulkin and Willett² demonstrated motility, hydrogen sulfide production, and carbohydrate fermentation by members of *Salmonella* and *Shigella* groups. They called attention to the “brush-like growth” or motility of the typhoid organisms. Greene et al. used SIM Medium to detect motility in a large series of cultures of typhoid organisms.³

Principles of the Procedure

The nitrogen, carbon, and amino acids sources in SIM Medium are provided by Enzymatic Digest of Casein and Enzymatic Digest of Animal Tissue. Ferric Ammonium Citrate and Sodium Thiosulfate are used to detect hydrogen sulfide production. H₂S gas reacts with Ferric Ammonium Citrate to produce ferrous sulfide, a black precipitate. SIM Medium is a semi-solid, due to the low concentration of agar. The semi-solid nature of this medium allows for easy visual determination of motility which appears as growth extending outward from the original line of inoculation.

Enzymatic Digest of Casein contains tryptophane, which is converted to indole. Indole is detected after incubation by the addition of Kovac’s Reagent.

Formula / Liter

Enzymatic Digest of Casein 20 g
 Enzymatic Digest of Animal Tissue..... 6.1 g
 Ferric Ammonium Citrate..... 0.2 g
 Sodium Thiosulfate 0.2 g
 Agar 3.5 g

Final pH: 7.3 ± 0.2 at 25°C

Formula may be adjusted and/or supplemented as required to meet performance specifications.

Precaution

1. For Laboratory Use.

Directions

1. Dissolve 30 g of the medium in one liter of purified water.
2. Heat with frequent agitation to completely dissolve the medium.
3. Autoclave at 121°C for 15 minutes.

Quality Control Specifications

Dehydrated Appearance: Powder is homogeneous, free flowing, and beige.

Prepared Appearance: Prepared medium is light amber and clear to slightly hazy.

Expected Cultural Response: Cultural response in SIM Medium at 35°C after 18 - 24 hours of incubation.

Microorganism	Approx. Inoculum (CFU)	Expected Results			
		Recovery	Indole	Motility	H ₂ S
<i>Escherichia coli</i> ATCC® 25922	2 – 3 colonies; direct inoculum	+	+	+	-
<i>Salmonella typhimurium</i> ATCC® 14028	2 – 3 colonies; direct inoculum	+	-	+	+
<i>Shigella flexneri</i> ATCC® 12022	2 – 3 colonies; direct inoculum	+	-	-	-

The organisms listed are the minimum that should be used for quality control testing.

Test Procedure

1. Using a wire, inoculate test organism two-thirds into the medium with stab motion.
2. Incubate with loose caps at $35 \pm 2^\circ\text{C}$ for 18 – 24 hours.
3. Examine tubes after incubation for motility and H_2S production.
4. Add 3 – 4 drops of Kovac's Reagent to each tube. Record as indole positive if a pink or red color appear, or as indole negative if there is no color change. Add Kovac's Reagent after determining motility and H_2S production.

Results

Motility is indicated by turbidity of the medium or growth extending from inoculating stab line. H_2S production is shown by a blackening along the stab line. Indole production is seen as the production of a red color after the addition of Kovac's Reagent. Indole is produced from the tryptophane present in the medium.

Refer to appropriate references for complete identification of *Enterobacteriaceae*.⁴

Storage

Store sealed bottle containing the dehydrated medium at 2 - 30°C . Once opened and recapped, place container in a low humidity environment at the same storage temperature. Protect from moisture and light by keeping container tightly closed.

Expiration

Refer to expiration date stamped on the container. The dehydrated medium should be discarded if not free flowing, or if appearance has changed from the original color. Expiry applies to medium in its intact container when stored as directed.

Limitations of the Procedure

1. Due to nutritional variation, some strains may grow poorly or fail to grow on this medium.
2. Avoid inoculum from liquid or broth suspension as growth initiation will be delayed.⁵
3. Reactions are not sufficient to speciate organisms. Additional biochemical and serological tests are required for confirmation.⁶

Packaging

SIM Medium	Code No.	7221A	500 g
		7221B	2 kg
		7221C	10 kg

References

1. **Tittsler, R. P. and L. A. Sandholzer.** 1936. The use of semi-solid agar for the detection of bacteria motility. *J. Bact.* **31**:575.
2. **Sulkin and Willett.** 1940. *J. Lab Clin. Med.* **25**:649.
3. **Greene, R. A., E. F. Blum, C. T. Decoro, R. B. Fairchild, M. T. Kapla, J. L. Landau, and T. R. Sharp.** 1951. Rapid method for the detection of motility. *J. Bact.* **62**:347.
4. **Murray, P. R., E. J. Baron, M. A. Pfaller, F. C. Tenover, and R. H. Tenover. (eds.)** 1995. *Manual of clinical microbiology*. 6th ed. American Society for Microbiology, Washington, D.C.
5. **Sosa.** 1943. *Rev. Inst. Bact.* **11**:286.
6. **MacFaddin, J. D.** 1985. *Media for isolation-cultivation-identification-maintenance of medical bacteria*, Williams & Wilkins, Baltimore, MD.

Technical Information

Contact Acumedia Manufacturers, Inc. for Technical Service or questions involving dehydrated culture media preparation or performance at (517)372-9200 or fax us at (517)372-2006.