

**Product :
TRIPLE SUGAR IRON AGAR (TSI AGAR)**
Specification

Solid differential medium for the identification of enterobacteria according to ISO standards 6579, 6785 and 10272.

Formula * in g/L

Peptone	20.000		
Meat extract	3.000	Iron(III) citrate	0.300
Yeast extract	3.000	Sodium thiosulphate	0.300
Lactose	10.000	Phenol red	0.024
Sucrose	10.000	Agar	12.000
Dextrose	1.000		
Sodium chloride	5.000		
		Final pH 7.4 ±0.2 at 25 °C	

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* Adjusted and /or supplemented as required to meet performance criteria

Directions

Dissolve 64,6 g of powder in 1 L of distilled water and bring to the boil. Dispense into tubes and sterilize at 121°C for 15 minutes. Leave to solidify with short slants and good butts.

Description

TSI Agar is a modification of the classical Kliger's agar. 1% sucrose has been added to this medium to differentiate *Proteus* and *Hafnia* (sucrose positive) from *Salmonella* and *Shigella* (sucrose negative).

Sugar degradation with acid formation is detected by turning an indicator (phenol red) to yellow, whereas alkalinization turns it to purple. When only glucose is degraded, the acid production is weak and is evaporated on the surface, so the indicator may be re-oxidised producing an alkaline surface (red) and an acid butt (yellow). If lactose or sucrose is degraded, acid production is intense and the entire medium (surface and butt) turns yellow. Gas production is detected by the formation of bubbles and occasionally cracks in the agar.

Hydrogen sulfide production, from thiosulfate or sulphured amino-acids from peptones, is detected by the formation of black FeS precipitate when the medium reacts with iron salts.

Use the medium in slanted tubes with a good butt and a short slant. Inoculate by streaking on the surface and stabbing deeply. It is advisable to use tubes with cotton plugs, in order to allow a re-oxidation of the indicator. If screw caps are used, they must be loose. See the following page for the table of reading (observations) and interpretation of results in TSI Agar.

Quality control
Incubation temperature: 37°C ±1,0

Incubation time: 24 ± 3h

Inoculum: Stab the butt and streak the slant.

Microorganism

Shigella flexneri ATCC® 12022
Proteus mirabilis ATCC® 43071
Escherichia coli ATCC® 25922
Salmonella typhimurium ATCC® 14028
Salmonella abony NCTC® 6017
Shigella sonnei ATCC® 9290

Growth

Good to very good
Good to very good
Good to very good
Good to very good
Good to very good
Good to very good

Remarks

Slant:K; Butt:A; G(-); H2S (-)
Slant:K; Butt:A; G(+); H2S (+)
Slant:A; Butt:A; G(+); H2S (-)
Slant:K Butt:A; G(+); H2S (+)
Slant:K; Butt:A; G(D); H2S (+)
Slant:K; Butt:A; G(-); H2S (-)

References

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- EUROPEAN PHARMACOPOEIA (2005) Supp. 5.8 § 2.6.13 Test for specified microorganisms. EDQM. Strasbourg E.U.
- FIL-IDF (1991) International Standard 93A. Milk and Milk Products. Detection of Salmonella species.
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- HORWITZ, W. (2000) Official Methods of Analysis. 17th ed. AOAC International. Gaithersburg. Md. USA.
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- ISO Standard 6579-1 (2017) Microbiology of food chain - Horizontal method for the detection, enumeration and serotyping of Salmonella - Part 1 : Detection of Salmonella spp.
- ISO 6785 Standard (2001) Milk and milk Products - Detection of Salmonella spp.
- ISO 10272 Standard (1995) Microbiology of foods and animal feeding stuffs - Horizontal method for the detection of thermotolerant Campylobacter.
- ISO 11133:2014/ Adm 1:2018. Microbiology of food, animal feed and water. Preparation, production, storage and performance testing of culture media.
- ISO 21567 Standard (2004) Microbiology of food and animal feeding stuffs.- Horizontal method for the detection of Shigella spp.
- KRUMWIEDE, C. & L. KOHN (1917) A triple sugar modification of the Russell Double Sugar Medium. J. Med. Res. 37:225-229.
- US PHARMACOPOEIA (2002) <61> Microbial Limit Tests. 25th ed. US Pharmacopoeial Convention Inc. Rockville. Md. USA.

Storage

For laboratory use only. Keep tightly closed, away from bright light, in a cool dry place (+4 °C to 30 °C).