

Technical Data Sheet

GranuCult™
 XLD (Xylose Lysine Deoxycholate) Agar
 acc. ISO 6579
 Ordering number: 1.05287.0500

For the isolation and differentiation of Salmonella from food and animal feed, water and other materials.

This culture medium complies with the specifications given by EN ISO 6579, EN ISO/FDIS 6579-1, EN ISO 19250 and APHA.

Mode of Action

This medium relies on three indicator systems: degradation of xylose, lactose and sucrose to acid causes phenol red to change its color to yellow, lysine hydrochloride and also phenol red, sodium thiosulfate and iron.

Production of hydrogen sulfide is indicated by thiosulfate and iron(III) salt, which reacts to form a precipitate of black iron sulfide in the colonies. Bacteria which decarboxylate lysine to cadaverine can be recognized by the appearance of a purple coloration around the colonies due to an increase in pH. These reactions can proceed simultaneously or successively, this may cause the pH indicator to exhibit various shades of color or it may change its color from yellow to red on prolonged incubation.

The culture medium is moderately selective, thus the growth of unwanted organisms is suppressed, while sought bacteria can be tentatively grouped by reading the net effect of carbohydrate dissimilation, lysine decarboxylation and the formation of hydrogen sulfide leading to black colonies. Agar is the solidifying agent.

Typical Composition

Specified by ISO 6579, ISO FDIS 6579, ISO 19250, APHA		GranuCult™ XLD agar acc. ISO 6579	
Yeast Extract	3 g/l	Yeast Extract	3 g/l
NaCl	5 g/l	NaCl	5 g/l
Xylose	3.75 g/l	D(+)-Xylose	3.75 g/l
Lactose	7.5 g/l	Lactose	7.5 g/l
Sucrose	7.5 g/l	Sucrose	7.5 g/l
L-Lysine Hydrochloride	5 g/l	L(+)-Lysine	5 g/l
Sodium Thiosulfate	6.8 g/l	Sodium Thiosulfate	6.8 g/l
Iron(III) Ammonium Citrate	0.8 g/l	Ammonium Iron(III) Citrate	0.8 g/l
Phenol Red	0.08 g/l	Phenol Red	0.08 g/l
Sodium Deoxycholate	1 g/l	Sodium Deoxycholate	1 g/l
Agar	9-18 g/l	Agar-Agar*	14.5 g/l
Water	1000 ml/l	Water	n/a
pH at 25 °C	7.4 ± 0.2	pH at 25 °C	7.4 ± 0.2

* Agar-Agar is equivalent to other different terms of agar.

Preparation

Dissolve 55 g in 1 l of purified water. Heat in boiling water and agitate frequently until completely dissolved. Do not autoclave! Precipitates may be formed but do not affect the performance of the culture medium.

Preparation of large volumes, overheating and prolonged storage in water bath (47-50 °C) is to be avoided.

The prepared medium is clear and red. The pH value at 25 °C is in the range of 7.2-7.6.

There should be no visible moisture on the plates before use. When moisture is present, the plates should be dried for the minimum time required to remove visible moisture, following the procedure as described by EN ISO 11133.

Experimental Procedure and Evaluation

Depend on the purpose for which the medium is used.

Following the procedure given by EN ISO 6579, inoculate the surface of the medium from the selective enriched cultures so that well-isolated colonies will be obtained.

Incubate the inoculated plates inverted under aerobic conditions, e.g. acc. to EN ISO 6579 at 36-38 °C for 21-27 h.

Typical colonies of *Salmonella* on XLD agar acc. ISO 6579 have a black center and a lightly transparent zone of reddish color due to the color change of the indicator.

Salmonella H₂S-negative variants grown on XLD agar acc. ISO 6579 are pink with a darker pink center. Lactose-positive *Salmonella* grown on XLD agar acc. ISO 6579 are yellow with or without blackening.

A tentative grouping of isolates can be made from colonial appearance on XLD agar by discriminating roughly three groups of *Enterobacteriaceae*:

Colony color	Genera
Colonies with red zones and black center	<i>Salmonella</i> , <i>Arizonae</i> and <i>Edwardsiella</i>
Colonies with red zones and red center	<i>Shigella</i> , <i>Providencia</i> and hydrogen sulfide-negative <i>Salmonella</i>
Colonies with yellow haloes and yellow center	<i>Escherichia</i> , <i>Enterobacter</i> , <i>Citrobacter</i> , <i>Kluyvera</i> , <i>Klebsiella</i> , <i>Hafnia</i> , <i>Serratia</i> and <i>Proteus</i> and the species <i>Yersinia enterocolitica</i>

This presumptive evidence must be confirmed by carrying out the usual tests.

Storage

Store at +15 °C to +25 °C, dry and tightly closed. Do not use clumped or discolored medium. Protect from UV light (including sun light). For *in vitro* use only.

According to EN ISO/FDIS 6579-1, self-prepared plates can be stored at +2 °C to +8 °C in the dark and protected against evaporation for up to four weeks.

Quality Control

Function	Control strains	Incubation	Reference medium	Method of control	Expected results
Productivity	<i>Salmonella</i> Typhimurium ATCC® 14028	21-27 h at 36-38 °C	Tryptic Soy Agar (TSA)	Quantitative	Recovery ≥ 50 %, colonies with black center
	<i>Salmonella</i> Enteritidis ATCC® 13076				
Selectivity	<i>Escherichia coli</i> ATCC® 8739	21-27 h at 36-38 °C	-	Qualitative	Growth or partial inhibition, yellow colonies
	<i>Escherichia coli</i> ATCC® 25922				Total inhibition
	<i>Enterococcus faecalis</i> ATCC® 19433				
	<i>Enterococcus faecalis</i> ATCC® 29212				

Please refer to the actual batch related Certificate of Analysis.

The performance test is in accordance with the current version of EN ISO 11133. A

recovery rate of 50 % is equivalent to a productivity value of 0.5.



Salmonella Typhimurium
ATCC® 14028



Shigella
flexneri
ATCC® 12022



Klebsiella
pneumoniae
ATCC® 13883

Literature

APHA (2015): Compendium of Methods for the Microbiological Examination of Foods. 5th ed. American Public Health Association, Washington, D.C.

Becker, H., Eberhardt, S. and Märklbauer, E. (2003): Comparative studies on the detection of *Salmonellae* in milk and milk products using a horizontal (ISO 6579:2002) and a vertical (ISO 6785/IDF 93:2001) International Standard. Arch. Lebensmittelhyg. **54**: 118-121.

ISO International Standardisation Organisation. Microbiology of food and animal feeding stuffs - Horizontal method for the detection of *Salmonella* spp. EN ISO 6579:2002.

ISO International Standardisation Organisation. Microbiology of the food chain - Horizontal method for the detection, enumeration and serotyping of *Salmonella* - Part 1: Horizontal method for the detection of *Salmonella* spp. EN ISO/FDIS 6579-1:2015.

ISO International Standardisation Organisation. Water quality - Detection of *Salmonella* spp. EN ISO 19250:2010.

ISO International Standardisation Organisation. Microbiology of food, animal feed and water - Preparation, production, storage and performance testing of culture media. EN ISO 11133:2014.

Mooijman, K.A. (2012): Culture media for the isolation of *Salmonella*. In: Handbook of Culture Media for Food and Water Microbiology. (Corry, J.E.L., Curtis, G.D.W. and Baird, R.M. eds), pp. 261-286. Royal Society of Chemistry, Cambridge, UK.

Ordering Information

Product	Cat. No.	Pack size	Other pack sizes available
GranuCult™ XLD (Xylose Lysine Deoxycholate) Agar acc. ISO 6579	1.05287.0500	500g	
ReadyPlate™ XLD Agar ISO 6579	1.46751.0020	20 x 90 mm	
GranuCult™ Buffered Peptone Water acc. ISO 6579, ISO 21528, ISO 22964, FDA-BAM and EP	1.07228.0500	500 g	5 kg, 25 kg
Readybag® Buffered Peptone Water acc. ISO 6579, ISO 21528, ISO 22964, FDA-BAM and EP, 5.7 g, irradiated	1.02448.0060	60 bags	60 bags x 29 g 35 bags x 86 g

Product	Cat. No.	Pack size	Other pack sizes available
ReadyTube™ 9 BPW ISO 6579, 6887, 21528	1.46142.0020	20 x 9 ml	100 x 9 ml, 6 x 225 ml, 6 x 1000 ml, 1 x 2000 ml
GranuCult™ MKTTn (MULLER-KAUFFMANN Tetrathionate Novobiocin) Broth (Base) acc. ISO 6579	1.05878.0500	500 g	
Potassium Iodide	1.05043.0250	250 g	
Iodine resublimed	1.04761.0100	100 g	
GranuCult™ RVS (RAPPAPORT-VASSILIADIS-Soya) Broth (Base) acc. ISO 6579	1.07700.0500	500 g	
Novobiocin Sodium Salt	N6160-1-G	1 g	5 g, 25 g
ReadyTube™ 10 RVS Broth ISO 6579	1.46694.0020	20 x 10 ml	100 x 10 ml
MSRV (Modified Semi-solid RAPPAPORT-VASSILIADIS) Medium (Base) acc. ISO 6579	1.09878.0500	500 g	
MSRV Selective Supplement	1.09874.0010	10 x 1 vial	
ReadyTube™ 12 MSRV Medium ISO 6579	1.46694.0100	100 x 12 ml	
RAMBACH® Agar	1.07500.0001	4 x 250 ml	4 x 1000 ml, 4 x 50 l
RAMBACH® Agar ready-to-use	1.46719.0020	20 x 90 mm	100 x 90 mm
Singlepath® Salmonella	1.04140.0001	25 test	
Bismuth Sulfite Agar acc WILSON-BLAIR	1.05418.0500	500 g	
Triple Sugar Iron Agar	1.03915.0500	500 g	
Urea Agar (Base) acc CHRISTIANSEN	1.08492.0500	500 g	
Urea GR for Analysis ACS, Reagent Ph Eur	1.08487.0500	500 g	
MR-VP (Methyl Red-VOGES-PROSKAUER) Broth	1.05712.0500	500 g	
KOVACS' Indole Reagent	1.09293.0100	100 ml	

Merck KGaA

Frankfurter Strasse 250 64293
Darmstadt, Germany Fax: +49
(0) 61 51 / 72-60 80

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