

MERCK

# Key Ingredients

- ✓ Microbial Spoilage Testing
- ✓ Quality Assurance
- ✓ Your Dedication to Safety

We support food testing heroes  
Find your solutions



The life science business of  
Merck operates as MilliporeSigma  
in the U.S. and Canada.

**Millipore®**

Preparation, Separation,  
Filtration & Monitoring Products

# High Quality and Safe Beverages

Spoilage organism testing is a crucial step within the beverage industry to enable the safe release of drinks to the market. Requirements can vary from industry to industry, depending on different spoilage parameters—we can offer a full range of culture media and tests for microbiological quality control with our new combined Merck and Sigma-Aldrich portfolio.

Our beverage safety testing solutions cover the most important spoilage organisms, so you can ensure the quality of your beverages. Whether you need to test wine, beer, soft drinks, juices, or water, we have the safety testing solution to fit your needs.

**[SigmaAldrich.com/bevmicro](https://sigmaaldrich.com/bevmicro)**



# Wine

Wine is an alcoholic beverage made from fermented grapes or other fruits. The natural chemical balance of grapes lets them ferment without the addition of sugars, acids, enzymes, water, or other nutrients. Yeast consumes the sugars in the grapes and converts them into ethanol and carbon dioxide. Different varieties of grapes and strains of yeasts produce different styles of wine.

Typical spoilage organisms for wine are wild yeasts (for example, *Brettanomyces*), lactic acid bacteria such as *Lactobacillus*, *Leuconostoc*, *Oenococcus* and *Pediococcus*, or acetic acid bacteria from the genus *Acetobacter* and *Gluconobacter*.

## Process Outline

**Harvest** – The grapes are picked based on sugar levels, and acidity (pH).

**Crush** – Step to remove the stems and skin from the grape to extract the juice (called must).

**Fermentation** – Yeast turns the sugar in the juice into carbon dioxide and alcohol.

**Maceration** – Dwell time of the must for developing flavor, color and tannins.

**Pumping over** – Mix skin and other solids that have floated to the top with the rest of the must to increase tannin and color extraction.

**Press** – This separates the wine from the grape skins.

**Aging** – Can be carried out in oak barrels or stainless steel tanks.

**Filtration/stabilization** – Clarification, filtration and addition of preservatives.

**Finishing** – This includes blending, fining and filtration to get the right taste and to avoid spoilage by microbes.

## Microbiological Control of Wine:

Wine quality depends on the ability to avoid any undesired fermentation by spoilage microorganisms in the different steps of the process (fermentation, aging, finishing, bottling). Fermentation is the least risky phase, particularly if selected yeasts strains are added to drive it.

During aging, microorganisms can produce metabolites (e.g. guaiacol by *Brettanomyces*) affecting the bouquet and flavors, so periodic chemical controls are recommended, followed by microbiological control.

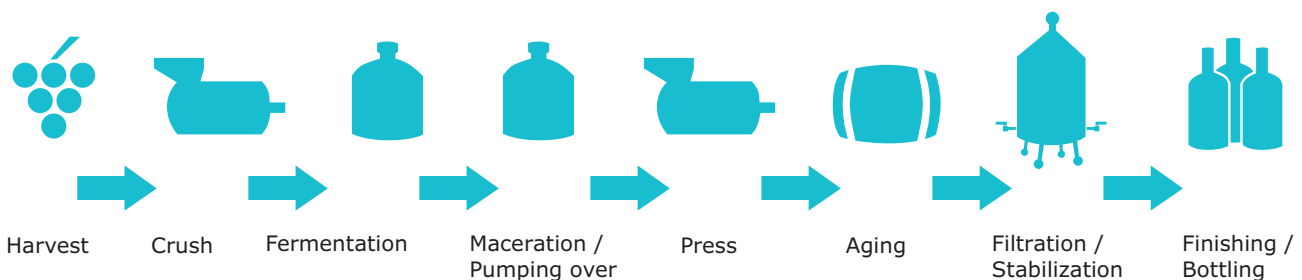
Microbiological control of wine is carried out before bottling (samples taken after the filters from final storage tanks), to test washing water after cleaning of pipes, and bottled wine by taking some random samples. Cork stoppers should be also checked for any microbiological contamination.

Culture media and tests are used to check the presence or absence of undesired microorganisms in wine and washing solutions. Typical examples of spoiling yeasts are *Dekkera/Brettanomyces*, *Kloeckera*, *Saccharomyces*, *Zygosaccharomyces* and *Candida*. All of them grow in media supplemented with cycloheximide while the pitching yeast are inhibited. Other types of media like Schwarz Differential Agar can differentiate wild yeast from brewing yeast. Typical spoiling bacteria can be detected using diverse media such as MRS, NBB, WL Differential Agar etc. (see the culture media list).

Air samplers are used to check the microbiological contamination of the bottling environment.

The aim of all tests performed before bottling is to prevent any contamination that can modify the taste of bottled wine (particularly for high quality wines that are not submitted to any chemical treatment for microbiological stabilization).

## Process of wine manufacturing



## Beer

Beer is an alcoholic beverage brewed from cereal grains—most commonly from malted barley, but also wheat, maize (corn), and rice. During the brewing process, fermentation of the starch sugars in the wort produces ethanol and carbonation in the resulting beer. Most modern beer is brewed with hops, which add bitterness and other flavors and act as a natural preservative and stabilizing agent. Other flavoring agents such as gruit, herbs, or fruits may be included or used instead of hops.

The microorganisms responsible for beer spoilage are often wild yeasts or bacteria from the genera *Lactobacillus*, *Pediococcus*, *Pectinatus* and *Megasphaera*.





## Process Outline

### At the Maltings

**Malting** is the process to release starch/malt out of the barley.

**Steeping** – the grain is set under water by aeration to swelling.

**Germination** – allows the development of enzymes, to modify the structure of the barley by breaking down the cell walls and the protein matrix. The enzymes are also needed to breakdown starch into shorter molecule lengths.

**Kilning** – drying process at ambient or high temperatures and stopping of the germination

### At the Brewery

**Milling** – is the cracking of the grain

**Lautering/Mashing** – Converts the starches, which were released during the malting stage, to sugars that can be fermented. The so-called mash is separated into the clear liquid wort and the residual grain.

**Boiling/Brewing** – In the brew kettle, the wort is brought to boil. The boiling stage of brewing involves many technical and chemical reactions. Certain types of hops are added at different times during the boil for either bitterness or aroma.

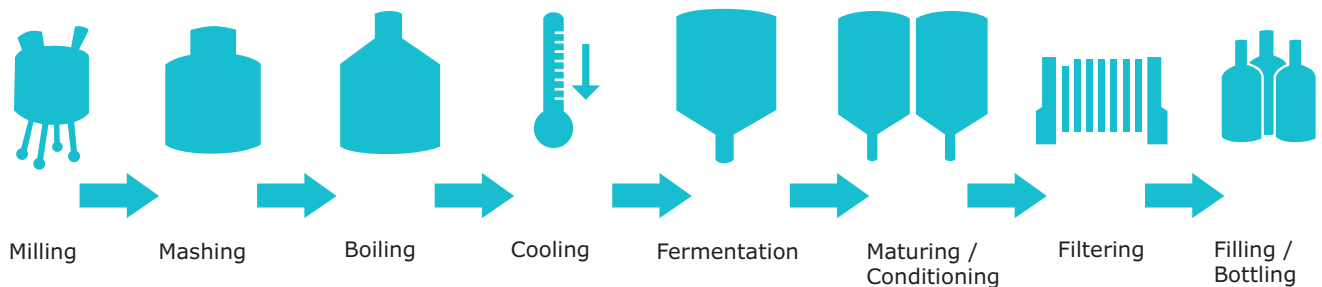
**Cooling** – the wort is transferred from the brew kettle through a device to filter out the hops, and then onto a heat exchanger to be cooled (to a point where yeast can safely be added).

**Fermentation** – yeast is added and the wort sugars are fermented into alcohol.

**Conditioning/Maturing** – the beer is usually transferred into a fresh container, so that it is no longer exposed to the dead yeast. Beer is conditioned, matured or aged.

**Filtration, Carbonation and Filling** – finally, the beer can be filtered and then carbonated. Then the beer is moved to a holding tank where it stays until it is bottled or kegged.

### Process of beer manufacturing



## Microbiological Control of Beer:

Brewing beer involves microbial activity at every stage, from raw material (grain, hops, water, syrups, sugars), to wort and fermentation, up to the final packed beer. Most of these activities are desirable, as beer is the result of a traditional fermentation, but others represent threats to the quality of final product.

Water is an important raw material used for steeping and mashing; it is checked for chemical (e.g. hardness, alkalinity etc.) and microbiological properties (potable water parameters, EU Directive 98/83/EC *Quality of Water Intended for Human Consumption*).

In pursuit of a constant beer quality, brewers seek to achieve consistent fermentations, which demands control of the key variables of yeast type and quantity, oxygen input, wort nutritional status, temperature, yeast-wort contact (mixing) and the absence of spoiling organisms.

Through the fermentation of maltose and other sugars to ethanol and carbon dioxide, the resulting conditions are hostile to the growth of most microorganisms. Nevertheless, some spoilage yeasts (e.g. *Brettanomyces*

or its teleomorph *Dekkera*) and bacteria can survive and grow slowly and may start to spoil the beer weeks after leaving the brewery.

The packaging and distribution of beer represent the two greatest challenges to the microbial stability of beer. Biofilms can form on the surfaces of filler kegs, tubes or any vessel, increasing the risk of microbial contamination. The industry long ago addressed this issue through product stabilization via filtration, pasteurization, or some combination thereof. However, with today's increasing demand for unpasteurized beers, this has led to an increase in incidents of microbial contamination and spoilage of beer.

Rinsing water is also checked for microbial contamination of the process (after filtration, usually using Schwarz Differential Agar as a non-selective medium, and Raka-Ray for the enumeration of *Lactobacillus* that create turbidity and undesired flavors). In some cases, dip-slides are also used to test the water as an indicator of potential microbial contamination.



## Soft drinks and juices

Soft drinks are water based drinks with natural or artificial flavoring, often sweetened by sugars, syrups, fruit juices, fruit juices concentrates or sweeteners. They are often carbonated and supplemented by minerals, vitamins, stabilizers, antioxidants and caffeine. They are often stored in bottles, either cooled or at room temperature. Typical examples are teas and lemonades.

Juice is a liquid that is naturally contained in fruit and vegetables. Today there is also a trend for smoothies, which are blends of raw fruits and vegetables often with other additives like water, ice, sweeteners or dairy products.

Fermented soft drinks and probiotic beverages are also a big market today, examples include Yakult (Japan, China) and Kombucha (China, Korea, Japan, Russia).

Often microorganisms cause spoilage and build a malodor, turbidity or slime in soft drinks and juices. Typical causes are yeasts but many bacteria can also lead to spoilage, as listed below:

### Acetic Acid Bacteria

- *Acetobacter*
- *Gluconobacter*

### Lactic Acid Bacteria

- *Lactobacillus*
- *Oenococcus*
- *Lactococcus*
- *Pediococcus*
- *Leuconostoc*
- *Microbacterium*

### Acidophilic Heat Resistant Bacteria

- *Alicyclobacillus*
- *Clostridium pasteurianum*
- *Bacillus spp.*
- *Clostridium butyricum*

### Ethanol Producing Bacteria

- *Zymomonas*
- *Zymobacter*
- *Saccharobacter*

## Microbiological Control of Soft Drinks and Water:

The main risk for microbial contamination of soft drinks comes from raw material (water, syrups, sugars, juices, additives) and from final filling. Today's trend for natural and healthy drinks increases the risk for contamination and final spoilage, due to the minimization of heat and filter steps. In addition, several heat resistant spore forming organisms are known to be frequent spoiling organisms in soft drinks.

Water is an important raw material as it is practically used for all soft drinks except the pure juices. It is checked for chemical (e.g. hardness, alkalinity) and microbiological properties (potable water parameters, EU Directive 98/83/EC *Quality of Water Intended for Human Consumption*).

Microbial control for bottled water also follows national and international regulations and can include testing of the following microbes or total count:

- *Escherichia coli* (*E. coli*)
- *Pseudomonas aeruginosa*
- Coliforms
- *Clostridium perfringens*
- *Enterococcus*
- Total Viable Count



# Tests for the Detection of Spoiling Organisms

## HybriScan® kits

### An innovative simple molecular screening method for beer spoilage organisms based on the detection of rRNA

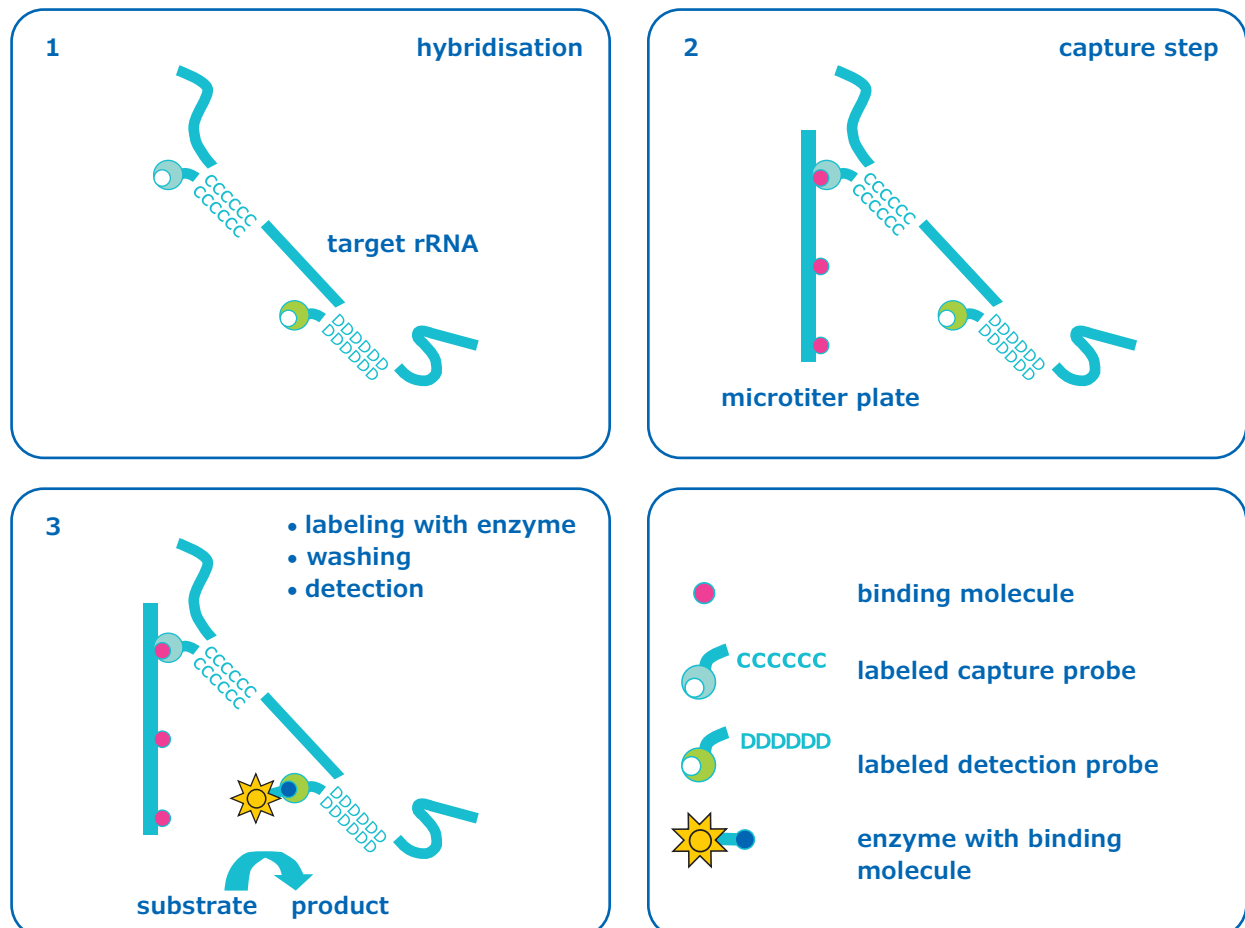
- not based on PCR
- no expensive instruments needed
- very robust system: not sensitive to sample matrix & based on 2 specific probes
- detection of ONLY viable microorganisms
- results within 2 hours (reduces time to result)
- HybriScan® system fulfills the needs of beverage industries:
- low reagent costs
- low investment costs
- little training needed.

#### Principle:

The HybriScan® method is based on the detection of rRNA via hybridization events and specific capture and detection probes. The ideal hybridization target for bacteria and yeast is rRNA. These cells contain a large

number of rRNA-containing ribosomes; a single cell therefore contains several thousand copies of rRNA. Sandwich hybridization also provides sensitivity in crude biological samples because it is not susceptible to matrix interference.

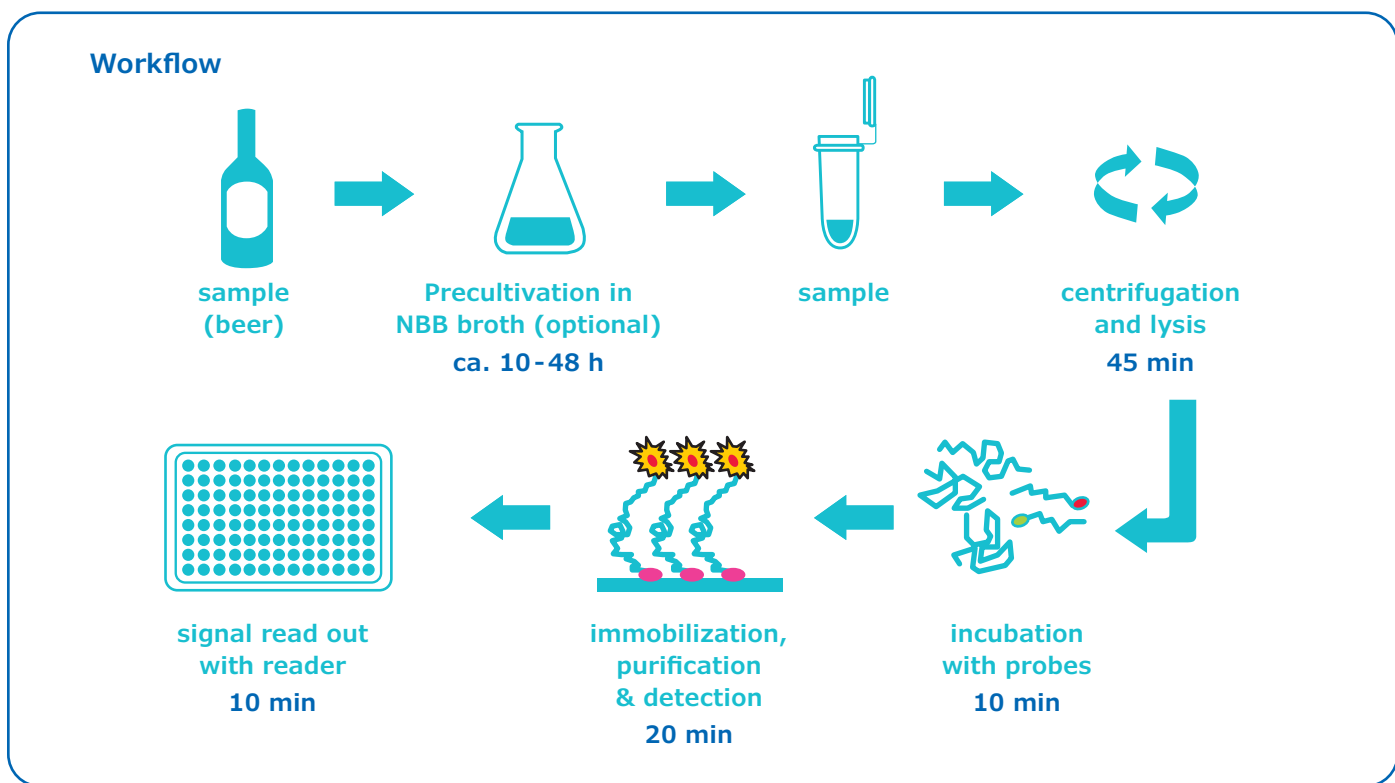
Specificity is achieved by targeting conserved or unique rRNA sequences. A biotin-labeled capture probe is used to immobilize the target sequence on a solid support plate (streptavidin-coated microtiter plate). A digoxigenin-labeled detection probe provides an enzyme-linked optical signal read-out. Detection results from application of anti-DIG-horseradish peroxidase Fab fragments. The bound complex is visualized by horseradish peroxidase substrate TMB (3,3',5,5'-tetramethylbenzidine). Photometric data are measured at 450 nm and compared with standard solutions.





Detection kit (quantitative)	Cat. No.	Beverage	Brewery	Wine
HybriScan® <b>D</b> Beer	62533		x	
HybriScan® <b>D</b> Drinks	68301	x		x
HybriScan® <b>D</b> Lactobac	59744	x	x	x
HybriScan® <b>D</b> Total Bacterial Count	02349	x	x	x
HybriScan® <b>D</b> Yeast	61397	x	x	x
<b>Identification Kit</b>				
HybriScan® <b>I</b> Alicyclobacillus <b>New</b>	39851	x		
HybriScan® <b>I</b> Brettanomyces	79742	x	x	x
HybriScan® <b>I</b> Lactobacillus brevis	75724	x	x	x
HybriScan® <b>I</b> Lactobacillus buchneri	80065	x	x	x
HybriScan® <b>I</b> Lactobacillus lindneri	86827	x	x	x
HybriScan® <b>I</b> Leuconostoc	77007	x	x	x
HybriScan® <b>I</b> Megasphaera	42875		x	
HybriScan® <b>I</b> Pectinatus cerevisiiphilus	89384	x	x	
HybriScan® <b>I</b> Pectinatus frisingensis	73582	x	x	
HybriScan® <b>I</b> Pediococcus damnosus	67289	x	x	x

\* Table: HybriScan®**D** kits for beer control. D is for detection kits and means it is a quantitative test and includes 96 tests. HybriScan®**I** kits for beer control. I is for Identification kits and means it is a qualitative test and includes 48 tests (a half microtiter plate).



The detection limit is about 1000 cfu per mL for bacteria or about 100 cfu per mL for yeasts. That means often an enrichment step is used for testing small numbers of beverage spoilers.

To learn more, visit  
[SigmaAldrich.com/hybriscan](https://SigmaAldrich.com/hybriscan)

Equipment	Cat. No.
Thermomixer Comfort, Eppendorf	Z605271
Exchange unit for 24x2ml reaction tubes; Eppendorf	Z605670
Exchange unit for microtiter plate; Eppendorf	T3942
Centrifuge for 2 mL reaction tubes	Z605220 Z606235
Microplate reader (e.g. Multiskan FC , Order number: 51119000 Thermo)	na

\* Table: Equipment needed for HybriScan® kits

## EZ-Fluo® System

### For rapid detection of spoilage organisms in beverages

Many beverage manufacturing processes are susceptible to spoilage organisms like yeast or bacteria contamination. Contamination can alter the odor, flavor or turbidity of a beverage, resulting in customer dissatisfaction and, in some cases, in product recall. For these microorganisms, traditional monitoring methods require up to 10 days to obtain microbiological results allowing the release of the product. A rapid microbiology system that can detect potential contamination 3 times faster than traditional monitoring methods would result in a significant cost saving and preserved company reputation. The EZ-Fluo® System uses fluorescence-based technology, and is a convenient and a sensitive platform

for the quantitative detection of contaminants in filterable samples. This rapid microbiological method is based on a universal enzymatic fluorescent staining of viable and culturable microorganisms. The fluorescent staining procedure is non-destructive, allowing microorganism identification following a positive result.

The EZ-Fluo® system offers a fast and reliable alternative for the rapid detection of spoilage microorganisms in wines. An evaluation study, performed by the accredited lab Centro de Investigación y Asistencia Técnica a la industria (CIATI AC) in Argentina, shows that the system enables a faster response and corrective action when used during the wine manufacturing process. It improves process control, product yield and the faster release of final product to market.

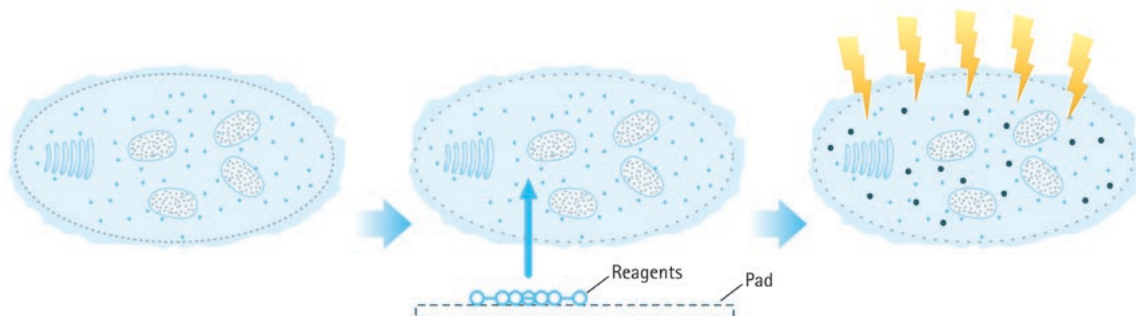
### Microorganisms:

Lactic Acid Bacteria, *Oenococcus oeni* strain, *Brettanomyces spp.* strain, Acetic acid bacteria (AAB), Yeast Counts / *Saccharomyces cerevisiae* strain

### Principle of detection

The principle of the fluorescence detection is based on an enzymatic reaction. The fluorogenic substrate used

is a non-fluorescent viability marker which is cleaved by non-specific ubiquitous intracellular enzymes resulting in a fluorescent product. Natural amplification of fluorescence by accumulation inside cells is an indicator of microbial metabolism. The dye is diluted in a staining buffer allowing cell membrane permeability and thus dye introduction into cells.



Note: Fluorescence detection is a non-destructive method that enables the microorganisms to continue to grow after they have been stained in order to identify them using standard ID technology.



## Protocol for rapid detection

The standard protocol to detect spoilage microorganisms in samples of interest with the fluorescence detection is as follows:

- A filtration unit is installed onto the filtration system
- The appropriate volume of sample is poured into the filtration unit
- After filtration, the membrane is disconnected from the device and aseptically transferred onto a media plate

- The incubation is performed according to the specifications
- After incubation, the membrane is stained with the fluorogenic reagent for 30 min at 32.5 °C ( $\pm 2.5$ )
- The fluorescent micro-colonies are counted using the fluorescence reader
- After detection, the stained membrane can be re-incubated on fresh media for traditional plate count and identification if required

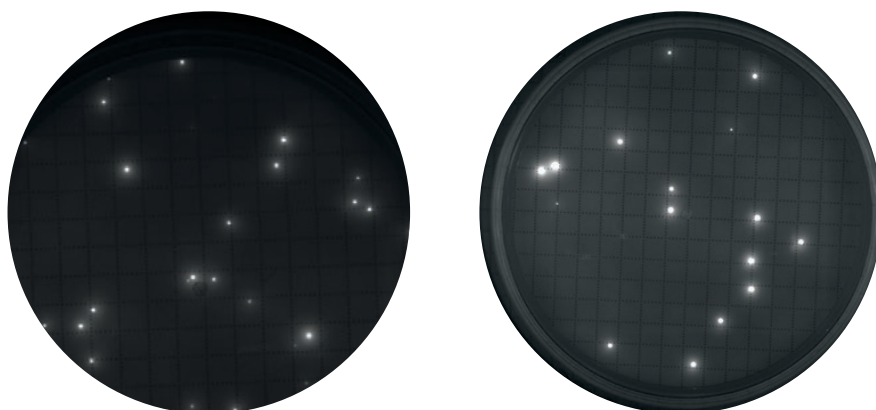
## Definition of a rapid incubation time

An appropriate incubation time is defined as the minimal time which allows a percentage of recovery above 70% compared to the traditional method. The calculation is based on both formulas:

- The fluorescence recovery is the fluorescent dot count compared to the traditional method count.  
$$\text{Fluorescence recovery (\%)} = (\text{average of fluorescence counts} / \text{average of traditional method count}) \times 100$$

- The viability recovery is the colony count on stained membranes after re-incubation compared to the traditional method count. 
$$\text{Viability recovery (\%)} = (\text{average of Colony-Forming Units counts after re-incubation} / \text{average of traditional method counts}) \times 100$$

An optimal incubation time should allow a sufficient fluorescent signal intensity and fluorescence and viability recoveries above 70%.



The picture on the right illustrates a sufficient fluorescent signal intensity translating to an appropriate incubation time. The picture on the left shows that an accurate count is not possible if the intensity of fluorescence is too low due to an insufficient incubation time.

### Materials:

- EZ-Fluo® system Reader (EZFKIT001WW)
- Membrane Filtration systems (EZFTIMIC01)

### Equipment:

- EZ-Fluo® system Reagent Kits (EZFREAG57)

### Media:

- MRS agar + tomato juice
- Brettanomyces agar
- Carr agar
- YEPD agar

To learn more, visit  
[SigmaAldrich.com/EZ-Fluo](https://SigmaAldrich.com/EZ-Fluo)

# Traditional Culture Media Solutions

## GranuCult® granulated culture media

GranuCult® are superior low-dust granulated culture media, developed with more than 100 years of experience. The granulation technology provides excellent wettability, solubility, and free-flowing properties. These media have a shelf life of up to 5 years.



## NutriSelect® powdered culture media

NutriSelect® are high-quality and cost-efficient powdered culture media, all made from high quality raw materials. These cost-efficient media serve many applications, from academic research to testing according to industry standards.



## Quality control levels

Basic, plus, and prime—our three QC levels clearly indicate the degree to which our GranuCult® and NutriSelect® culture media are compliant, making it easy for you to find the dehydrated culture medium to match your needs.

Quality control level	Regulatory compliance
Prime	<ul style="list-style-type: none"><li>Regulatory F&amp;B and pharma industry standards</li><li>QC with Growth Promotion Test acc. to regulatory standards (ISO, FDA-BAM, EP, USP, and QC under ISO 17025 accreditation)</li></ul>
Plus	<ul style="list-style-type: none"><li>Quality control with Growth Promotion</li><li>Test acc. to industry standards</li><li>Quality assurance acc. to ISO 9001</li></ul>
Basic (NutriSelect® media only)	<ul style="list-style-type: none"><li>Basic QC</li><li>Quality assurance acc. to ISO 9001</li></ul>

Choose the media type and QC level according to your needs. You will find all the information on regulatory compliance with additional reference standards on the product label or technical data sheet.



## Ready-to-use culture media solutions

### MC-Media Pad®



With fewer handling steps for your indicator organism testing, our MC-Media Pad® are a convenient ready-to-use method that complies with international beverage standards such as AOAC-PTM & AOAC-OMA, ISO 16140 (MicroVal). The clear color coding means you will always pick the right one at a glance. The MC-Media Pad® improves your workflow and reduces the need for storage, incubation, and waste capacity. Simply inoculate your sample, incubate, and count your colonies!

### ReadyPlate™ 90 mm agar plates

For isolation and enumeration of indicator organisms, our ReadyPlate™ pre-prepared agar plates are certified to be fully compliant with EN ISO 11133:2014, as well as with certain other standards, and are quality controlled by ISO/IEC 17025:2005 accredited laboratories. Each plate carries a label with a data matrix code for paperless plate identification.

#### Our range includes:

- ReadyPlate™ (90 mm plates), e.g. XLD agar, MYP, BPA, PEMBA
- ReadyPlate™ CHROM (90 mm plates) chromogenic media, e.g. CCA, TBX and Listeria Agar

### ReadyPlate™ 55 mm agar plates



The ReadyPlate™ 55 line is designed for easy membrane handling onto these ready-to-use 55 mm agar plates after membrane filtration. The high fill level makes reproducible membrane filter placement easy, avoiding bubbles and folds. Storage at room temperature and the 6 to 9 month shelf life give you the flexibility you need.

To further improve your workflow, we have developed the new ReadyPlate™ 55 testing kits: 55 mm filled-to-the-top agar plates combined with a set of matching membrane filters.

Both the agar plates and the kits are certified for compliance with EN ISO 11133:2014 by an ISO 17025 accredited QC lab, saving you the need to test each filter batch with each batch of culture medium, as is now demanded by EN ISO 11133.

### ReadyTube® liquid media

Discover ready-to-use media in tubes and bottles for isolation, enumeration or enrichment of microorganisms in food. Our ReadyTube® bottles and tubes are fully compliant with EN ISO 11133:2014 and with certain other standards, and are quality controlled by ISO/IEC 17025:2005 accredited laboratories to ensure compliance.

Our clear naming convention whereby the number indicates the volume in milliliters of medium contained in each bottle or tube (e.g. ReadyTube® 200 indicating that each bottle in the pack contains 200 mL) makes identification simple.

# Culture Media for Water Testing

## Media for Water Testing

Medium	Trademark	Medium format	Packaging	Cat. No.
<b><i>Clostridium perfringens</i></b>				
CP ChromoSelect Agar	NutriSelect® basic	Powder	500 g	12398
m-CP Agar Base	NutriSelect® plus	Powder	500 g	75605
TSC Agar*	NutriSelect® basic	Powder	500 g	93745
TSC (Tryptose Sulfite Cycloserine) agar (base) acc. ISO 7937 and ISO 14189	GranuCult® plus	Granules	500 g	1119720500
<b><i>E. coli</i> / Coliforms</b>				
CCA ISO 9308	ReadyPlate™ CHROM	90 mm plate	20 EA	1466890020
Coliform agar acc ISO 9308-1	Chromocult®	Granules	500 g	1104260500
CCA ISO 9308	ReadyPlate™ 55	55 mm plate	20 EA	1467570020
			200 EA	1467570200
CCA ISO 9308	ReadyPlate™ 55 KIT	KIT	KIT	1467580150
Coliforms 100	Readycult®	Granules	1 x 20 test	1012980001
Coliforms 50	Readycult®	Granules	1 x 20 test	1012950001
ECD Agar	NutriSelect® basic	Powder	500 g	44655
ECD Agar with MUG	NutriSelect® plus	Powder	500 g	09142
ENDO Agar	GranuCult® plus	Granules	500 g	1040440500
Endo Agar	NutriSelect® plus	Powder	500 g	E5399
ENDO Agar (Base)	NutriSelect® plus	Powder	500 g	70137
Lactose TTC Agar mit Tergitol®-7	GranuCult® plus	Granules	500gr	1076800500
Lactose TTC Agar with Tergitol®-7	NutriSelect® plus	Powder	500 g	54232
Lactose TTC Agar with Tergitol®-7	-	90 mm plate	20 EA	1461850020
Membrane Lactose Glucuronide Agar (MLGA)	NutriSelect® plus	Powder	500 g	39734
m-FC Agar	NutriSelect® plus	Powder	500 g	96961
m-FC Agar	GranuCult® plus	Granules	500 g	1112780500
Tergitol®-7 Agar	NutriSelect® plus	Powder	500 g	86455
<b>Enterobacteriaceae</b>				
Mac Conkey Agar No 1	NutriSelect® plus	Powder	500 g	70143
<b>Enterococcus (intestinal)</b>				
Bile Esculin Azide Agar	GranuCult® plus	Granules	500 g	1000720500
Bile Esculin Azide Agar	NutriSelect® plus	Powder	500 g	06105
Bile Esculin Azide Agar ISO 7899-2:2000	NutriSelect® plus	Powder	500 g	72678
Bile Esculin Azide Agar	-	90 mm plate	20 EA	1463210020
Enterococci 100	Readycult®	Granules	1 x 20 test	1012990001
Enterococcus faecium ChromoSelect Agar (Base)	NutriSelect® plus	Powder	500 g	90919
KF-Streptococcus Agar	NutriSelect® plus	Powder	500 g	1107070500
KF-Streptococcus Agar	NutriSelect® plus	Powder	500 g	60641
Membrane filter Enterococcus Selective Agar	NutriSelect® plus	Powder	500 g	63647
Slanetz-Bartley Agar (Base), acc. ISO 7899	GranuCult® prime	Granules	500 g	1052890500
Slanetz-Bartley Agar incl. TTC acc. ISO 7899	GranuCult® prime	Granules	500 g	1052620500
Slanetz and Bartley Agar ISO 7899	ReadyPlate™ 55	55 mm plate	20 EA	1467650020
Slanetz-Bartley Agar ISO 7899	ReadyPlate™ 55 KIT	90 mm plate	20 EA	1467660150

Medium	Trademark	Medium format	Packaging	Cat. No.
<b>General spoilage organisms</b>				
Yeast Extract Agar acc. ISO 6222	GranuCult® prime	Granules	500 g	<b>1131160500</b>
Yeast Extract Agar	NutriSelect® plus	Powder	500 g	<b>01497</b>
Yeast Extract Agar acc. ISO 6222	ReadyTube® 18	18 mL tubes	20 EA	<b>1461210020</b>
<b><i>Pseudomonas aeruginosa</i></b>				
Bismuth sulfite (BS) agar acc. WILSON-BLAIR	NutriSelect® prime	Powder	500 g	<b>1001910500</b>
Bismuth sulfite Agar	NutriSelect® basic	Powder	500 g	<b>95388</b>
CN Agar ISO 16266	ReadyPlate™ 55	55 mm plate	20 EA	<b>1467670020</b>
CN Agar ISO 16266	ReadyPlate™ 55 KIT	KIT	20 EA	<b>1467680150</b>
Cetrimide Agar	NutriSelect® plus	Powder	500 g	<b>22470</b>
Pseudomonas CFC/CN Agar (Base) acc. ISO 13720 and ISO 16266	GranuCult® prime	Granules	500 g	<b>1076200500</b>
<b>Total Count/Spoiling organisms</b>				
Tryptone Glucose Extract Agar (TGE Agar)	GranuCult® plus	Granules	500 g	<b>1101280500</b>
Tryptone Glucose Extract Agar (TGE Agar)	NutriSelect® plus	Powder	500 g	<b>70159</b>
Tryptone Glucose Extract Agar (TGE Agar)	ReadyPlate™ 55	55 mm plate	20 EA	<b>1467610020</b>
Tryptone Glucose Extract Agar (TGE Agar)	ReadyPlate™ 55 KIT	KIT	KIT	<b>1467620150</b>
<b>Yeast &amp; Molds</b>				
Sabouraud 2% Dextrose Agar	GranuCult® prime	Granules	500 g	<b>1073150500</b>
Sabouraud 2% Glucose Agar	NutriSelect® basic	Powder	500 g	<b>84086</b>
Sabouraud 4% Dextrose Agar	GranuCult® prime	Granules	500 g	<b>1054380500</b>
Sabouraud 4% Glucose Agar	NutriSelect® plus	Powder	500 g	<b>84088</b>
m-Green Agar	ReadyPlate™ 55	55 mm plate	20 EA	<b>1467690020</b>
m-Green Agar	ReadyPlate™ 55 KIT	KIT	KIT	<b>1467700150</b>

## Supplements for Water Testing Media

Supplement	Function	Corresponding Media	Packaging	Cat. No.
Clostridium perfringens selective supplement	Inhibits yeasts & molds, chromogenic substrate	TSC agar (Cat. No. 1119720500)	10 Vials	<b>1008880010</b>
Enterococcus faecium Selective Supplement	Inhibits gram-negative bacteria and most gram-positive bacteria but not Enterococcus species	Enterococcus faecium ChromoSelect Agar Base (Cat. No. 90919)	5 Vials	<b>01318</b>
M-CP selective Supplement I	Inhibit gram positive and most gram-negative bacteria	CP ChromoSelect Agar (Cat. No. 12398), m-CP Agar Base (Cat. No. 75605)	5 Vials	<b>51962</b>
m-CP selective Supplement II	Indicator	m-CP Agar Base (Cat. No. 75605)	5 Vials	<b>82265</b>
Perfringens T.S.C. Supplement	Inhibit gram positive bacteria	CP ChromoSelect Agar (Cat. No. 12398)	1 Vial	<b>P9352</b>
Pseudomonas CN Selective Supplement	Inhibit the Gram-positive and Gram-negative bacteria	Pseudomonas CFC/CN Agar, Base (Cat. No. 1076200500)	10 Vials	<b>1076240010</b>
Rosolic acid	Indicator	m-FC Agar (Cat. No. 96961 & 1112780500)	25 g 100 g	<b>861324</b>
TTC Solution	Chromogenic Indicator	Lactose TTC Agar with Tergitol®-7 (Cat. No. 54232), Tergitol(R)-7 Agar (Cat. No. 86455), Tryptone Glucose Extract Agar/TGE Agar (Cat. No. 70159)	10x10 mL	<b>17779</b>

# Culture Media for Beverage Product Testing

## Media for Quality Control of Beverage Products

Medium	Soft Drinks	Brewery	Wine	Samples and remarks	Trademark	Medium format	Packaging	Cat. No.
<b>Acetic Acid resistant organisms</b>								
PRY Broth	x	x	x	Bottling	-	2 mL ampoules	50 EA	MHA00PRY2
<b>Alicyclobacillus spp.</b>								
BAT agar acc. IFU Method No. 12	x			Citrus juice	GranuCult® prime	Granules	500 g	1079940500
BAT broth acc. IFU Method No. 12	x			Citrus juice	GranuCult® prime	Granules	500 g	1079930500
<b>Aspergillus flavus, A. parasiticus</b>								
Dichloran Rose Bengal Agar (Base)		x		Grain	NutriSelect® plus	Powder	500 g	17147
<b>Aspergillus flavus, A. parasiticus, spoiling Yeasts &amp; Molds</b>								
DRBC (Dichloran-rose bengal chloramphenicol) Agar (base) acc. ISO 21527 and FDA-BAM		x		Grain	GranuCult® prime	Granules	500 g	1004660500
<b>Bacillus species</b>								
Bacillus ChromoSelect Agar	x	x		Syrups, sugars	NutriSelect® plus	Powder	500 g	92325
Cereus Selective Agar	x	x		Syrups, sugars	NutriSelect® basic	Powder	500 g	22310
<b>Bacillus thermoacidurans (Spores)</b>								
Thermoacidurans Agar	x			Bottling	NutriSelect® plus	Powder	500 g	17274
<b>Brettanomyces</b>								
Brettanomyces Selective Broth		x	x	Wort, fermentation, bottling	-	2 mL ampoules	50 EA	MHA00BSM2
<b>Fungi</b>								
Aspergillus Differentiation Agar (Base)	x	x		Grain, juice	NutriSelect® plus	Powder	500 g	17121
Buffered Peptone Water acc. ISO 6579, ISO 19250, ISO 21528, ISO 22964, ISO 6887, FDA-BAM and EP	x			In raw materials and brewery environments	GranuCult® prime	Granules	500 g	1072280500
Buffered Peptone Water	x			In raw materials and brewery environments	ReadyTube® 1000	Bottle 100 mL	6 EA	1464030006
Buffered Peptone Water	x			In raw materials and brewery environments	ReadyTube® 9	Tubes 9 mL	20 EA	1461420020
Cooked Meat Broth	x			In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	60865
Czapek Dox Agar		x		Grain	NutriSelect® basic	Powder	500 g	70185
DG 18 (Dichloran glycerol chloramphenicol) agar (base) acc. ISO 21527 and FDA-BAM	x	x		Grain	GranuCult® prime	Granules	500 g	1004650500
DG 18 ISO 21527	x	x		Grain	ReadyPlate™	90 mm plate	20 EA	1461610020
Dichloran Glycerol Agar (DG 18 Agar)	x	x		Grain	NutriSelect® plus	Powder	500 g	40587
Potato Dextrose Agar (pH 5.6 +/- 0.2)		x		Grain	GranuCult® prime	Granules	500 g	1101300500
Potato Dextrose Agar (pH 5.7 +/- 0.2)		x		Grain	NutriSelect® plus	Powder	500 g	70139
Potato Dextrose Agar		x		Grain	NutriSelect® plus	Powder	500 g	P2182
Potato Dextrose Broth		x		Grain	NutriSelect® plus	Powder	500 g	P6685
Potato Glucose Rose bengal Agar		x		Grain	NutriSelect® plus	Powder	500 g	17204
<b>General spoilage organisms</b>								
Nutrient agar acc. ISO 6579, ISO 10273 and ISO 21528		x		In raw materials and brewery environments	GranuCult® prime	Granules	500 g	1054500500
Nutrient Agar No 2		x		In raw materials and brewery environments	NutriSelect® basic	Powder	500 g	70116
Nutrient broth acc. FDA-BAM		x		In raw materials and brewery environments	GranuCult® prime	Granules	500 g	1054430500



Medium	Soft Drinks	Brewery	Wine	Samples and remarks	Trademark	Medium format	Packaging	Cat. No.
Nutrient Broth No. 4		x		In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	03856
Orange Serum Agar acc. IFU		x		In raw materials and brewery environments	GranuCult® prime	Granules	500 g	1106730500
Orange Serum Agar	x			In raw materials and brewery environments	NutriSelect® basic	Powder	500 g	75405
Orange Serum Agar	x			In raw materials and brewery environments	-	Bottle 200 mL	6 EA	1464250006
Peptone Water, phosphate-buffered	x			In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	77187
Peptone Water, phosphate-buffered, Vegitone	x			In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	40893
RLS Broth (Rapid Lemonade Spoilage Organism Broth)	x		x	In raw materials and brewery environments	NutriSelect® basic	Powder	500 g	38587
Universal Beer Agar		x		In raw materials and brewery environments	GranuCult® plus	Granules	500 g	1004450500
Universal Beer Agar		x		In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	17226
Wallerstein Differential Broth		x	x	In raw materials and brewery environments, bacteria present in a small number in a mixed flora (cycloheximide inhibits the growth of most of the yeasts and molds)	-	2 mL ampoules	50 EA	MHA000P2D
Wallerstein Nutrient Broth		x	x	In raw materials and brewery environments	-	2 mL ampoules	50 EA	MHA000P2N
WL Differential Agar		x	x	In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	17215
WL Nutrient Agar		x	x	In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	17222
WL Nutrient Agar		x	x	In raw materials and brewery environments	GranuCult® plus	Granules	500 g	1108660500
WL Nutrient Agar, modified		x		In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	1006100500
WL Nutrient Broth		x	x	In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	W2261
Yeast Malt Agar	x			In raw materials and brewery environments	NutriSelect® plus	Powder	500 g	Y3127
<b>Lactic acid bacteria, <i>Pectinatus</i>, <i>Megasphaera</i></b>								
NBB Agar		x		Yeast, fermentation, bottling	NutriSelect® plus	Powder	500 g	64198
NBB Broth		x		Yeast, fermentation, bottling	NutriSelect® plus	Powder	500 g	50725
Raka Ray Agar, Base		x		Wort, fermentation, bottling	NutriSelect® plus	Powder	500 g	02538
<b>Lactobacilli, <i>Leuconostocs</i> and lactic acid streptococci</b>								
APT agar	x	x		Wort, fermentation, bottling	NutriSelect® plus	Powder	500 g	1104530500
<b><i>Lactobacillus</i></b>								
MRS Agar	x	x		Wort, fermentation, bottling	NutriSelect® basic	Powder	500 g	69964
MRS agar (de MAN, ROGOSA and SHARPE) acc. ISO 15214	x	x	x	Wort, fermentation, bottling	GranuCult® plus	Granules	500 g	1106600500

## Media for Quality Control of Beverage Products (continued)

Medium	Soft Drinks	Brewery	Wine	Samples and remarks	Trademark	Medium format	Packaging	Cat. No.
MRS Agar ISO 15214	x	x	x	Wort, fermentation, bottling	ReadyTube® 200	Bottle 200 ml	6 EA	1463640006
MRS Agar, original acc. DeMan-Rogosa-Sharpe	x	x	x	Wort, fermentation, bottling	NutriSelect® basic	Powder	500 g	30912
MRS Agar, Vegitone	x	x	x	Wort, fermentation, bottling	NutriSelect® plus	Powder	500 g	41782
MRS Broth (DE MAN, ROGOSA and SHARPE)	x	x	x	Wort, fermentation, bottling	GranuCult® prime	Granules	500 g	1106610500
MRS Broth	x	x	x	Wort, fermentation, bottling	NutriSelect® basic	Powder	500 g	69966
MRS Broth modified, Vegitone	x	x	x	Wort, fermentation, bottling	NutriSelect® plus	Powder	500 g	38944
MRS Liquid medium	x	x	x	Wort, fermentation, bottling	-	2 mL ampoules	50 EA	MHA00MRS2
Rogosa Agar (Lactobacillus Selective Agar)	x	x		Wort, fermentation, bottling	GranuCult® plus	Granules	500 g	1054130500
Rogosa SL Agar	x	x		Wort, fermentation, bottling	NutriSelect® plus	Powder	500 g	R1148
Tomato Juice Agar	x	x		Wort, fermentation, bottling	NutriSelect® plus	Powder	500 g	17216
<b>Total Count/Spoiling organisms</b>								
Rapid Aerobic Count	x			For "non-filterable materials"	MC-Media Pad®	Plating film system	100 EA	1323590001
Plate Count Agar acc ISO 4833, ISO 17410 and FDA-BAM, GranuCult™	x			Bottling	GranuCult® prime	Granules	500 g	1054630500
Plate Count Agar	x			Bottling	NutriSelect® plus	Powder	500 g	70152
Plate Count Agar	x			Bottling	-	Bottle 200 mL	6 EA	1463650006
Plate count Agar	x			Bottling	ReadyPlate™ 55	55 mm plate	20 EA	1467630020
Plate count Agar	x			Bottling	ReadyPlate™ 55 KIT	KIT	KIT	1467640150
Plate Count Agar, Vegitone	x			Bottling	NutriSelect® plus	Powder	500 g	19718
Plate Count Agar according to Buchbinder et al.	x			Bottling	NutriSelect® plus	Powder	500 g	88588
Plate Count Agar according to Buchbinder et al. (Sachets)	x			Bottling	NutriSelect® plus	Sachets for 500 mL	5 EA	03628
Plate Count MUG Agar	x			Bottling	NutriSelect® plus	Powder	500 g	51413
TGE Agar	x	x	x	Bottling	GranuCult® plus		500 g	1101280500
Tryptone Glucose Extract Broth (TGE)	x	x	x	Bottling	-	2 mL ampoules	50 EA	MHA000P2T
Tryptone Glucose Extract Broth (TGE) with TTC	x	x	x	Bottling	-	2 mL ampoules	50 EA	MHA000P2TT
<b>Yeast</b>								
Brettanomyces Selective Broth		x	x	Bottling, end product	-	2 mL ampoules	50 EA	MHA00BSM2
Lysine Medium		x	x	Wort, fermentation, bottling	NutriSelect® plus	Powder	500 g	L5910
MGYP Agar with Copper		x	x	Fermentation, bottling	NutriSelect® plus	powder	500 g	43479
<b>Yeast &amp; Molds</b>								
Corn Meal Agar		x		Grains, hops	NutriSelect® plus	Powder	500 g	42347
m-Green Agar	x			Water analysis	ReadyPlate™ 55	55 mm plate	20 EA	1467690020
m-Green Agar	x			Water analysis	ReadyPlate™ 55 KIT	KIT	KIT	1467700150
m-Green Yeast and Mold Broth	x			Water analysis	-	2 mL ampoules	50 EA	MHA000P2M
OGY Agar	x			Grains, hops	NutriSelect® basic	Powder	500 g	75310

Medium	Soft Drinks	Brewery	Wine	Samples and remarks	Trademark	Medium format	Packaging	Cat. No.
OGYE Agar (Base)	x			Grains, hops	GranuCult® plus	Granules	500 g	1059780500
OGYE ChromoSelect Agar Base	x			Grains, hops	NutriSelect® plus	Powder	500 g	66481
Rose Bengal Chloramphenicol (RBC) Agar		x		Grains, hops	GranuCult® plus	Granules	500 g	1004670500
Rose Bengal Chloramphenicol (RBC) Agar		x		Grains, hops	NutriSelect® plus	Powder	500 g	17211
Schwarz Differential Agar		x		Wort, fermentation, bottling	NutriSelect® plus	Powder	500 g	40608
Wort Agar		x	x	Wort, fermentation, bottling	GranuCult® plus	Granules	500 g	1054480500
Wort Agar		x	x	Wort, fermentation, bottling	NutriSelect® basic	Powder	500 g	70196
Wort broth		x	x	Wort, fermentation, bottling	GranuCult® plus	Granules	500 g	1054490500
Yeasts & Molds	x	x	x	For "non-filterable materials"	MC-Media Pad®	plating film system	100 EA	1323600001
Yeast and Mold Selective Broth		x	x	Grain, malt, mash, wort, fermentation, bottling, chloramphenicol inhibits background bacteria growth	-	2 mL ampoules	50 EA	MHA00P2SM
Yeast Nitrogen Base		x	x	Wort, fermentation, bottling	NutriSelect® plus	Powder	500 g	51483
Yeast Nitrogen Base without Amino Acid		x	x	Wort, fermentation, bottling	NutriSelect® basic	Powder	500 g	Y0626
Yeast Nitrogen Base without Amino Acid and Ammonium Sulfate		x	x	Wort, fermentation, bottling	NutriSelect® basic	Powder	500 g	Y1251
<b>Yeast &amp; Molds at low pH (Media Fill - aseptic filling)</b>								
Linden Grain medium	x			Sterility in aseptic filling lines	GranuCult® plus	Granules	5 kg 25 kg	1037905000 1037909025
Linden Grain medium HALAL	x			Sterility in aseptic filling lines	NutriSelect® plus	Powder	5 kg 25 kg	1027475000 1027479025
<b>Yeast &amp; Molds, <i>Bacillus</i></b>								
Malt Agar	x	x		Syrups, sugars, hops	NutriSelect® Plus	Powder	500 g	M9802
Malt Extract Agar	x	x	x	Syrups, sugars, hops	GranuCult® prime	Granules	500 g	1053980500
Malt Extract Agar	x	x	x	Syrups, sugars, hops	NutriSelect® plus	Powder	500 g	70145
Malt Extract Agar	x	x	x	Syrups, sugars, hops	-	90 mm plate	20 EA	1461510020
Malt Extract Agar with chloramphenicol	x	x		Syrups, sugars, hops	-	90 mm plate	20 EA	1467290020
Malt Extract Agar, modified	x	x		Syrups, sugars, hops	NutriSelect® plus	Powder	500 g	97218
Malt Extract Broth	x	x		Syrups, sugars, hops	GranuCult® prime	Granules	500 g	1053970500
Malt Extract Broth	x	x		Syrups, sugars, hops	NutriSelect® plus	Powder	500 g	70146
m-Green Yeast and Mold Broth	x			Water analysis	-	Powder	100 gr	MB000000Y

## Supplement for Quality Control of Beverage Products

Supplement	Inhibiting organisms	Corresponding Media	Packaging	Cat. No.
Chloramphenicol Selective Supplement	Inhibits bacteria	Rose Bengal Chloramphenicol Agar Base (Cat. No. 17211)	5 Vials	29231
Cycloheximide Solution	Inhibits yeasts & moulds	Raka-Ray Agar, Base (Cat. No. 02538)	10x10 mL	18079
Glycerol for analysis EMSURE®	Inhibits bacteria	Supplement for DG18 agar	1 L	1040921000
Lactic Acid Supplement, modified	Inhibits non lactic acid bacteria	Rakay-Ray Agar, Base (Cat. No. 02538)	5 Vials	14121
OGYE Selective supplement	Inhibits bacteria	OGYE Agar, Base (Cat No. 1059780500)	10 vials	109877.0010
Oxytetra Selective Supplement	Inhibits bacteria	OGYE Chromogen Agar Base (cat. No. 66481), OGY Agar (Cat. No. 75310)	5 Vials	51239

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