

Food and Water Testing



Chromogenic Media Reference Guide

BIO-RAD

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General Instructions

Introduction

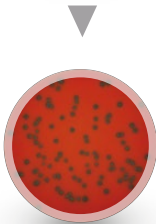
RAPID¹ chromogenic media are used to detect and enumerate microorganisms in food, water, and other samples using simple protocols developed to optimize laboratory workflow and offering results in a shorter time than classical methods.



Step 1: Sample Preparation/Enrichment*

Recovery of the target bacteria with a balance between nutrition and selectivity.

* Enrichment not required for enumeration protocol.



Step 2: Plate Inoculation

Detection of the target bacteria by a specific and visible typical colony.



Step 3: Confirmation**

Verification that the typical colony corresponds to the target bacteria.

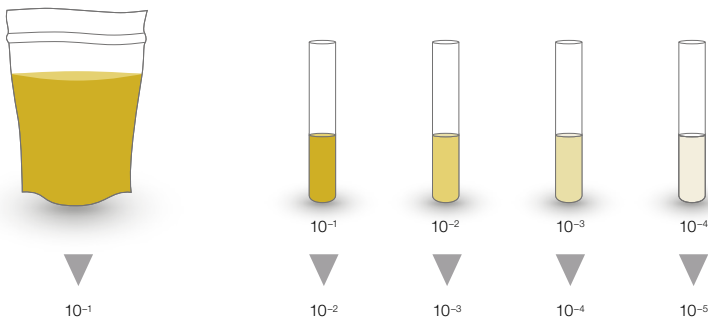
** Confirmation not required for all protocols.

Sample Preparation/Enrichment

RAPID[®] chromogenic media are used to detect and enumerate microorganisms in food products (which may be raw material ingredients, in-process food samples, or final products), in environmental samples (which may be sponges, swabs, carcass rinses, process water, and others), and in water for human consumption.

Often, sample preparation is dependent on the matrices being tested; some products have specific requirements. These requirements can be found by referencing standard methods (for example, ISO, USDA MLG, FDA BAM). Alternative rapid methods sometimes have a different enrichment scheme that has been optimized to fit the method.

For a quantitative method (one that counts the actual number of bacteria present in the sample), there is no enrichment step. The sample is homogenized with a diluent (1:10) and testing is performed starting there. Decimal dilutions can be made when high levels of contamination are expected.



General Instructions

For qualitative methods, which test for presence or absence of target bacteria, an enrichment step is needed for growing the bacteria in the sample to a level high enough to be detected by a test method. The enrichment step must balance nutrition, to grow target organisms, and selectivity, to limit the growth of competing flora.

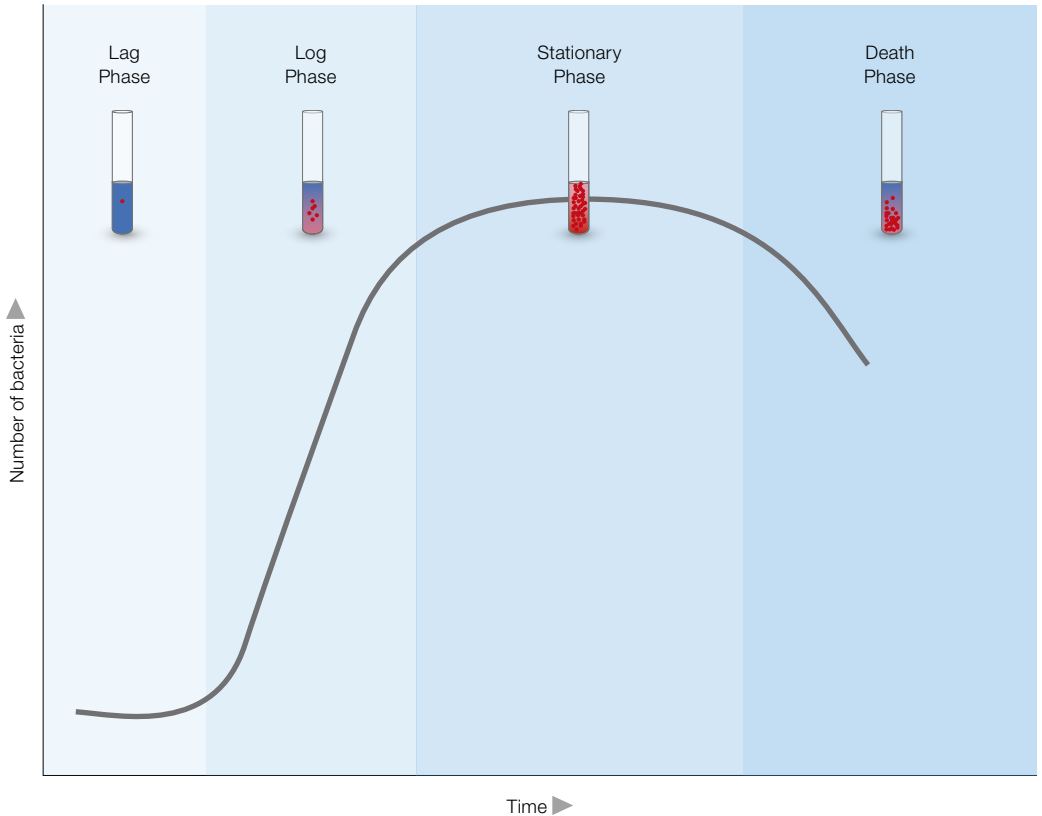
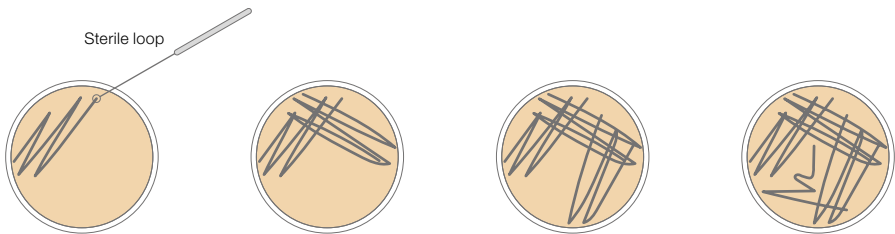


Plate Inoculation

Streak-Plate Inoculation

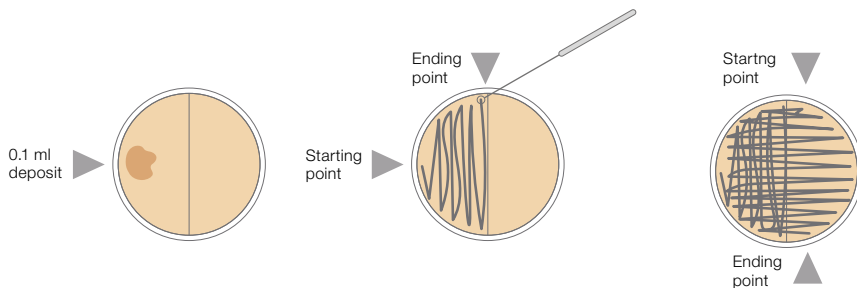
Isolation of small volume (10 μ l)

Using a calibrated sterile loop, place 10 μ l of sample on the outside edge of the agar surface. Using a back-and-forth motion, streak for isolation by spreading the deposit in relatively close streaks over the entire dish from the edge of the previous spread.



Isolation of large volume (100 μ l)

Using a sterile pipet, collect 0.1 ml of sample and place drops on the outside edge of half of the agar surface. Using a sterile pasteur pipet or inoculating loop, spread sample over half of the agar surface in a back-and-forth motion. On the other half of the agar surface, streak for isolation by spreading the deposit in relatively close streaks over the entire dish from the edge of the previous spread. This method may be used when inoculating RAPID'*L.mono*, RAPID'*Listeria* spp., and AL Agars.



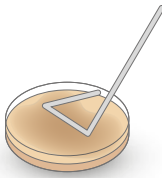
General Instructions

Spread-Plate Inoculation

Add 0.1 ml of sample or its decimal dilutions in the center of one dry petri dish. Spread evenly over the agar surface.



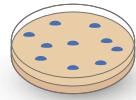
1. Pipet inoculum onto the surface of agar plate.



2. Spread evenly over the agar surface.



3. Incubate.



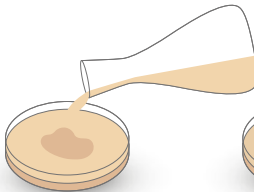
4. Colonies grow only on the surface of medium.

Pour-Plate Inoculation

Add 1 ml of sample to an empty petri dish. Pour approximately 18 ml of medium tempered to 44–47°C. Mix by swirling gently. Let solidify.



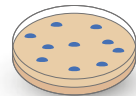
1. Pipet inoculum onto sterile plate.



2. Add sterile medium.



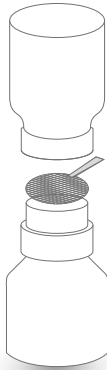
3. Mix by swirling and incubate.



4. Colonies grow in and on medium.

Membrane Filtration

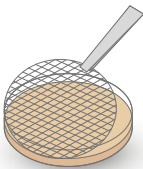
Bacteria in a water sample need to be concentrated by running the sample through a filtration apparatus connected to a vacuum pump or flask. Add 100 ml–1 L of sample to the filtration funnel containing a 0.45 μm porosity membrane. Once water is filtered, carefully remove the membrane and transfer it to the surface of the agar plate.



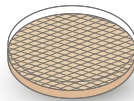
1. Use a 0.45 μm membrane filter on a support.



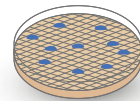
2. Concentrate sample by filtering water.



3. Place the filter membrane in the plate containing appropriate medium.



4. Incubate.



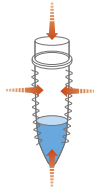
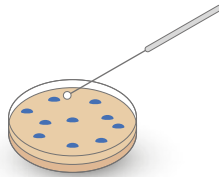
5. Assess typical colonies.

General Instructions

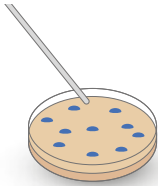
Confirmation

Colony Confirmation with iQ-Check Protocol

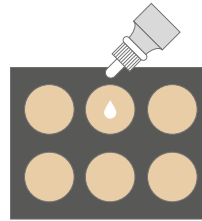
1. Pick an isolated colony from the agar surface with a toothpick, sterile loop, or other adapted consumable.
2. Resuspend the colony in 100 μ l tryptone salt or distilled sterile water in a microcentrifuge tube. Homogenize using a vortexer.
3. Use 5 μ l of the suspension with 45 μ l of iQ-Check PCR mix to run the PCR reaction.



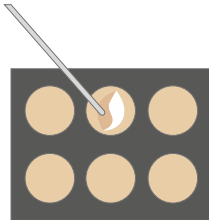
Colony Confirmation with Latex Confirmation Test



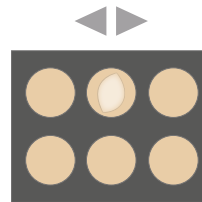
1. Select an isolated colony (or subculture as appropriate). It is important to use a pure culture.



2. Place one free falling drop of antisera onto a slide for agglutination and add a pure colony.



3. Mix reagent and colony together.



4. Rock the slide in a circular motion for 30 sec and observe for agglutination.



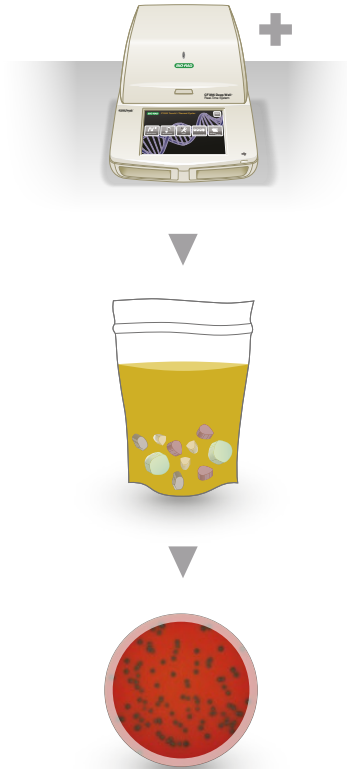
No agglutination = negative result

Agglutination = positive result

General Instructions

Confirmation of iQ-Check Positive Result with RAPID[®] Chromogenic Media

1. Collect the appropriate volume of the selective enrichment (10 or 100 μ l). In the case of nonselective enrichment (for example, iQ-Check *Salmonella* II), perform a subculture in selective broth.
2. Place a drop on the outside edge of the plate and streak to obtain isolated colonies.
3. Incubate under the appropriate conditions, then read the plate.



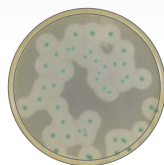
RAPID' Media Descriptions and Usage Tips for Food Testing

AL (Agar *Listeria* according to Ottaviani and Agosti)

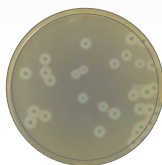
Detection and enumeration of *Listeria monocytogenes* and other species of *Listeria* in food products for human consumption and in environmental samples

AL Agar is based on the simultaneous detection of activities of two enzymes: β -D-glucosidase and phosphatidylinositol-specific phospholipase C (PIPLC). The β -D-glucosidase activity, common to all *Listeria*, is detected using a chromogenic substrate (X-glucoside). Hydrolysis of this substrate by the *Listeria* genus leads to the production of blue to blue-green colored colonies. PIPLC is an enzyme detected only in pathogenic *Listeria* species, *L. monocytogenes* and *L. ivanovii*. AL medium contains phosphatidylinositol, which, when broken down, produces an opaque halo around colonies of bacteria of these two species. This halo generally appears after 24 hr of incubation in *L. monocytogenes* and after 48 hr of incubation in *L. ivanovii*. Selectivity of the medium is achieved by the combined action of lithium chloride, antibiotics, and an antifungal.

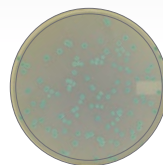
How to Read a Plate



Listeria monocytogenes



Listeria ivanovii



Listeria innocua

Total inhibition: gram-negative bacteria, *Enterococcus faecium*, *Staphylococcus aureus*

Keys to Success

- AL Agar can be used as a second medium in many standard methods such as ISO, FDA BAM, and Health Canada
- For easy reading and the production of a distinct halo, allow the dishes to dry shortly before use until no droplets are visible on the surface of the medium
- In the presence of a low concentration of *L. monocytogenes* among *Listeria* species, the specific enzymes of *L. monocytogenes* can be inhibited, leading to the production of typical colonies. Using the appropriate amount of inoculum in order to obtain well-isolated colonies allows the expression of these enzymes and the production of typical colonies even in samples with high bacterial competition

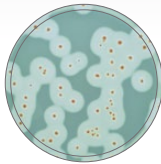
RAPID' Media Descriptions and Usage Tips for Food Testing

RAPID'*B.cereus* Agar

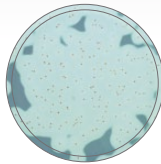
Detection and enumeration of the *Bacillus cereus* group (vegetative cells and spores) in 24 hr (without confirmation) in food products for human consumption

RAPID'*B.cereus* Agar is based on a chromogenic reaction and phospholipase activity. Typical *B. cereus* colonies develop a characteristic red color generally surrounded with an opaque halo. The medium's selective mixture prevents the growth of the interfering flora and enables the analysis of a broad range of foods. The sensitivity of the medium has been specially optimized to allow growth of all pathogenic *B. cereus* strains, even those that are difficult to culture, such as *B. cytotoxicus*. The interpretation of RAPID'*B.cereus* Agar is further facilitated by the high level of the contrast between the color of the colonies and the agar.

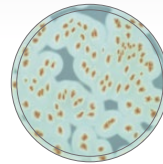
How to Read a Plate



Bacillus cereus



Bacillus cytotoxicus



Bacillus mycoides

Total inhibition: gram-negative bacteria, other *Bacillus* spp., *Enterococcus faecalis*

Keys to Success

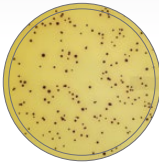
- Inoculate agar using the pour-plate method, ensuring that the molten agar is 44–47°C before use
- For easy reading, dry the dishes shortly before use until no droplets are visible on the surface of the medium
- A small percentage of *B. cereus* strains do not express phospholipase activity (red colonies without opaque halo), especially when the pour-plate protocol is used. These red colonies should be considered typical without any form or size criteria
- The time lapse between the end of preparation of the stock solution (or 10⁻¹ dilution, in the case of a solid product) and when the dilutions come into contact with the culture medium must not exceed 45 min

RAPID[®] *Campylobacter* Agar

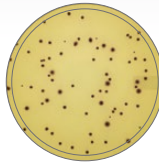
Detection and enumeration of the main species of thermophilic *Campylobacter* in 24 hr (without confirmation) in food products for human consumption and in environmental samples

The use of a selected nutritive mixture associated with a reducing agent allows the growth of thermotolerant *Campylobacter* spp. in an optimal time. Other bacterial species, as well as yeasts and molds, are inhibited by the selective agents. *Campylobacter* produce brick-red colonies.

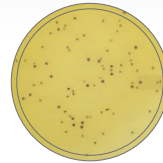
How to Read a Plate



Campylobacter jejuni



Campylobacter coli



Campylobacter lari

Total inhibition: most gram-negative bacteria, most gram-positive bacteria, extended-spectrum beta-lactamase (ESBL)-producing bacteria (such as *Escherichia coli* and *Acinetobacter* spp.)

Keys to Success

- Maintenance of appropriate microaerobic conditions is critical for the growth of *Campylobacter*
- For easy reading, dry the dishes shortly before use until no droplets are visible on the surface of the medium. Avoid prolonged drying so as not to modify the efficiency of the medium. Do not dry plates in a laminar flow hood
- Confirming fewer than 5 colonies involves a risk of making an overestimation because of the presence of typical colonies that could be bacteria other than *Campylobacter* spp.
- If colonies are not easily countable after 24 hr of incubation, reincubate the plate for a total of 48 hr

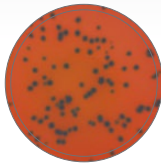
RAPID' Media Descriptions and Usage Tips for Food Testing

RAPID'*E.coli* O157:H7 Agar

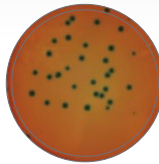
Detection of *Escherichia coli* O157:H7 in food products for human consumption and in environmental samples

RAPID'*E.coli* O157:H7 Agar is a selective medium combining chromogenic substrates and biochemical indicators. This combination provides direct presumptive identification of *E. coli* O157:H7, including atypical strains, among the interfering flora on the basis of the specific metabolic and enzymatic profiles observed. The selectivity of the medium is increased by adding the selective agents novobiocin (10 mg/L) and potassium tellurite (0.8 mg/L). Typical *E. coli* O157:H7 (sorbitol- and β -glucuronidase-) present characteristic bright, bulging colonies measuring 1–2 mm, dark blue to black in color, with a slight black precipitate around the edges of the colonies. Atypical β -glucuronidase+ strains form colonies of the same type. Strains of atypical sorbitol+ *E. coli* O157:H7 are also detected. These colonies will have a blue to turquoise color with a weak black precipitate around the edges of the colonies.

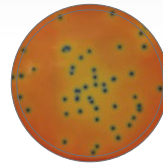
How to Read a Plate



Escherichia coli
O157:H7



Escherichia coli
non-O157:H7



Escherichia coli
O157:H7 (sorbitol+)

Total inhibition: gram-positive bacteria, other *Escherichia coli*

Keys to Success

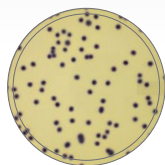
- For easy reading, dry the dishes shortly before use until no droplets are visible on the surface of the medium
- The agar will turn completely red in the presence of pure strains of *E. coli* O157:H7
- On agar with a mixture of strains, typical *E. coli* O157:H7 produce dark blue to black colonies with a slight black precipitate around the edges of the colony, sometimes combined with a red halo
- Performing the immunomagnetic separation step requires sufficient training and regular practice of the technique to obtain valid, reliable results

RAPID'*E.coli* 2 Agar

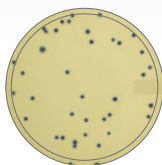
Detection and enumeration of colonies of *Escherichia coli* and other coliform bacteria in 24 hr (without confirmation) in food products for human consumption and in animal feed

RAPID'*E. coli* 2 Agar relies on the simultaneous detection of the activity of two enzymes: β -D-glucuronidase (GLUC) and β -D-galactosidase (GAL). These enzymes react with the chromogenic substrates present in the medium to produce specific colors. A substrate specific to GLUC leads to pink coloration of colonies positive for this enzyme. A substrate specific to GAL leads to blue coloration of colonies positive for this enzyme. The detection of GLUC makes the culture medium highly specific, as *E. coli* is one of the only species of coliforms to possess this enzyme. *E. coli* (GAL+/GLUC+) form violet to pink colonies. Other coliforms (GAL+/GLUC-) form blue colonies. Other bacteria are inhibited by the selective mixture.

How to Read a Plate



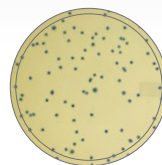
Escherichia coli



Citrobacter spp.
Klebsiella spp.



Salmonella spp.



Escherichia coli
O157:H7

Total inhibition: gram-positive bacteria

Keys to Success

- Inoculate agar using the pour-plate method, ensuring that the molten agar is 44–47°C before use
- For medium prepared in advance, avoid overheating (in general, 20 min is enough to obtain a homogenous liquid agar)
- The agar must not undergo more than two regeneration cycles
- As development of colonies at the bottom of the petri dish may interfere with reading, the period between the deposition of the inoculum in the dish and the dispensing of the culture medium should be limited

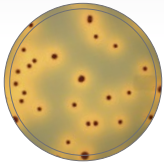
RAPID' Media Descriptions and Usage Tips for Food Testing

RAPID' *Enterobacteriaceae* Agar

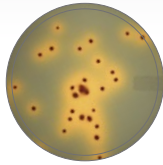
Detection and enumeration of *Enterobacteriaceae* in 24 hr (without confirmation) in food products for human consumption, in animal feed, and in environmental samples

RAPID' *Enterobacteriaceae* Agar relies on the ability of *Enterobacteriaceae* to ferment glucose. Due to the simultaneous presence of crystal violet and bile salts, the medium inhibits gram-positive bacteria and some gram-negative bacteria. The combination of color indicators allows a high level of contrast of *Enterobacteriaceae* colonies, which appear red on a clear gray medium.

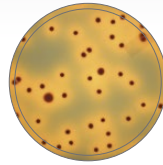
How to Read a Plate



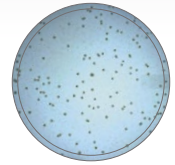
Escherichia coli



Salmonella spp.



Acinetobacter spp.



Pseudomonas spp.

Total inhibition: gram-positive bacteria

Keys to Success

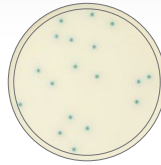
- Inoculate agar using the pour-plate method, ensuring that the molten agar is 44–47°C before use. Do not autoclave the medium
- As development of colonies at the bottom of the petri dish may interfere with reading, the period between the deposition of the inoculum in the dish and the dispensing of the culture medium should be limited
- It is preferable to use a double-layered medium with matrices containing abundant mesophilic flora. The aim of the second layer is to limit overgrowth of these bacteria of the surface, which can interfere with reading

RAPID[®] *Listeria* spp. Agar

Detection and enumeration of all *Listeria* spp. in food products for human consumption and in environmental samples

RAPID[®] *Listeria* spp. Agar is based on the detection of β -D-glucosidase activity by a chromogenic substrate. All *Listeria* colonies are blue to blue-green. The selectivity of the medium is optimized by the combined action of lithium chloride and an antibiotic mixture.

How to Read a Plate



Listeria spp.

Total inhibition: gram-negative bacteria such as *Escherichia coli* and *Enterococcus faecalis*

Keys to Success

- RAPID[®] *Listeria* spp. Agar is ideal for isolating *Listeria* without differentiation of species
- For easy reading, dry the dishes shortly before use until no droplets are visible on the surface of the medium

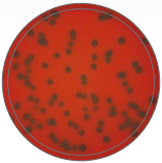
RAPID' Media Descriptions and Usage Tips for Food Testing

RAPID'*L.mono* Agar

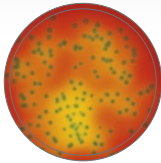
Detection and enumeration of *Listeria monocytogenes* and other species of *Listeria* in food products for human consumption and in environmental samples

RAPID'*L.mono* Agar relies on the specific detection of the PIPLC activity of *L. monocytogenes* and on the inability of this species to metabolize xylose. After 24 hr of incubation, *L. monocytogenes* form characteristic blue (pale blue, gray-blue, or dark blue) colonies without a yellow halo. Colonies formed by other species of *Listeria* are white, with or without a yellow halo. *L. ivanovii* form blue-green colonies with a yellow halo (xylose-positive characteristic). This halo can appear after 24–48 hr of incubation. The selective solution in the medium permits inhibition of most interfering flora (gram-positive and gram-negative bacteria, yeasts, and molds).

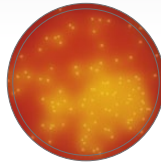
How to Read a Plate



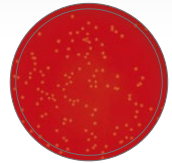
Listeria monocytogenes



Listeria ivanovii



Listeria welshimeri



Listeria innocua

Total inhibition: gram-negative bacteria, *Staphylococcus aureus*

Keys to Success

- RAPID'*L.mono* Agar can be used as a second medium in many standard methods such as ISO, FDA BAM, and Health Canada
- When inoculating a high volume of sample (0.1 ml), the dishes can be left on the work surface for 15–30 min to permit complete absorption
- Differentiation between *L. ivanovii* and *L. monocytogenes* is based on the metabolism of xylose, which lowers pH and changes the color of the agar, forming a yellow halo. Any irregular change of the pH from a high concentration of lactic acid bacteria, an acidic sample, or the use of insufficiently distilled water might interfere with reading the results
- In the presence of a low concentration of *L. monocytogenes* among other *Listeria* species, the specific enzymes of *L. monocytogenes* can be inhibited, leading to the production of atypical colonies. Using the appropriate amount of inoculum to obtain well-isolated colonies allows the expression of these enzymes and the production of typical colonies even in samples with high bacterial competition

RAPID'*Sakazakii* Agar

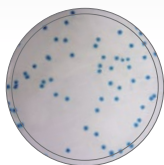
Detection of *Cronobacter* spp. (formerly *Enterobacter sakazakii*) in milk powders, infant formula and raw materials, and in environmental samples

RAPID'*Sakazakii* Agar is based on the detection of the α -glucosidase enzymatic activity characteristic of *Cronobacter* spp. Under this action, the chromogenic substrate 5-bromo-4-chloro-3-indolyl α -D-glucopyranoside is hydrolyzed, producing *Cronobacter* spp. colonies with a blue to blue-green color. Sodium deoxycholate and crystal violet inhibit the growth of competing microflora.

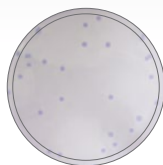
How to Read a Plate



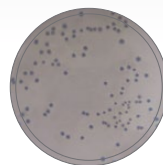
Cronobacter sakazakii



Other *Cronobacter* spp.



Salmonella spp.



Escherichia coli

Total inhibition: probiotic bacteria, gram-positive bacteria

Keys to Success

- Enrichment is a key step to ensure the full recovery of all *Cronobacter* spp. The quality of the buffered peptone water (BPW) broth has a major impact on the recovery of rare and stressed cells. RAPID'*Sakazakii* validation has been performed with Bio-Rad BPW Plus
- For large sample sizes, the short protocol using the PIF Supplement will improve the handling and the sensitivity of the RAPID'*Sakazakii* method and allow for simultaneous enrichment of *Cronobacter* spp. and *Salmonella* spp.
- The association of a selective mix and a high incubation temperature of 44°C ensures the inhibition of the growth of background flora and probiotics found in certain matrices

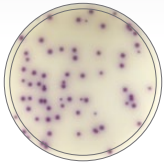
RAPID' Media Descriptions and Usage Tips for Food Testing

RAPID' *Salmonella* Agar

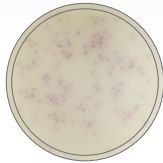
Detection of *Salmonella* spp. in food products for human consumption, in animal feed, and in environmental samples

RAPID' *Salmonella* Agar allows the presumptive identification of motile and nonmotile *Salmonella* spp. by detecting C8-esterase activity. Simultaneous screening of β -glucosidase activity permits the differentiation of *Salmonella* colonies from those of other *Enterobacteriaceae*. After incubation, *Salmonella* appear as readily identifiable — typically magenta — colonies, whereas non-*Salmonella* bacteria grow as blue or colorless colonies. RAPID' *Salmonella* Agar permits detection of motile and nonmotile *Salmonella*, as well as lactose-positive *S. Typhi* and *S. Paratyphi*.

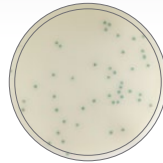
How to Read a Plate



Salmonella Typhimurium



Salmonella Dublin



KES bacteria,
Citrobacter spp.



Escherichia coli

Total inhibition: gram-positive bacteria, *Pseudomonas* spp.

Keys to Success

- Enrichment is a key step to ensure the full recovery of all *Salmonella*. The quality of the BPW broth has a major impact on the recovery of rare and stressed *Salmonella* cells. RAPID' *Salmonella* validation has been performed with Bio-Rad BPW Plus
- Some low-C8-esterase *Salmonella*, such as *S. Dublin*, can produce pale magenta colored colonies. All pink to magenta colonies must be considered presumptive *Salmonella*
- In the presence of a high level of background flora and bacterial competition, specific enzymes of *Salmonella* can be inhibited and don't produce the typical phenotype. Isolation of the appropriate amount of inoculum to obtain well-isolated colonies allows the expression of the typical phenotype of *Salmonella*, even in samples with high bacterial competition
- For large sample sizes, the short protocol using the PIF Supplement will improve the handling and sensitivity of the RAPID' *Salmonella* method and allow for simultaneous enrichment of *Salmonella* spp. and *Cronobacter* spp.

RAPID' *Staph* Agar

Detection and enumeration of coagulase-positive staphylococci (*Staphylococcus aureus* and other species) in food products for human consumption, in animal feed, and in environmental samples

RAPID' *Staph* Agar is based on a Baird-Parker formula optimized for the detection and enumeration of coagulase-positive staphylococci such as *S. aureus* in 24 hr. The principle of the medium relies on the capacity of *S. aureus* to reduce tellurite (black colonies) and induce the proteolysis of egg yolk (clear halo around colonies).

How to Read a Plate



Staphylococcus coagulase+

Total inhibition: most coagulase-negative and gram-negative bacteria

Keys to Success

- Inoculate agar using the pour-plate method, ensuring that the molten agar is 44–47°C before use
- For easy reading, dry the dishes shortly before use until no droplets are visible on the surface of the medium
- The time lapse between the end of preparation of the stock solution (or 10⁻¹ dilution, in the case of a solid product) and when the dilutions come into contact with the culture medium must not exceed 45 min
- Some coagulase-positive *Staphylococcus* strains can require an additional 24 hr incubation for the halo to be clearly visible

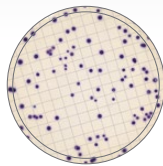
RAPID' Media Descriptions and Usage Tips for Water Testing

RAPID'*E.coli* 2 Agar for Water Testing

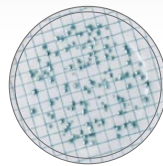
Direct enumeration of *Escherichia coli* and other coliform bacteria in 21 ± 3 hr (without confirmation) in water for human consumption

RAPID'*E.coli* 2 Agar for Water Testing allows simultaneous detection of the activity of two enzymes, β -D-glucuronidase (GLUC) and β -D-galactosidase (GAL), by two chromogenic substrates. Cleavage of the GAL-specific substrate forms a precipitate, giving a blue color to the colonies positive for this enzyme (coliforms). Cleavage of the GLUC-specific substrate forms a precipitate giving a pink color to the colonies positive for this enzyme (*E. coli*). Coliforms (GAL+/GLUC-) produce blue colonies. *E. coli* (GAL+/GLUC+) produce violet to pink colonies due to the superposition of both colors. The selective mixture in the supplement inhibits the main interfering flora in water.

How to Read a Plate



Escherichia coli



Other coliforms

Total inhibition: major interfering flora in water such as *Citrobacter*, *Enterobacter*, *Hafnia*, *Klebsiella*, *Serratia*, *Acinetobacter*, *Aeromonas*, *Bacillus*, *Proteus*, *Pseudomonas*, *Salmonella*, *Shigella*, *Staphylococcus*, and *Vibrio* strains

Keys to Success

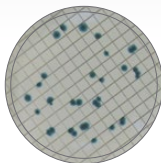
- Place the membrane, cross-hatched surface up, on the surface of the medium, taking care that the membrane-agar contact is complete
- Always use a sterile filter membrane (47 mm, 0.45 μ m)
- Avoid trapping air bubbles underneath the membrane during its placement on the agar. Poor membrane-agar contact may lead to an erroneous result. If necessary, gently and carefully flatten the membrane with forceps
- Retain only dishes that contain a maximum of 110 colonies
- To ensure the physiological integrity of reference cells, preparation of a fresh calibrated suspension from a strain cultured on a nutritive medium is recommended. The use of other commercial reference material is also possible
- The incubation time and temperature conditions are suitable for simultaneous use with RAPID'*P.aeruginosa* Agar

RAPID'*P.aeruginosa* Agar for Water Testing

Direct enumeration (without confirmation) of *Pseudomonas aeruginosa* in 22 hr in water for human consumption

RAPID'*P.aeruginosa* Agar is based on the detection of an enzymatic activity typical of *P. aeruginosa* that cleaves a specific chromogenic substrate, leading to the formation of a blue to blue-green or green precipitate. The selective mixture makes it possible to inhibit the majority of interfering flora, in particular other *Pseudomonas* strains that are not *aeruginosa*. Other microorganisms may, however, show growth. Their colonies appear transparent or pigmented yellow-green and are easily distinguishable from those of *P. aeruginosa*.

How to Read a Plate



Pseudomonas aeruginosa

Total inhibition: *Pseudomonas* other than *P. aeruginosa*, and major interfering flora in water such as *Acinetobacter* spp., *Aeromonas* spp., *Escherichia coli*, and *Xanthomonas* spp.

Keys to Success

- Place the membrane, cross-hatched surface up, on the surface of the medium, taking care that the membrane-agar contact is complete
- Always use a sterile filter membrane (47 mm, 0.45 µm)
- Avoid trapping air bubbles underneath the membrane during its placement on the agar. Poor membrane-agar contact may lead to an erroneous result. If necessary, gently and carefully flatten the membrane with forceps
- Retain only dishes that contain fewer than 50 characteristic colonies and fewer than 100 colonies total
- The incubation time and temperature conditions are suitable for simultaneous use with RAPID'*E.coli* 2 Agar for Water Testing

Appendix

Quality and Certification

Our quality policy, which is the result of our dedicated efforts to food and water environmental and surface testing, is based on a constant commitment to improvement.

Within the scope of the CE labeling process for all of its medical diagnostic activities, a number of Bio-Rad sites received ISO 13485 certification in 2002. The Bio-Rad ISO 9001 version 2000 certification is also maintained for all of its activities.

United States Department of Agriculture (USDA) and Food and Drug Administration (FDA) inspections have confirmed Bio-Rad quality systems' and products' compliance with U.S. regulatory standards.

Production

From the delivery of raw materials right up to marketing of the finished products, Quality Assurance applies to every product manufactured by Bio-Rad. Each batch of finished products undergoes strict quality control testing and is marketed only if it complies with acceptance criteria.

All documentation relating to the production and quality control of a given batch is archived.

ISO/IEC 17025 Certification

ISO/IEC 17025 certification allows solution manufacturers and user laboratories to demonstrate that they operate competently and use reliable and valid products for reliable and valid results. The accreditation of the Bio-Rad culture media manufacturing facility and quality control laboratory was performed by Cofrac (French Accreditation Committee), an impartial independent third-party auditor, following strict requirements according to the ISO/IEC 17025 standard.

Distribution

Stock is maintained in a temperature-controlled environment with barcode readings of code, batch, expiration date, product status, commercial validity, and country authorization verified at each step in product storage and distribution.

Normally, products are transported at room temperature. Bio-Rad takes shipping-related stress conditions into account when developing reagents. This allows reagents to be carried via standard shipping services. For those rare instances when a product's performance cannot be guaranteed under these conditions, Bio-Rad offers specialized methods of transport.

Traceability

All Bio-Rad products can be traced electronically, making it possible to identify the customer(s) linked with a specific product and/or batch or serial number.

As part of the company's "reagent vigilance," this traceability makes it possible to inform clients when there's a problem with a particular batch or lot number, to indicate any actions to be taken based on the results, and, where applicable, to recall a given product.

Bibliography

ISO 6887-1:2017. Microbiology of the food chain — Preparation of test samples, initial suspension and decimal dilutions for microbiological examination — Part 1: General rules for the preparation of the initial suspension and decimal dilutions.

ISO 7218:2007. Microbiology of food and animal feeding stuffs — General requirements and guidance for microbiological examinations.

ISO 11133:2014. Microbiology of food, animal feed and water — Preparation, production, storage and performance testing of culture media.

ISO 19458:2006. Water quality — Sampling for microbiological analysis.

United States Department of Agriculture. Microbiology Laboratory Guidebook.

United States Food and Drug Administration. Bacteriological Analytical Manual.

Technical Data Sheets

For more information about our products, please refer to the technical data sheets.

Depending on the products, our technical sheets include:

- Applications of the product
- Corresponding standard references
- Product description
- Presentation or type(s) of packaging offered
- Stock status
- Typical formula
- Necessary product(s) or material(s) that are not supplied
- Detailed protocols
- Special precautions for use
- Quality controls indicating test strains and expected results

All of our technical data sheets are available on our website.

Quality Control Certificates

These certificates have been established for every product and indicate all the control tests carried out on the finished product, the expected specifications, and the results obtained.

These documents can be consulted online and can be downloaded in PDF format by using a product code and batch number.

Safety Data Sheets

These are established by our Department of Regulatory Affairs for every product containing hazardous substances and are recorded in the product reference information. These safety data sheets are available upon request.

Certificates of Health and Origin

These documents, available during audit, are delivered to us by our suppliers for peptones of animal origin when they are elements in the composition of a product.

Brochures



RAPID'Chromogenic Media Brochure
Bulletin 16288



iQ-Check Real-Time PCR Solution Brochure
Bulletin 16439

Visit bio-rad.com/foodscience for more information.

Videos



Visit the Bio-Rad Food Science video library, which includes product tutorials, technical information, and more.

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Appendix

Ordering Information

Catalog # Description

AL (Agar *Listeria* according to Ottaviani and Agosti)

3563695 Ready to use, 90 mm x 20 dishes
3563965 Ready to use, 90 mm x 120 dishes
3564043 Dehydrated base, 500 g
3555200 Base medium, 237.5 ml x 6 bottles
3564041 Supplement 1, 10 vials
3564042 Supplement 2, 10 vials

RAPID'*B.cereus* Agar

12007304 Ready to use, 90 mm x 20 dishes
12007305 Dehydrated base, 500 g
12007306 Supplement 1, 10 vials
12007307 Supplement 2, 10 vials

RAPID'*Campylobacter* Agar

12012036 Ready to use, 90 mm x 20 dishes
3564295 Dehydrated base, 500 g
3564296 Supplement, 10 vials

RAPID'*E.coli* O157:H7 Agar

3564748 Dehydrated base, 100 g

RAPID'*E.coli* 2 Agar

3555299 Ready to use, 100 ml x 6 bottles
3555297 Ready to use, 200 ml x 6 bottles
3564024 Dehydrated base, 500 g

RAPID'*Enterobacteriaceae* Agar

3554012 Ready to use, 200 ml x 6 bottles
3564004 Dehydrated base, 500 g

RAPID'*Listeria* spp. Agar

3564744 Dehydrated base, 500 g
3564745 Supplement 1, 10 vials
3564746 Supplement 2, 10 vials

Catalog # Description

RAPID'*L.mono* Agar

3563694 Ready to use, 90 mm x 20 dishes
3563964 Ready to use, 90 mm x 120 dishes
3555294 Kit: 190 ml + supplement 2
3564293 Dehydrated base, 500 g
3564294 Supplement 1, 10 vials
3564746 Supplement 2, 10 vials

RAPID'*Sakazakii* Agar

3563971 Ready to use, 90 mm x 20 dishes
3564976 Dehydrated base, 500 g

RAPID'*Salmonella* Agar

3563961 Ready to use, 90 mm x 20 dishes
3563963 Ready to use, 90 mm x 120 dishes
3564705 Dehydrated base, 500 g
3564709 Enrichment supplement capsules, 10x concentrated, 100 capsules
3564710 Enrichment supplement capsules, 100 capsules
3564712 Enrichment supplement, 100 analyses

RAPID'*Staph* Agar

3563960 Ready to use, 90 mm x 20 dishes
3564704 Dehydrated base, 500 g

RAPID'*E.coli* 2 for Water Testing

3563982 Ready to use, 55 mm x 20 dishes
3555299 Ready to use, 100 ml x 6 bottles
3555297 Ready to use, 200 ml x 6 bottles
3564024 Dehydrated, 500 g
12008041 Supplement, 6 vials (for 200 ml bottles)
17005373 Ready-to-use kit (for 200 ml), includes 6 bottles of agar and 6 vials of supplement

RAPID'*P.aeruginosa* Agar for Water Testing

3563984 Ready to use, 55 mm x 20 dishes
3564900 Dehydrated, 500 g

BIO-RAD

**Bio-Rad
Laboratories, Inc.**

*Life Science
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Denmark 00 800 00 24 67 23 **Finland** 00 800 00 24 67 23 **France** 00 800 00 24 67 23
Germany 00 800 00 24 67 23 **Hong Kong** 852 2789 3300 **Hungary** 00 800 00 24 67 23
India 91 124 4029300 **Israel** 0 3 9636050 **Italy** 00 800 00 24 67 23
Japan 81 3 6361 7000 **Korea** 82 2 3473 4460 **Luxembourg** 00 800 00 24 67 23
Mexico 52 555 488 7670 **The Netherlands** 00 800 00 24 67 23 **New Zealand** 64 9 415 2280
Norway 00 800 00 24 67 23 **Poland** 00 800 00 24 67 23 **Portugal** 00 800 00 24 67 23
Russian Federation 00 800 00 24 67 23 **Singapore** 65 6415 3188
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Switzerland 00 800 00 24 67 23 **Taiwan** 886 2 2578 7189 **Thailand** 66 2 651 8311
United Arab Emirates 36 1 459 6150 **United Kingdom** 00 800 00 24 67 23

