CHROMagar™
The Chromogenic Media Pioneer

Performance of CHROMagar™ Pseudomonas

Chromogenic Culture Medium for the Isolation and Detection of Pseudomonas species

Laboratory

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This report contains 14 pages, including 1 page of annexes

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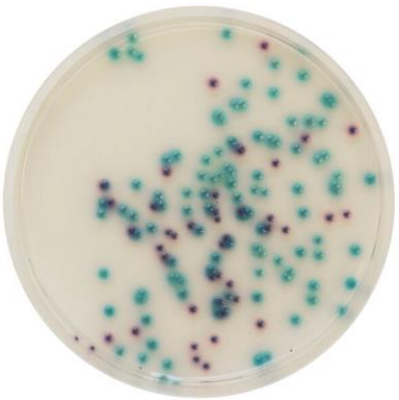
1. Introduction

Pseudomonas species are Gram-negative bacteria widely distributed in the environment, using a large range of nutritional sources, even very simple nutritional environments without any organic compounds. These bacteria are a valid indicator of the effectiveness of recreational water disinfection. This parameter is currently used as a criterion in wading pool and swimming pool regulations. *Pseudomonas* species can remain viable for a long time in many different habitats, under adverse conditions, and are found in water, saline solutions, utensils, cosmetics, pharmaceuticals, disinfectants and many manufactured foods. Cold-tolerant *Pseudomonas* species are a major food spoilage problem in refrigerated meat, fish, shellfish, and dairy products. As *Pseudomonas* thrive in water systems forming biofilms which render water treatment ineffective, they can be the source of contamination in the food and beverage industry.

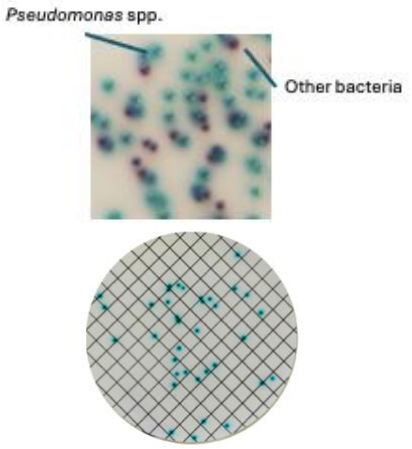
In addition, *P. aeruginosa* is important as an opportunistic pathogen whose transmission is often associated with water. Pathogenic *Pseudomonas* are present throughout the body, most often in the urinary tract, respiratory tract, blood, and wounds. Its remarkable ability to form biofilms is an additional factor in pathogenicity and antibiotic tolerance.

CHROMagar™ Pseudomonas (ref. PS83) has been developed to enable the detection and enumeration of *Pseudomonas* species in water, food industry (meat and surfaces). ***Pseudomonas* species grow specifically as blue green colonies under aerobic conditions at 30°C for 24-36 hours (*Pseudomonas* incubation).** Depending on the sample type and the field of application, ***P. aeruginosa* growth is favored by incubation at 37°C for 24-36 h or at 41°C for 24 h (*P. aeruginosa* incubation)**. Most of enterobacteria grow as mauve to violet colonies or are inhibited, and selectivity agents inhibit Gram-positive bacteria.

CHROMagar™ Pseudomonas consists of a powder base which is stored at 15 to 30 °C. Samples can be streaked or spread onto agar plates. In addition, water samples can be analysed by the filtration method on CHROMagar™ Pseudomonas plates. Suspected colonies can be confirmed by the oxidase test. Filtration with polycarbonate filters give optimal performances.



CHROMagar™ Pseudomonas



Membrane filtration method

This document compiles CHROMagar™ Pseudomonas evaluations at two stages:

- In-house evaluations of the chromogenic formula with pure strains.
- Independent laboratory evaluations of CHROMagar™ Pseudomonas using environmental samples (soil, sludge, sewage, sea sediment, and water), agri-food samples and clinical samples.

2. Performance of the chromogenic formula

2.1. Analytical data

Different strains of *Pseudomonas* species (n=23) and other bacterial strains (n=27) were seeded by the streaking and spreading techniques on CHROMagar™ Pseudomonas. Plates were incubated under aerobic conditions either at 30°C for 36 hours and at 37°C for 24-36 h or at 41°C for 24h. Results are shown below in Tables I, II and III, respectively.

Table I. Bacterial strains tested to evaluate the ***Pseudomonas* spp. inclusivity** of CHROMagar™ Pseudomonas. **Aerobic incubation at 30°C for 36 hours (*Pseudomonas* incubation).**

Bacterial Species	Strain #	CHROMagar™ Pseudomonas (*Pseudomonas* incubation)
Pseudomonas aeruginosa	ATCC® 9027	BG++, 1.5-2 mm, halo++
P. aeruginosa	ATCC® 10145	BG+++, 2-3 mm, BG hallo+++
P. aeruginosa	ATCC® 27853	BG, 3-4 mm
P. aeruginosa	AR6748	BG+, 3 mm
P. aeruginosa	AR6436	BG+, 2.5 mm
P. aeruginosa	AR6439	BG+, 1.5 mm
P. aeruginosa	AR5847	BG++, 2-3 mm, halo++
P. aeruginosa	AR5658	BG+, 2-3 mm, halo -/+
P. aeruginosa	AR5586	BG+, 2-4 mm, halo+/-
P. aeruginosa	AR5588	BG+, 2.5-3 mm, halo++
P. aeruginosa	AR5197	BG+, 2-3 mm, halo+
P. aeruginosa	AR5196	BG+, 3 mm, halo -/+
P. aeruginosa	AR6330	BG--/+, 1.5 mm
P. otitidis	AR6785	BG+/-, 3 mm
P. monteillii	AR5573	BG++, 1-3 mm
P. mosselii	AR6787	BG+, 2 mm
Pseudomonas spp.	AR6043	BG++, 1-2 mm halo++
P. fluorescens	AR6055	BG-/+, 0.6-1 mm
P. putida	AR6164	BG+, 3 mm
P. mendocina	AR6056	Unc. to B--/+, 0.6 mm *
P. mendocina	AR6214	BG+, 1 mm

*BG, blue green; unc., uncolored; +, -, color intensity; size in mm; CFU, colony forming units; AR, CHROMagar™ strain collection; ND, not determined. * Some fragile Pseudomonas species growing small colonies may need an incubation of 48 hours.*

Colonies of *Pseudomonas* species are easily detected in blue-green with or without blue-green halo on CHROMagar™ Pseudomonas under aerobic conditions at 30°C for 36 hours with sensibility at 100%. *Pseudomonas* species can be easily recovered on CHROMagar™ Pseudomonas plates.

Table II. Bacterial strains tested to evaluate the ***P. aeruginosa*** **inclusivity** of CHROMagar™ Pseudomonas. **Aerobic incubation at 37°C for 24-36 h or at 41°C for 24h (*P. aeruginosa* incubation).**

Bacterial Species	Strain #	CHROMagar™ Pseudomonas (*P. aeruginosa* incubation)		
		37°C for 24 h	37°C for 36 h	41°C for 24 h
Pseudomonas aeruginosa	ATCC® 27853	BG++, 3 mm	BG++, 4 mm	BG++, 2,5-3 mm
P. aeruginosa	ATCC® 10145	BG++, 1.2 mm	BG++, 3 mm	BG++, 1-1.5 mm
P. aeruginosa	ATCC® 9027	BG+, 1.5-2 mm	BG++, 3 mm	BG++, 3-4 mm
P. aeruginosa	AR5196	BG+, 1-2 mm	BG+, 2-3 mm	BG+, 1.5-2 mm
P. aeruginosa	AR5197	BG+, 0.6-1 mm	BG+, 1.5 mm	BG++, 1.5 mm
P. aeruginosa	AR5586	BG-/+, 0.8-1 mm	BG++, 3 mm	BG++, 3 mm
P. aeruginosa	AR5588	BG+/-, 1.5 mm	BG+, 2.5 mm	BG+, 2.5-3 mm
P. aeruginosa	AR5658	BG+, 1.5-2	BG+, 3 mm	BG+, 2.5 mm
P. aeruginosa	AR5847	BG+, 1-2 mm	BG+, 3 mm	BG+, 2.5-3 mm
P. aeruginosa	AR6106	BG+, 1 mm	BG+, 3.5 mm	ND
P. aeruginosa	AR6330	BG-/+ DZ	BG+, 1 mm	BG+, 1 mm
P. aeruginosa	AR6436	BG+, 2-3 mm	BG+, 3 mm	BG+, 3 mm
P. aeruginosa	AR6439	BG+/-, 1 mm	BG+, 2 mm	BG+, 2,5 mm
P. otitidis	AR6785	BG+, 3 mm	BG+, 1.5 mm	BG+, 2 mm
P. putida	AR6164	BG-/+, 1.5-3 mm	BG+/-, 2.5 mm	BG+, 1.5-2 mm
P. citronellolis	AR5572	BG+/-, 0.6 mm	BG++, 2 mm	-
P. mosselii	AR6787	BG+, 2 mm	BG+, 2 mm	-
P. fluorescens	AR6748	BG-/+, 1.5 mm	BG+, 2 mm	-
P. monteillii	AR5573	Unc. to BG--/+, 0.8	BG+, 1.5 mm	
P. mendocina	AR6214	DZ BG, Unc. 1.5	BG+, 1.5 mm	-
P. fluorescens	AR6055	-	DZ B+	-
P. mendocina	AR6056	Unc. trace	Unc. trace	-

BG, blue green; unc., uncolored; +, -, color intensity; size in mm; DZ, dense zone; -, growth absence; AR, CHROMagar™ strain collection; ND, not determined.

P. aeruginosa growth is favored with incubations at 37°C for 24-36 h or at 41°C for 24h. The choice of the incubation temperature depends on the type of sample and application field. Some multi-drug resistant Gram (-) bacteria may develop as false-positive colonies on CHROMagar™ Pseudomonas, but they can be distinguished by the biochemical oxidase test (see point 2.2).

Table III. Microbial strains tested to evaluate **exclusivity** of CHROMagar™ Pseudomonas. **Aerobic incubation at 30°C for 36 hours (*Pseudomonas* incubation).**

Microbial Species	Strain #	CHROMagar™ Pseudomonas (*Pseudomonas* incubation)
Staphylococcus aureus subsp. *aureus*	ATCC® 25923	DZ B, -
S. saprophyticus	AR3883	Trace B, -
Escherichia coli	ATCC® 25922	Trace M, -
E. coli	CIP 105860	-
E. col (IMP)	NCTC 13476	M+, 2 mm
E. coli (ESBL)	AR5191	M++, 1.5-2 mm
E. coli	AR3740	-
Klebsiella pneumoniae (KPC)	ATCC® BAA 1705	V++, 3 mm
K. pneumoniae (KPC)	AR5251	V++, 1.5-2.5 mm
K. pneumoniae	AR5239	DZ B++, µcol.
K. oxytoca	AR5755	-
Enterococcus faecalis	AR3906	-
E. faecalis	AR3908	-
E. faecium (VRE)	AR5199	-
E. avium	AR5258	-
Proteus mirabilis	AR3022	Unc., 0.4-1 mm, brown halo
P. vulgaris	AR3919	Unc. DZ
Providencia stuartii	AR5704	Unc. DZ
Acinetobacter baumannii	SN96-461	DZ B+, µcol.
Pseudoxanthomonas mexicana	AR6020	-
Ralstonia pickettii	AR6172	-
Aeromonas hydrophila	AR5469	
Stenotrophomonas maltophilia	AR5319	BG+, 1,5 mm *
Achromobacter xylosoxidans	AR6600	DZ BG-/+
Serratia marcescens	AR5569	V-/+, 3 mm
Candida albicans	ATCC® 10231	DZ B, unc. to B-/+, 0.8 mm
C. tropicalis	ATCC® 1369	DZ B+

B, blue; M, mauve; V, violet; Unc., uncolored; +, -, color intensity; DZ, dense zone; µcol., micro-colonies; -, growth absence; size in mm; ESBL, Extended-Spectrum β-Lactamases; IMP, active-on-imipenem carbapenemase type; KPC, Klebsiella pneumoniae carbapenemase type; VRE, vancomycin-resistant Enterococcus ; AR, CHROMagar™ strain collection.
** S. maltophilia incubated at 41°C for 24 h is inhibited (Unc. DZ) and no longer a false positive of Pseudomonas spp.*

The antimicrobial agents of CHROMagar™ Pseudomonas inhibit annex flora (*i.e.*, there is a trace or dense zone or they are flagged as -, in table III). Non-target bacteria capable of growing aerobically on CHROMagar™ Pseudomonas are differentiated (mauve to violet colonies).

CHROMagar™ Pseudomonas was employed with the filtration method using different types of filter membranes to evaluate performance with pure strains (Table IV).

Table IV. Performance of CHROMagar™ Pseudomonas with the **filtration method** using different types filter membranes. **Aerobic incubation at 30°C for 36 h.**

Microbial Species	Strain #	CHROMagar™ Pseudomonas (CFU), percent of recovery with filtration method vs TSA medium						
		Plate streaking	Nitrocellulose	Cellulose ester	Cellulose acetate	Nylon	Polyethersulfone	Polycarbonate*
K. pneumoniae (KPC)	AR5251	V++, 1-2 mm (73), 56%	No growth	No growth	No growth	V++, 0.4-1 mm (3) 2%	V++, 1 mm (1) 1%	V++, 0.6-2 mm (35), 27%
E. coli (ESBL)	AR5191	M+, 1-2 mm (63), 70%	No growth	M+, 1.5 mm (27), 68%	M+, 3 mm (1), 1%	No growth	M+, 0.6-2 mm (3) 3%	M++, 1-2 mm (31), 34%
P. monteillii	AR5573	BG++, 3 m (10) 28%	Unc., 2 mm (1) 3%	Unc., 3 mm (22) 13%	Unc.,3 mm (9) 5%	No growth	No growth	BG++, 3 mm (29), 67%
P. fluorescens	AR6055	BG+/-, 0.6-1.2 mm (80), 62%	Unc., 0.8 mm (25) 19%	Unc., 1 mm (22) 16%	Unc., 1 mm (1) 0.7%	Unc., 0.6 mm (1) 1%	BG--/+, 2 mm (10) 7%	BG+/-, 0.8 mm (133) 72%
P. mendocina	AR6056	Unc.-B--/+, 0.8-1 mm (34), 29%	Unc., 0.6 mm (1) 1%	BG+, 1 mm (170) 67%	Unc., 2 mm (108) 42%	No growth	Unc., 0.8-1 mm (4) 3%	Unc., 1 mm (54) 51%
Pseudomonas aeruginosa	ATCC® 10145	BG+++, 3 mm, BG halo (16), 43%	BG-/+, 3 mm (8) 22%	BG+/-, 2 mm (108) 68%	BG+/-, 5 mm (22) 14%	BG++, 2 mm (6) 16%	BG--/+, 3 mm, BG halo (9) 24%	BG++, 4 mm, BG halo (45) 96%
P. aeruginosa	ATCC® 9027	BG+++, 2 mm, GB halo (53), 74%	BG--/+, 2-3 mm (43) 32%	BG+/-, 2 mm (81) 41%	BG-/+, 3 mm (45) 23%	BG+/-, 1-3 mm (28) 39%	B+/-., 3 mm, BG*/- halo (25) 35%	BG++, 2 mm, BG ++ halo (48) 66%
P. aeruginosa	AR5197	BG++, 1.5 mm (44), 54%	BG--/+, 2 mm (35) 43%	BG+/-, 1 mm (120) 103%	BG-/+, 3 mm (13) 23%	BG+/-, 0.5 mm (7) 9%	BG-/+, 3 mm (14) 17%	BG+, 3 mm (110) 95%
P. aeruginosa	AR5588	BG+, 2 mm (17), 39%	BG--/+, 2 mm (20) 45%	BG-/+, 1 mm (85) 71%	Unc., 2 mm (32) 27%	BG+, 2 mm (16) 36%	BG+/-, 2-2.5 mm (16) 36%	BG+, 3 mm, BG++ halo (112) 93%
P. aeruginosa	AR5658	BG+++, 3 mm, BG halo (44), 19%	BG--/+, 2 mm (35) 15%	BG+, 1 mm (120) 39%	Unc., 2 mm (29) 9%	BG++, 2 mm (39) 17%	BG-/+, 2 mm, BG halo (39) 17%	BG++, 3 mm, BG+ halo (300), 98%

BG, blue-green; M, mauve; V, violet; Unc., uncolored; +, -, color intensity; size in mm; CFU, colony forming units; ND, not determined; KPC, Klebsiella pneumoniae carbapenemase type; ESBL, Extended-Spectrum β-Lactamases; TSA, tryptic soy agar; AR, CHROMagar™ strain collection.

* The chromogenic differentiating (blue-green and mauve to violet colonies), and selecting (inhibition of annex flora) performances of CHROMagar™ Pseudomonas meet the optimal performance using the filtration method with polycarbonate filters.

2.2. Confirmatory test of *Pseudomonas* species

Most *Pseudomonas* species (e.g., *P. luteola* is oxidase-negative) produce cytochrome oxidase, which enables a practical laboratory test based on the formation of a blue coloration, indophenol blue, from the oxidation of dimethyl-*p*-phenylenediamine in the presence of α-naphthol. A positive reaction to the oxidase test is a feature associated with *Pseudomonas* spp. The results of the oxidase reaction performed on bacterial strains grown on CHROMagar™ Pseudomonas are shown in Table V.

Table V. Oxidase test on bacterial colonies grown on CHROMagar™ Pseudomonas.

Microbial Species	Strain #	Oxidase test
Proteus mirabilis	AR3022	-
E. coli (ESBL)	AR5191	-
Klebsiella pneumoniae (KPC)	AR5251	-
Pseudomonas aeruginosa	AR5197	+
P. aeruginosa	AR5847	+
P. aeruginosa	AR5658	+
P. fluorescens	AR6055	+

ESBL, Extended-Spectrum β-Lactamases; KPC, Klebsiella pneumoniae carbapenemase type; AR, CHROMagar™ strain collection.

3. Independent laboratory evaluation of the product

3.1. Medium performance with environmental samples and strains.

CHROMagar™ Pseudomonas plates have been selected to be employed in the environmental field using pollutant-degrading *Pseudomonas* strains with different bacteriological methods (Table VI).

Table VI. Strains and environmental samples tested on CHROMagar™ Pseudomonas.

Laboratory, Country	*Pseudomonas* strains	Type of samples	Use of CHROMagar™ Pseudomonas
Institute of Environmental Sciences, Bogazici Ubiversity, Türkiye.	*Pseudomonas* sp. strain BIOMIG1^{BAC} (bioremediation use).	Different waste water compositions treated by a reactor system for water depollution, including the bioremediating strain.	Used to estimate bacterial concentration of reactor columns. Spreading method, incubation at 28°C for 24 h (1).
Institute of Environmental Sciences, Bogazici Ubiversity, Istanbul, Türkiye School of Civil and Environmental Engineering / School of Biology, Georgia Institute of Technology, USA.	*Pseudomonas* sp. strain BIOMIG1^{BAC} (bioremediation use).	Samples of activated sludge, sewage from an urban wastewater treatment plant, polluted surface soil and sea sediment.	Selective medium enabling the Isolation and characterization of a strain useful in bioremediation. Streaking method, incubation at 30°C for 24 h (2).
Depts. of Chemical and Mechanical Engineering Technology and Water and Environmental Engineering, Malaysia.	*P. putida* ATCC® 49128.	Samples of soil contaminated with diesel blends.	Bacterial survival over time in a bioremediation approach. Filtration method, incubation at 37°C for 24 h (3).

The survival curves of *P. putida* ATCC® 49128 enabled Sunar *et al.* (3) to assess strain's pollutant-sensitivity as part of the definition of a soil pollution biomarker. Thus, enumeration of *Pseudomonas* on filters is feasible with CHROMagar™ Pseudomonas medium.

3.2. Detection of *Pseudomonas* species from water and soil samples.

P. aeruginosa has been successfully detected in soil and wastewater samples (n=776), allowing the surveillance of non-clinical environment at both local and regional levels and the implementation of the One Health approach.

Moreover, the bacteriological quality, presence, and antimicrobial resistance of *P. aeruginosa* in swimming pools (n=120) were successfully examined using CHROMagar™ Pseudomonas plates (Table VII).

Table VII. Water and soil samples tested on CHROMagar™ Pseudomonas.

Laboratory, Country	Type of sample (# of samples)	Medium performance	Colony identification, test	Use of CHROMagar™ Pseudomonas
Aquarium of Genova, Italy.	Samples from a closed water system.	*P. flexibilis* (formerly *P. tuomuerensis*), blue-green colonies.	Biochemical ID confirmation, (oxidase-positives).	Search for *P. aeruginosa*. Filtration method on nitrocellulose filter, incubation at 37°C for 24 h. Personal communication, 2025.
Instituto Politécnico Nacional, Centro de Investigación en Alimentación y Desarrollo, Mexico.	Agricultural soil samples (n=100)	Detection of *Pseudomonas* spp., prevalence 89% *P. aeruginosa*, prevalence 55%	PCR, MALDI-TOF MS	Study of pathogenicity, heavy metal and antibiotic resistance. Streaking method, incubation at 37°C for 24 h (4).
Yamagata University, Tohoku University Graduate School of Medicine, Japan	Municipal and hospital wastewater samples (n=576)	Detection of MDR *P. aeruginosa*, prevalence 8-33%	AST	One-year monitoring of MDR *P. aeruginosa* in municipal water, streaking method, incubation at 37°C for 18–24 h (5).
Walter Sisulu University, South Africa.	Abattoir effluent and surface water samples (n=100)	Detection of MDR *P. aeruginosa*, prevalence 65.4% *P. fluorescents*, prevalence 27.3%	rtPCR	Study of antibiotic resistant P. aeruginosa in non-clinical environment Filtration method, incubation at 30°C for 24 h (6).
Alexandria University, High Institute of Public Health, Egypt.	Swimming pool water samples (n=120)	Detection of 26 isolates, including 9 MDR *Pseudomonas.*	Biochemical ID confirmation, AST	Assess the occurrence and the antimicrobial resistance of *P. aeruginosa* with CHROMagar™ Pseudomonas and PCA plates. Filtration method, incubation at 30°C for 24 h (7).

MDR, muti-drug resistant; AST, antibiotic susceptibility testing; MALDI-TOF MS*, Matrix-assisted laser desorption/ionization-time of flight; rtPCR, real-time PCR; PCA, plate count agar.*

CHROMagar™ Pseudomonas plates facilitated turn-around-time since biochemical testing for confirmation were carried out directly on blue-green colonies (7).

3.3. Detection of *Pseudomonas* in agri-food samples

CHROMagar™ Pseudomonas plates have been employed to assess the prevalence of *Pseudomonas* in the food chain (n=874).

Table VIII. Agri-food samples tested on CHROMagar™ Pseudomonas.

Laboratory, Country	Type of sample (# of samples)	Medium performance	Colony identification, test	Use of CHROMagar™ Pseudomonas
Capital Medical University, Beijing Center for Disease Prevention and Control, China Agricultural University, China	Pork- and chicken-derived foods (n=259).	Isolation of *P. aeruginosa*, prevalence 42% (n=109).	WGS, MLST	Study of the prevalence and spread of MDR *P. aeruginosa*, screening. Incubation at 30°C for 24 h (8).
Norwegian Institute of Food, Fisheries and Aquaculture Research Norwegian Veterinary Institute, Norway.	Raw poultry. Presumptive isolates (n=443).	Isolation of psychrotrophic *Pseudomonas* spp.: *P. fluorescens* (n=284) *P. syringae* (n=16) *P. chlororaphis* (n=13)	PCR, WGS, AST	Study of the prevalence of psychrotrophic *Pseudomonas* spp. in the food chain. Addition or not of ciprofloxacin. Incubation at 20°C for 48 h (9).
University of Malaysia, Malaysia.	Aquaculture, fish and water samples (n=74).	38 isolates, including *P. aeruginosa* (n=2).	PCR, AST	Surveillance of susceptibility of *P. aeruginosa*. Comparison to TSA. Incubation at 37°C for 24 h (10).
China Agricultural University, Ministry of Health, China National Center for Food Safety Risk Assessment, Institute of Infection & Immunity, UK.	Chickens and surrounding environment (n=98).	17 isolates, including β-lactam resistant *P. aeruginosa* (n=1) and *P. putida* (n=3).	MALDI-TOF MS, AST	Surveillance of animal husbandry. Addition of meropenem to the medium. Incubation at 30°C for 24 h (11).

AST, antibiotic susceptibility testing; WGS, whole-genome sequencing; MLST, multilocus sequence typing; MALDI-TOF MS*, Matrix-assisted laser desorption/ionization-time of flight; TSA, tryptic soy agar.*

The mass spectrometry (MS) and PCR assays are compatible with the use of CHROMagar™ Pseudomonas medium.

3.4. Detection of *Pseudomonas* in clinical samples

CHROMagar™ Pseudomonas does not claim to differentiate *P. aeruginosa*, but has proved to be effective at isolating this bacterium from a variety of clinical samples (n=394).

Table IX. Clinical isolates spiked in stool samples tested on CHROMagar™ Pseudomonas.

Laboratory, Country	Type of sample (# of samples)	Medium performance	Colony identification, test	Use of CHROMagar™ Pseudomonas
Northumbria University, Freeman Hospital, UK bioMérieux SA, France.	Respiratory samples, cough swabs and sputum (n=198).	Sensitivity 91% PPV 61% (24 h)	MALDI-TOF MS	Detection of *P. aeruginosa* in respiratory samples from patients with cystic fibrosis. Incubation at 37°C for 24-72 h (12).
Autonomous University of San Luis Potosí, La Salle Bajío University, Mexico.	Removable orthodontic appliances and oral mucosa in children (n=55).	Sensitivity 92% PPV 95%	Biochemical characterization	Evaluation of the frequency of *P. aeruginosa* in appliances and oral mucosa. Incubation at 36°C and 42°C for 24 h (13).
University of Fribourg, University of Lausanne, University Hospital Center, Switzerland.	Spiked stools with CRPA, clinical isolates (n=32).	Sensitivity 93% Specificity 100%	PCR, AST	Optimal detection of CRPA. Enrichment and selective culture of spiked stools on medium supplemented with 2mg/L meropenem. Incubation conditions are not indicated (14).
College of Science, University of Tikrit, College of Nursing, University of Basra, Iraq.	Swab samples of burns (n=62).	Detection of *P. aeruginosa* (n=42).	Biochemical ID confirmation	Evaluation of the incidence of *P. aeruginosa* in burn patients Incubation at 37°C for 24 h (15).
Trinity College Dublin, Tallaght Hospital, Maynooth University The National Children's Hospital, University College Dublin, Ireland.	Spiked sputum samples with cystic fibrosis-*P. aeruginosa* isolates (n=2).	Detection of *P. aeruginosa* in spiked sputum.	MALDI-TOF MS	Selective culture in the study of biofilm formation in cystic fibrosis. Incubation at 35°C for 48 h (16).
Al-Muthanna University, Iraq.	Samples of removed gallstones (n=45).	Detection of *P. aeruginosa* in biliary pebbles, prevalence 78%	Biochemical ID confirmation	Selective culture in the study of the role of *P. aeruginosa* in gallstone formation. Incubation at 37°C for 24-48 h (17).

PPV, positive predictive value; CRPA, carbapenem resistant Pseudomonas aeruginosa; AST, antibiotic susceptibility testing; MALDI-TOF MS*, Matrix-assisted laser desorption/ionization-time of flight.*

In the context of cystic fibrosis, *P. aeruginosa* exhibits a mucoid phenotype. CHROMagar™ Pseudomonas lacked specificity, with a range of non-fermentative Gram-negative species resembling *P. aeruginosa* (12). This medium was not developed for clinical diagnostics.

4. Conclusion

The performance of the CHROMagar™ Pseudomonas medium has been validated by a series of evaluations. These evaluations included inclusivity and exclusivity studies, as well as analyses of environmental, water, and agri-food samples. Additionally, the medium is useful with clinical samples.

Parameter	**Performance of CHROMagar™ Pseudomonas**
Inclusivity / Exclusivity	100 % / 100 % with bacterial & fungal strains.
Detection of *Pseudomonas* species (clinical samples)	Sensitivity 91-93 % [12-14] Specificity 100 % [14]
Appearance of colonies	Blue green with or without blue green halo.
Biochemical ID confirmation and other tests directly from colony	Test: oxidase [7, 13, 15, 17] MALDI-TOF MS [4, 11, 12, 16] and PCR [4, 6, 9, 10, 14]

In appropriate storage, the shelf life of the powder base is > 18 months. Advantages in the selectivity and visualisation of colonies on CHROMagar™ Pseudomonas plates compared to blood agar plates were reported from laboratories. Good preparation of the medium can be verified by isolating recommended ATCC strains for Quality Control testing.

The results on CHROMagar™ Pseudomonas plates are easy to read with the naked eye, strain confirmation can be carried out by biochemical characterization, PCR or by mass spectrometry.

CHROMagar™ Pseudomonas enables enumeration of *Pseudomonas* species when incubated at 30°C for 36 h and the enumeration of *P. aeruginosa* when incubated at 37°C for 24-36 h or at 41°C for 24 h. The use polycarbonate filters is recommended to meet the optimal performance.

This medium has very good performances, but the following limitations can be pointed out:

- Some multi-resistant Gram negative bacteria may grow as false positives.
- *Pseudomonas* species cannot be distinguished from one another by colour.

Hugo CRUZ RAMOS, PhD.

Scientific Expert

5. Literature

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Annexes

Annex 1. Website information about CHROMagar™ Pseudomonas.

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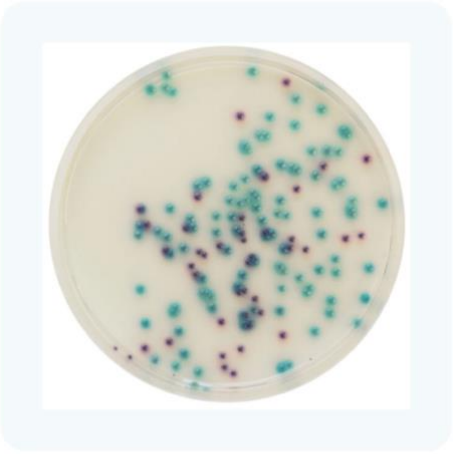
Clinical Microbiology A complete range of culture media to help in clinical diagnosis

Food Industry A complete range of culture media for the food industry

Water Testing A complete range of culture media for water analysis

Veterinary Microbiology A complete range of culture media for the veterinary sector



CHROMagar™ Pseudomonas

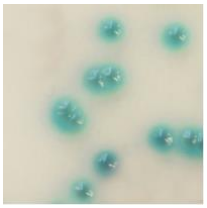
Pour la détection et l'isolement de *Pseudomonas* spp.

Order References

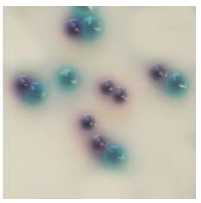
Please use these references when contacting your local distributor :

5000 mL Pack PS832

Colony appearance



Pseudomonas including *P. aeruginosa* Blue-green



Most of Enterobacteriaceae mauve to violet or inhibited

Composition

Powder Base	Total ..... 45.5 g/L Agar ..... 15.0 Peptone ..... 20.0 Salts ..... 8.0 Chromogenic mix ..... 2.5 Storage at 15/30 °C - pH: 7.5 +/- 0.2 Shelf Life ..... > 18 months
Usual Samples	Environmental, water, meat, air, surfaces
Procedure	Direct Streaking. Incubation at 30 °C for 24/36 h. Extention to 48 h for fragile *Pseudomonas* species (small colonies etc). Aerobic condition.
Scientific Publications on this product: available on www.CHROMagar.com Please read carefully the instructions for use (IFU document) available on www.CHROMagar.com	

Performance

Pseudomonas are ubiquitous bacteria found in the soil, on plants, in freshwater and marine habitats. Many strains can grow at low temperature (psychrophilic strains) and may contaminate food or pharmaceutical products stored in the refrigerator.

P. aeruginosa is a valid indicator for recreational water disinfection efficacy. This parameter is currently used as a criterion in the regulation of wading and swimming pools. Moreover, *P. aeruginosa* is important not only in terms of its role as an indicator, but also because it is an opportunistic pathogen whose transmission is often associated with water.

Other forms of *Pseudomonas* bacteria are known to cause food spoilage at low temperatures. These psychrophillic *Pseudomonas* strains include: *P. fragi,* which causes spoilage of dairy products, *P. taetrolens* which causes mustiness in eggs and *P. mudicolens* and *P. lundensis,* which cause spoilage of milk, cheese, meat, and fish, but are rarely a cause of food poisoning.

1. Fast : From 24 h incubation.

2. Filtration method : A membrane filtration method can be used for detection from 100 mL of water, the inoculated membrane is placed, on the agar plate.

4. Simple to use : Colonies can be viewed under normal lighting conditions. *Pseudomonas* colonies develop with an intense blue-green colony colour, clearly visible to the naked eye.

5. Easy to read : One unique intensified colour for *Pseudomonas*.

3. Easy preparation : The pre-weighed agar powder is mixed with the required volume of distilled water.