

# F&BFOCUS

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# BREWING WORKFLOW

## Lab Essentials

Pipet Controllers  
Pipettors and Starter Kits  
Bottle-Top Dispensers  
Tissue Wipers  
Casework, Shelving, Workstations  
Personal Protection



## Water & Beer Analysis

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Columns  
Vials, Caps, and Closures  
GC System Starter Kits  
HPLC Solvents  
pH Meters  
Shakers  
Spectrophotometers  
Water Purification Systems  
Water Pathogen Testing System



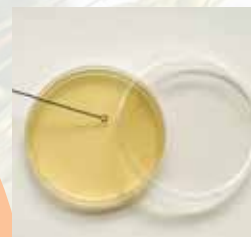
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Culture Media  
Agar Media  
Brewing Coliforms  
Lactobacilli/Yeasts

Liquid Media  
Electrophoresis Systems  
PCR Mix  
Transfer Pipets

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Pipette Tips  
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Microcentrifuge Tubes



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## Money Saving Offers

Microbiology Incubators  
Advanced Analytics Chemicals  
ColonyDoc-It™ Imaging Station  
HQd Meter Kit  
Prime Thermal Cyclers  
AccuStart® II for PCR  
qTOWER qPCR Thermal Cycler

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## Essential Testing Products for the Brewing Industry

Use this representative guide to source the consumables, filtration products, equipment, and chemicals you need to produce beer. From sampling, to analysis and quality control — VWR has it covered.

To find all the products you need for a complete brewing workflow, visit [vwr.com/food-beverage](http://vwr.com/food-beverage).

### Sample Collection

	Cat. No.
BDH® Reference Standard Buffers.....	BDH5046-500ML
VWR® Polypropylene Carboys.....	89170-786
VWR® Sample Sak™ Sample Bags.....	11216-000
VWR® Disposable Serological Pipets.....	89130-902
VWR Signature™ Pipet Tips.....	37001-528
Neptune™ Universal Pipet Tips.....	89168-762
VWR® Wide Mouth Laboratory Bottles.....	414004-112
	414004-115
	414004-126
VWR® Graduated Polypropylene Beakers.....	414004-143
VWR® Disposable Petri Dishes.....	25384-302

### Sample Preparation

	Cat. No.
VWR® High-Performance Centrifuge Tubes.....	89039-666
VWR® SuperClear™ Ultra-High Performance Centrifuge Tubes.....	21008-242
VWR® BigTop™ Microcentrifuge Tubes.....	20170-333
VWR® Erlenmeyer Flasks.....	89095-270
	10126-408
	10126-410
VWR® Standard Line Cell Culture Flasks.....	10062-872
VWR® Grade 315, Crepe Fluted Filter Circles.....	28331-048

### Water & Beer Analysis

	Cat. No.
VWR® sympHony™ Benchtop Meter with pH Probe.....	89231-664
HACH DR 1900 Portable Spectrophotometer.....	10145-568
VWR® Advanced 3500 Orbital Shaker.....	89032-096
ELGA PURELAB® Chorus 1 General Science Water System.....	10034-544
PerkinElmer® Velocity-Wax GC Columns.....	97054-288
VWR® 18 mm Screw-Thread Headspace Vials & Caps.....	10119-902, 10119-914
SiTite™ FingerTite Starter Kit.....	97051-952
EMD Methanol, HPLC.....	EM-MX0475-1
EMD TitriPUR® Hydrochloric Acid.....	EM1.09057.2500
EMD TitriPUR® Sulfuric Acid.....	EM1.09074.4000
EMD ACS Grade Magnesium Chloride, Hexahydrate.....	EM-MX0045-1
EMD ACS Grade Potassium Phosphate, Dibasic.....	EM-PX1570-1
EMD Pure Ethyl Alcohol, 190 Proof.....	EMD-EX0290-1

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### Lab Essentials

	Cat. No.
VWR Signature™ Ergonomic High Performance Single-Channel Pipettor Kit.....	89080-000
JENCONS Powerpette® Plus Pipet Controller.....	14526-202
JENCONS Zippette™ Bottle-Top Dispenser.....	53409-976
VWR® Light-Duty Tissue Wipers.....	82003-820
Customized Workstations — VWR® Bench Selector.....	<a href="http://vwr.com/benchselector">vwr.com/benchselector</a>
Labconco® REDISHIP Purifier® Logic® + Class II A2 Biosafety Cabinets.....	89413-128
VWR® Contour™ Self-Skinned Urethane Chairs.....	80086-439

### Microbiology

	Cat. No.
VWR® Disposable Transfer Pipets.....	16001-188
VWR Life Science AMRESCO Yeast Genomic DNA Purification Kit.....	89492-618
VWR Life Science AMRESCO PCR Mix, 2X.....	97063-322
VWR® Mini Gel II Complete Horizontal Electrophoresis System.....	95043-650
<b>HiMedia® Products for Controlling the Fermentation Process</b>	
<b>Agar Media</b>	
Actidione Agar Base w/o Actidione®.....	95020-150
Actidione Agar w/ Actidione.....	95022-906
Lysine Medium Base.....	95021-866
50% Potassium Lactate.....	71005-792
Malt Agar.....	61000-058
Modified NBB Agar (Pedi-Lacto Selective Agar Base).....	95021-332
Universal Beer Agar, Modified.....	95021-210
Universal Beer Agar (UB Agar).....	95021-796
WL Nutrient Medium.....	95020-592
WL Differential Agar.....	95020-392
Wort Agar.....	61000-628
<b>Liquid Media</b>	
Anaerobic Fermentation Medium Base.....	95022-580
Andrade Peptone Water.....	95022-412
Andrade Peptone Water w/ Meat Extract.....	95022-444

Blue Agar.....	95021-776
Bromo Cresol Purple Broth Base (Yeast Fermentation Broth Base).....	95022-154
CHO Medium Base.....	95021-712
Enteric Fermentation Base.....	95021-420
Glucose Agar.....	95021-308
Glucose Broth.....	95022-370
Peptone Water.....	95020-080
Universal Liquid Medium.....	95020-952
WL Differential Agar.....	95020-392
WL Differential Broth.....	95021-788
WL Nutrient Broth.....	95020-134
Wort Broth.....	95021-694
<b>HiMedia® Brewing Products</b>	
<b>Coliforms</b>	
Bromo Cresol Purple Agar w/ Lactose.....	95020-822
Fluid Lactose Medium.....	95020-076
MacConkey Agar w/ 0.15% Bile Salts, CV and NaCl.....	95020-204
MacConkey Broth Purple w/ BCP.....	95020-214
Super Broth.....	95020-920
<b>Lactobacilli/Yeasts</b>	
Lactic Acid Bacteria Selective Broth Base (Raka-Ray No. 3 Broth Base).....	95021-062
Lactic Supplement.....	71005-682
Lactic Bacteria Differential Agar.....	95020-458
Lactic Bacteria Differential Broth.....	95020-456

Lee's Multidifferential Agar.....	95020-954
Litmus Milk.....	61000-124
Lysine Medium Base.....	95022-120
50% Potassium Lactate.....	71005-792
M-BCG Yeast and Mould Agar.....	95021-236
M-BCG Yeast and Mould Broth.....	95020-542
MRS Agar (Lactobacillus MRS Agar).....	95022-946
Oxytetra Glucose Yeast Agar Base (OGYE Agar Base).....	61000-134
Oxytetra Selective Supplement.....	89134-988
Pedi Lacto Selective Agar Base.....	95021-332
Rogosa SL Agar.....	95020-904
Rose Bengal Chloramphenicol Agar.....	95022-944
SCHWARZ Differential Medium.....	95020-950
Tomato Juice Medium Base.....	95022-956
Lactobacilli Supplement.....	71005-744
Universal Beer Agar (UB Agar).....	95021-796
Universal Beer Agar, Modified.....	95021-210
Universal Liquid Medium.....	95020-952
WL Differential Agar.....	95020-392
WL Differential Broth.....	95021-788
WL Nutrient Broth.....	95020-134
WL Nutrient Medium.....	95020-592
Wort Agar.....	61000-628
Yeast Malt Agar (YM Agar) (ISP Medium No. 2).....	95021-804

Products with 🍷 icon are also available as HiVeg™ Media.

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Whether you're in a lab or scaling up for production, you face the challenge of balancing the need to stretch your dollars with the need for quality and innovation. Our VWR Brands provide the right products, at the right price, and a suite of customized solutions—all with the name you trust.

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- Homogeneous blending of complex powder blends
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## Puritan ESK® Sampling Kits

- Butterfield's Solution: Dilution and enumeration of microorganisms
- Lethen Broth: Neutralization of quaternary ammonium compounds in disinfectant testing
- Neutralizing Buffer: Microbiological examination of surfaces
- Buffered Peptone Water: Pre-enrichment of injured Salmonella species from food specimens prior to inoculation to a selective enriched medium for isolation and identification

### Specifications

Tip Size	17.4 mm (0.687")
Tip Diameter	5.15 mm (0.203")
Handle Length	82.55 mm (3.25")
Overall Tube Length	103.12 mm (4.06")
Fill Solution	10 mL (also available in 4mL and customized fills)

ESK Sampling Kits	Cat. No.	Cs. of 50
Butterfield's Solution	89221-698	59.90
Lethen Broth	89221-706	63.51
Neutralizing Buffer	89221-714	57.37
Buffered Peptone Water	89221-722	57.02

Featured Kits are Sterile.



## Puritan EnviroMax Plus® Swabs

- Pre-moistened with 50% NB / 50% 0.1% BPW
- Quick-turn open and leak-resistant cap securely attached to swab
- Rigid paddle inside foam is ideal for reaching into crevices

### Specifications

Tip Size	56.38 mm (2.22")
Tip Diameter	15.545 mm (0.612")
Handle Length	Pointed: 147.32 mm (5.8"); Round: 145.03 mm (5.71")
Overall Tube Length	152.91 mm (6.02")



EnviroMax Plus Swabs	Cat. No.	Price
Pointed	89221-742	Pk. 25/ 58.78
Pointed	89221-744	Cs. 250/ 508.39
Rounded	89221-746	Pk. 25/ 58.78
Rounded	89221-748	Cs. 250/ 508.39



The Only

# Syringe Filter

You Will Ever Need

## Acrodisc® Syringe Filter with GHP Membrane

### Removing the Barriers to Filtration for Clear Results

- ▶ Reduce time for method validation with higher analyte recoveries
- ▶ Eliminate membrane selection process with universal membrane
- ▶ Extend HPLC column lifetimes with Pall's unique filter technology



Description	Pore Size, µm	Pall PN	Cat. No.	Case of 200
Acrodisc Syringe Filter	0.2	AP-4564	28143-272	716.83
Acrodisc Syringe Filter	0.45	AP-4560	28143-922	716.83
Acrodisc GxS Syringe Filter	0.2	AP-4307	28143-878	777.12
Acrodisc GxS Syringe Filter	0.45	AP-4559	28143-920	777.12

Membrane: GHP; Size: 25 mm.



Filtration. Separation. Solution.™

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## Compact Dry™ for Bacterial Counts

Compact Dry is ready-to-use chromogenic medium for performing coliform counts, *E. coli*, yeasts and molds, as well as total aerobic bacterial counts. It contains dehydrated media and a water-soluble gelling agent in a non-woven cloth matrix. The medium is instantly hydrated when inoculated with a sample, and capillary action diffuses the sample evenly over the matrix to form a gel within seconds.

A diluted food or beverage sample (1mL) is added to the center of the device, which diffuses automatically and evenly throughout the plate. No spreader is required. The device is then incubated and colonies grow with specific colors for easy organism differentiation and counting.

Description	Target Organisms	Cat. No.	Pack of 100
Compact Dry CF	Coliforms	10145-952	152.60
Compact Dry EC	<i>E. coli</i> & Coliforms	10145-954	185.15
Compact Dry ETB	ETB Enterobacteriaceae	10753-986	193.33
Compact Dry TC	Total Count	10145-968	129.15
Compact Dry XSA	<i>S. aureus</i>	10145-970	217.39
Compact Dry YM	Yeast & Mold	10145-972	202.33

Packaging: Four plates per mylar sleeve, 25 mylar sleeves per pack.



Compact Dry™ CF  
(Coliforms).  
Cat. No. 10145-952



Compact Dry™ EC  
(*E. coli* & Coliforms).  
Cat. No. 10145-954



Compact Dry™ ETB  
(ETB, Enterobacteriaceae)  
Cat. No. 10753-986



Compact Dry™ TC  
(Total Count).  
Cat. No. 10145-968



Compact Dry™ XSA  
(*S. aureus*).  
Cat. No. 10145-970



Compact Dry™ YM  
(Yeast & Mold).  
Cat. No. 10145-972

**Long shelf life (18 months)  
and can be stored at room  
temperature.**

## BACTRON Anaerobic Chambers



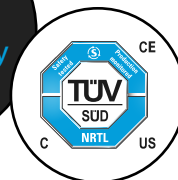
Model No.	Workspace, cu. ft.	Plate Capacity	Cat. No.	Each
BACTRONEZ	13.7	300	10210-216	11,171.00
BACTRON300	17.6	300	89409-530	24,268.03
BACTRON600	17.6	600	89409-534	28,040.49
BACTRON900	17.6	900	89409-536	29,416.10

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The Most  
Comfortable  
Chamber

New  
Features

300-900  
Plate Capacity



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NEW



BAX System Q7 can hold up to 96 samples per process run.

## DuPont™ BAX® System

The DuPont BAX System is an automated detection system that uses the power of the polymerase chain reaction (PCR) to identify pathogens and other harmful organisms in food ingredients, finished products, and production environments.

The BAX System Q7 instrument not only amplifies bacterial DNA through a series of carefully timed heating and cooling cycles, but also automatically detects the presence or absence of the target pathogen to provide clear yes-or-no results that require no advanced interpretation. For real-time PCR assays, the automated processing is complete in 60–70 minutes. For standard PCR assays, processing is complete in about 3.5 hours.

The BAX System method is certified as a Performance Tested Method<sup>SM</sup> and an Official Method of Analysis by AOAC for detecting pathogens such as Salmonella, Listeria, E. coli O157:H7, Campylobacter, Vibrio, and yeast and mold in a wide variety of food and environmental sample types.

The DuPont BAX System Q7 Start-Up Package includes a Q7 instrument, computer workstation with BAX System software, heating and cooling blocks, and all the additional supplies you need to process your first 96 samples with the BAX System method. BAX System PCR assays and enrichment media are sold separately.

Description	Electrical	Cat. No.	Each
BAX Startup System Q7	120V	10754-678	52,000.00

Same Pure Product.  
New Pure Brand.



## VWR Life Science AMRESCO Yeast Genomic DNA Purification Kit

- Rapid purification yields high-quality, high molecular weight DNA
- No enzymes, glass beads, or freeze thawing for cell lysis
- Method is phenol, chloroform, and column-free
- Simple protocol requires only about one hour to complete
- Easily scale purification as needed

**Ordering Information:** Kit includes Yeast Lysis Solution; Ribonuclease A (RNase A); Protein Precipitation Solution; TE, pH 8.0. Visit [vwr.com](http://vwr.com) for additional product details.

No. of Reactions	Cat. No.	Each
50	89492-618	71.76
200	89492-616	225.56



## VWR® Disposable Transfer Pipets

These unbreakable all-in-one graduated transfer pipets eliminate the hazard of broken glass and exposure to infectious materials. Molded from see-through low density polyethylene, pipets are inert to biological fluids and most acids, and can be sealed and refrigerated. The low-affinity surface reduces the loss of cells and valuable proteins due to binding. Ideal for quick, safe transfer of fluids. Transfer pipets can be gas sterilized.

- No bulb to insert or remove
- Uniform drop size

Description	Capacity, mL	Overall Length, cm	Bulb Draw, mL	Sterility	Cat. No.	Pack of 500	Case of 5,000
General-Purpose	7.5	15.5	3.2	Nonsterile	16001-188	50.99	352.34
Thin Stem	1.5	11.6	0.8	Nonsterile	16001-172	47.59	327.86
Small Bulb	3	13.8	2.1	Nonsterile	16001-176	48.47	333.12
Large Bulb	5.8	15.5	3.4	Sterile	414004-015	82.08	565.75

Many additional sizes and packaging options are available; visit [vwr.com](http://vwr.com). Featured pipets are bulk packaged.

# Culture Media for Brewery & Fermentation

Dr. Rahul Warke, Director of R&D, HiMedia Laboratories



## Enrichment and growth of desired organisms

## Rigorous limitation of harmful organisms

Brewing is one of the oldest and more complex technologies in food and beverage production. The microbiology of brewing is a diverse subject that begins with the production of beer and wine and extends to product stability to spoilage. While most microorganisms are inhibited by the alcohol content, low pH, or other ingredients, there are a few genera of bacteria, wild yeasts, and molds that can exist in this environment, causing spoilage of beer and wine. Most of these spoilage organisms make the beer acidic or produce substances such as diacetyl and tetraden compounds, resulting in deleterious effects on flavor and shelf life. The microorganisms *Pectinatus* and *Megasphaera* are also dangerous pathogens. HiMedia makes a

broad range of media for determination of microbial flora at all stages in the beer and wine fermentation and manufacturing processes. Selective media like WL Differential Agar, Raka Ray Agar, WL Nutrient Agar, Wort Agar and Rose Bengal Agar w/ Chloramphenicol are widely used in the brewing industry for the detection of contamination/spoilage microorganisms. For the detection of contamination/spoilage microorganisms in beer, media such as Pedi-Lacto Selective Agar base and Modified NBB Broth are widely used by the industry.

See page 3 for HiMedia dehydrated culture media for brewing and fermentation.

## Steps of the Beer Manufacturing Process





## VWR® Professional Binocular and Trinocular Microscopes



These professional microscopes are suitable for advanced lab and hospital applications in medical, biological, and agricultural research fields.

- Binocular/Trinocular head Siedentopf type inclined 30° and 360° rotating
- Light distribution 100/0, 20/80
- Widefield eyepieces WF 10X/20mm
- Reversed quadruple nosepiece
- Planachromatic objectives PL 4X, 10X, 40X S, and 100X S-Oil
- Coaxial coarse and fine focusing adjustment
- Built-in low position coaxial mechanical stage
- Centerable and focusable 1.25 N.A Abbe condenser
- Iris diaphragm with filter holder
- Koehler illumination 3W LED with intensity control
- Main power supply 110V, C-UL, UL Listed; CSA certified



89404-886

Description	Cat. No.	Each
Binocular Microscope	89404-888	2043.79
Trinocular Microscope	89404-886	2117.89



See promotion on page 12!

## VWR® Forced Air Microbiological Incubators

VWR Forced Air incubators provide high temperature uniformity and stability for reproducible results in microbiology and research labs. Forced air can also be used for drying samples at higher temperatures in place of an oven.

- Quick temperature recovery after opening door and when replacing samples
- Stainless steel interior with smooth, rounded corners makes cleaning simple
- Electrical equipment inside unit with standard access port allows for independent data logging

### Specifications

Temperature Range	Ambient +5°C–75°C
Electrical	120V–60Hz

Volume, cu. ft.	Uniformity at 37°C	Stability at 37°C	Exterior Dimensions, H x W x D, in.	Perforated Shelves Supplied* / Max	Cat. No.	Each
2.3	± 0.2°C	± 0.1°C	28 x 21 x 22	2/13	89511-424	2301.33
3.6	± 0.3°C	± 0.1°C	32 x 25 x 22	2/16	89511-426	3039.11
6.3	± 0.4°C	± 0.1°C	36 x 25 x 29	2/19	89511-428	3414.42
13.4, Free-standing	± 0.3°C	± 0.2°C	61 x 29 x 31	2/39	89511-430	6248.73

## VWR® Mini Gel II Complete Horizontal Electrophoresis System

The complete horizontal electrophoresis system offers built-in convenience and safety, and contains all of the components required to cast and run horizontal gels, including gel trays, combs, casting stand, gel tank, and digital power supply. The migration tank, gel trays, and multichannel combs are all molded to ensure leakproof performance and a long service life.

Direct connection between the power supply and the gel box eliminates the need for power leads. An eject button separates the gel box from the power supply, and reconnection simply involves pressing the two units together. The power supply can be set to either constant voltage or constant current with automatic crossover between the two parameters.

A clear window over the gel platform allows for constant viewing throughout procedures. One large (12.5 x 12 cm) gel with multiple combs will accommodate up to 112 samples. Additionally, two small (12.5 x 6 cm) gels or four micro (6 x 6 cm) gels can be run at one time. Cassettes protect fragile electrodes from damage and allow for easy replacement.



Description	Buffer Volume	Cat. No.	Each
Mini Gel Electrophoresis System, 120V, US Plug	300 mL	95043-650	772.73

# Ultrapure Water Essential for Direct Determination of Bisphenol A by HPLC-MS/MS

ELGA LabWater, Lane End, United Kingdom



## Abstract

Until recently, bisphenol A (BPA) was widely used in the manufacture of polycarbonate plastics and epoxy resins that line aluminum beverage cans. The risks associated with BPA remain highly controversial. As a result, numerous determinations of trace BPA are now carried out, creating the need for robust analytical processes. High performance liquid chromatography-tandem mass spectrometry (HPLC-MS/MS) offers extremely high sensitivity for BPA detection, often with a detection limit of below 2ppt, making it essential to use ultrapure water throughout the analytical process. A range of ELGA® pure water systems have been tested for this application, and offer effective removal of BPA to below the detection limit of HPLC-MS/MS.

## Introduction

BPA has been used in the commercial production of polycarbonate plastics and epoxy resins for over 50 years, and until recently, was widely used throughout the chemical, plastics, and food and beverage industries despite being a known endocrine disrupter<sup>1</sup>. The potential hazards associated with the small amounts of unreacted BPA in polycarbonates and epoxy resins remain highly controversial<sup>2</sup>, and recent legislation banning the use of BPA for plastic manufacture in many countries has created a need for fast, reliable and highly sensitive techniques for its detection. Direct analysis in aqueous samples or extracts is preferred, as this has the advantage of minimizing the risk of contamination or low recovery rates, requiring analytical techniques capable of determining parts per trillion (ppt) levels of BPA. HPLC-MS/MS offers the specificity and sensitivity required for routine BPA screening, often with a detection limit of below 2ppt. The exceptional sensitivity of this technique makes the use of ultrapure water throughout the analytical process vital, requiring a reliable water purification system to avoid erroneous results.

## Experimental

To determine the suitability of ELGA PURELAB® water purification systems for BPA analysis, water samples from four different instruments from the PURELAB range (**Table 1**) were submitted for independent BPA analysis at the Institute for the Dynamics of Environmental Processes (CNR) in Venice, Italy. All units were set up in ELGA's central R&D facility, and were cleaned and operated for a set period prior to use. Samples were taken in glass bottles which had been pre-cleaned by rinsing in ultrapure water and heating to 450 °C.

Sample number	Water purification system
1	PURELAB Classic fed from a Micra
2	PURELAB flex 2 fed from PURELAB Option S
3	PURELAB flex 3
4	PURELAB Ultra fed from a PURELAB Option Q

Table 1: Details of samples submitted for BPA analysis.

## Method

Samples were analyzed by HPLC-MS/MS, using the method described by Sangiorgi *et al*<sup>3</sup> and the following instrument set-up:

### 1) HPLC

Column:	Synergi™ Hydro-RP, 4.6x50 mm (Phenomenex)
Mobile Phases:	A = H <sub>2</sub> O, B = MeOH,
Injection Volume:	100 µL
Chromatographic Run:	0 mins: 50 % B; 2–7 mins: 100 % B; 9–15 mins: 50 % B

### 2) Mass Spectrometry

Instrument:	API 4000 Triple Quadrupole Mass Spectrometer (Applied Biosystems)
Acquisition:	MRM (Multiple Reaction Monitoring)
Ion Source:	ESI in Negative Ion Mode
Transition Used for Quantification:	227.0>132.8

## Results

The example ion chromatogram in **Figure 1** shows the suitability of the method for detection of ppt levels of BPA. A standard calibration curve from 5 to 1,000 ppt BPA was generated, as shown in **Figure 2**, demonstrating good reproducibility up to 50,000 ppt BPA (summarized in **Table 2**), with a calculated detection limit of 1.8 ppt.

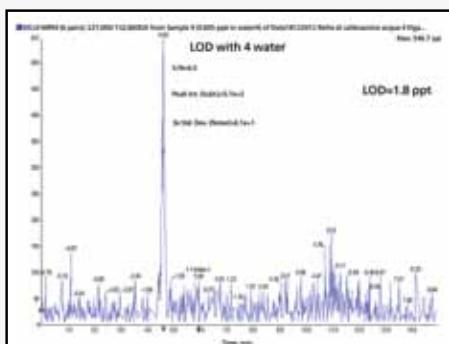


Figure 1: Bisphenol A signal for 5 ppt standard in ultrapure water.

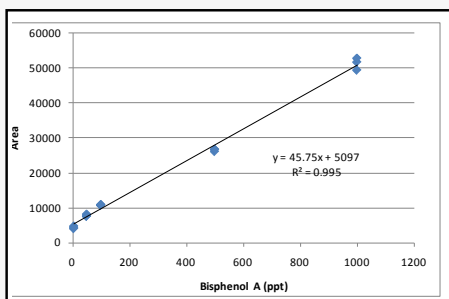


Figure 2: Calibration curve for 5 to 1,000 ppt bisphenol A.

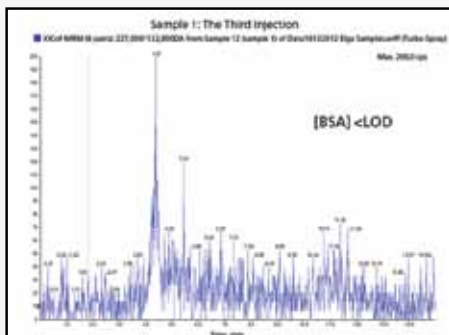


Figure 3: Bisphenol A determination for Sample 1.

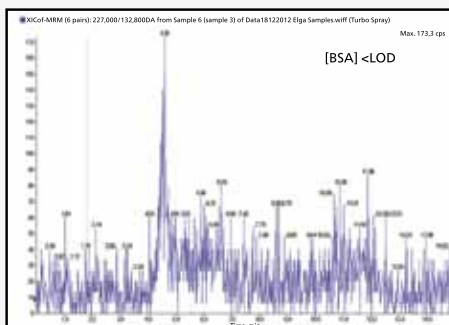


Figure 4: Bisphenol A determination for Sample 3.

Concentration of BPA (ppt)	Area BPA	RSD (%)
2	1.98E+03	5.16
	1.83E+03	
	1.80E+03	
5	4.11E+03	7.98
	4.82E+03	
	4.43E+03	
50	8.25E+03	4.32
	0 7.63E+03	
	7.70E+03	
100	1.08E+04	0.92
	1.10E+04	
	1.09E+04	
500	2.68E+04	1.3
	2.62E+04	
	2.68E+04	
1,000	4.95E+04	3.38
	5.18E+04	
	5.29E+04	
10,000	4.05E+05	8.06
	4.61E+05	
	4.72E+05	
50,000	2.48E+06	2.04
	2.40E+06	
	2.39E+06	

Table 2: Reproducibility data for standard calibration curve

## Results

Example ion chromatograms for the samples are shown in **Figures 3 and 4**, and the measured BPA concentrations for all samples were below the detection limit of the analytical technique.

## Conclusion

This study clearly demonstrates the suitability of the ELGA PURELAB water purification systems for use in BPA determination by HPLC-MS/MS. None of the water samples tested contained detectable levels of BPA, virtually eliminating the risk of BPA contamination of aqueous samples or extracts for direct analysis. To learn more, and find our complete portfolio of PURELAB water systems, visit [vwr.com](http://vwr.com) and search 'elga purelab'.

Description	Water Quality	Cat. No.	Each
PURELAB Chorus 1 General Science System	Type I	10034-544	9569.66
PURELAB flex 1 System, Includes Start Up Kit	Type I/Type II+	89221-838	6195.98
PURELAB flex 2 System, Includes Start Up Kit	Type I	89221-840	7783.97
PURELAB flex 3 System, Includes Start Up Kit	Type I	89221-842	7729.07
PURELAB flex 4 System, Includes Start Up Kit	Type I	89221-844	7590.10

## References

- <sup>1</sup>Rubin, B.S. Bisphenol A: An endocrine disruptor with widespread exposure and multiple effects. *J. Steroid Biochem. Mol. Bio.*, 2011, 127: 27-34
- <sup>2</sup>Berounis, A.; Rudén, C.; Håkansson, H and Hanberg, A. Risk to all or none? A comparative analysis of controversies in the health risk assessment of bisphenol A. *Reprod Toxicol*, 2009, 29(2): 132-146
- <sup>3</sup>Sangiorgi, G.; Ferrero, L; Ferrini, B.S; Lo Porto, C; Perrone, M.G; Zangrando, R; Gambaro, A; Lazzati, Z; Bolzacchini, E. Indoor airborne particle sources and semi-volatile partitioning effect of outdoor fine PM in offices. *Atmos Environ*, 2013, 65, 205-214



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117 (4)	32 x 25 x 22	89511-420	2317.28
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<b>VWR Forced Air Incubators</b>			
66 (2.3)	28 x 21 x 22	89511-424	2301.33
104 (3.6)	32 x 25 x 22	89511-426	3039.11
178 (6.3)	36 x 25 x 29	89511-428	3414.42
371 (13.4)	61 x 29 x 31	89511-430	6248.73

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<sup>3</sup> PrimeG Gradient Thermal Cycler, 30 x 0.5 mL	MP3PRIMEG05	2995.00
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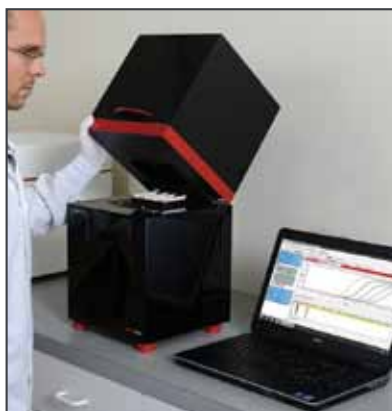
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Low ROX	500	MP95056-500	424.00
Low ROX	2000	MP95056-02K	1582.00
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Without Dye	500	MP95054-500	424.00
Without Dye	2000	MP95054-02K	1582.00
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With ROX	5000	MP95073-05K	1741.00
Low ROX	1250	MP95074-012	467.00
Low ROX	5000	MP95074-05K	1741.00
With Fluorescein	1250	MP95071-012	467.00
With Fluorescein	5000	MP95071-05K	1741.00
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B10P Benchtop Meter — pH	89231-662	758.38
B20PI Benchtop Multi Parameter Meter — pH, ISE	89231-692	1272.00
B30PCI Benchtop Multi Parameter Meter — pH, Conductivity, ISE	89231-696	1412.51
B40PCID Benchtop Multi Parameter Meter — pH, Conductivity, ISE, Dissolved Oxygen	89231-684	1537.44

Benchtop Meter Kits	Includes	Cat. No.	Each
B10C Benchtop Conductivity Meter with Conductivity Probe	B10C Meter (89231-676) and Conductivity Probe (89231-614)	89231-678	1247.74
B40PCID Multimeter with pH and DO Probes	B40PCID Meter (89231-684), pH Probe (89231-580), and DO Probe (89231-624)	89231-704	2229.69
B40PCID Benchtop Multimeter with DO Probe	B40PCID Meter (89231-684) and Dissolved Oxygen Probe (89231-624)	89231-670	2010.95
B40PCID Benchtop Multimeter with pH, Conductivity, and DO Probes	B40PCID Meter (89231-684), pH (89231-586), Conductivity (89231-618), and DO (89231-624) Probes	89231-686	2759.58
B30PCI Benchtop pH/Conductivity/ISE Multimeter with pH and Conductivity Probes	B30PCI Meter (89231-696), pH Probe (89231-580), and Conductivity Probe (89231-614)	89231-698	1758.98
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Amber	20 mL	10119-904	52.78
Clear	10 mL	10119-906	37.48
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Red Butyl/Grey PTFE	1.6 mm thick	10119-912	48.20
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Blue Silicone/White PTFE	1.3 mm thick	10119-916	66.40
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Cap Style	Standard
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Filtering Capacity	0.5 mL

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GMF	28137-770	100/ 310.94
Nylon	28137-754	100/ 310.94
PES	28137-776	1000/ 2770.75
Polypropylene	28137-766	100/ 335.69
PTFE	28137-758	100/ 310.94
PVDF	28137-762	100/ 310.94
RC	97015-562	100/ 310.94

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500	1.68 ±0.01	Colorless	185, 186	BDH5006-500ML	Ea./ 63.26 Cs. 12/ 623.57
500	2.00 ±0.02	Colorless	185, 186	BDH5010-500ML	Ea./ 63.26 Cs. 12/ 591.86
500	3.00 ±0.02	Colorless	185, 186	BDH5014-500ML	Ea./ 63.26 Cs. 12/ 591.86
20	4.00 ±0.01	Red	185, 186	BDH5016-20ML	Pk. 20/ 114.38 —
500	4.00 ±0.01	Red	185, 186	BDH5018-500ML	Ea./ 46.55 Cs. 12/ 395.12
500	4.00 ±0.01	Colorless	185, 186	BDH5024-500ML	Ea./ 46.55 Cs. 12/ 395.12
500	4.63 ±0.02	Colorless	185, 186	BDH5032-500ML	Ea./ 63.84 Cs. 12/ 642.76
500	5.00 ±0.02	Colorless	185, 186	BDH5034-500ML	Ea./ 63.26 Cs. 12/ 591.86
500	6.00 ±0.02	Colorless	185, 186	BDH5038-500ML	Ea./ 63.26 Cs. 12/ 591.86
500	6.86 ±0.01	Colorless	185, 186	BDH5040-500ML	Ea./ 101.30 Cs. 12/ 1016.73
20	7.00 ±0.01	Yellow	186, 191, 192	BDH5044-20ML	Pk. 20/ 112.06 —
500	7.00 ±0.01	Yellow	186, 191, 192	BDH5046-500ML	Ea./ 37.26 Cs. 12/ 418.46
500	7.00 ±0.01	Colorless	186, 191, 192	BDH5052-500ML	Ea./ 46.55 Cs. 12/ 395.12
500	7.38 ±0.02	Colorless	186, 191, 192	BDH5058-500ML	Ea./ 63.56 Cs. 12/ 670.84
500	8.00 ±0.02	Colorless	186, 191, 192	BDH5060-500ML	Ea./ 63.26 Cs. 12/ 591.86
500	9.00 ±0.02	Colorless	186, 191, 192	BDH5062-500ML	Ea./ 63.26 Cs. 12/ 591.86
500	9.18 ±0.01	Colorless	186, 191, 192	BDH5066-500ML	Ea./ 63.26 Cs. 12/ 646.67
20	10.00 ±0.02	Blue	186, 191, 192	BDH5070-20ML	Pk. 20/ 124.33 —
500	10.00 ±0.02	Blue	186, 191, 192	BDH5072-500ML	Ea./ 70.98 Cs. 12/ 634.91
500	10.00 ±0.02	Colorless	186, 191, 192	BDH5078-500ML	Ea./ 52.91 Cs. 12/ 442.03
500	11.00 ±0.02	Colorless	186, 191, 192	BDH5084-500ML	Ea./ 63.26 Cs. 12/ 591.86
500	12.00 ±0.02	Colorless	186, 191, 192	BDH5086-500ML	Ea./ 63.26 Cs. 12/ 591.86
500	12.45 ±0.02	Colorless	186, 191, 192	BDH5092-500ML	Ea./ 47.81 Cs. 12/ 410.59
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Lynn Tian, Global Product Manager, GE Healthcare

Brewing has become almost a science in recent times, and the growing global market for the product has led to an increasing awareness of the need for consistency in the characteristics of each particular brand, whether that be color, alcoholic strength, flavor, or clarity.

Analytical methods used by the brewing industry have been developed by a number of national and international bodies such as the European Brewery Convention and the American Society of Brewing Chemists (ASBC) and the Mitteleuropäische Brautechnische Analysenkommission (MEBAK)<sup>1</sup>. This combined group has been responsible for the refining and harmonization of the various test methods used throughout the brewing industry, many of which rely on a filtration step or steps as shown in **Table 1**.

**Wort Filtration:** When buying malt, the brewery is looking for a product which will yield the most economic extract (wort). To ensure that an appropriate malt is supplied, filtration is one of the measures to evaluate the potential of malt for producing total wort-solubles but also to serve as a predictive means for estimating contribution of malt to such wort properties as fermentable extract, total acidity, pH, color, viscosity, total nitrogen, and free amino nitrogen (from ASBC). A slower filtration speed reflects the lower solubility of the wort

which will result in a negative impact on fermentation. A faster filtration speed with maximum turbidity removal will indicate the high quality of the malt and positive influence on the quality of fermentation.

**CO<sub>2</sub> Removal/Measurement:** During beer fermentation, CO<sub>2</sub> is dissolved in beers. When a QC lab prepares a sample for chemical and physical analysis, they will take certain volume of sample as the presence of CO<sub>2</sub> will affect the accuracy of volume measurement. For total acid measurement in beer, CO<sub>2</sub> it will cause adverse impact to analysis results. Therefore, in order to facilitate quality measurements in beer the CO<sub>2</sub> content needs to be reduced as low as possible (degassing) to maximize the accuracy of volume measurements and total acidity determination. To decarbonate, a sample can be transferred to an Erlenmeyer flask and shaken until gas no longer escapes from the beer. Alternatively, a very simple and quick way is to filter beer through a filter paper.

**Removal of Yeast:** The majority of beers

are marketed as bright, which means they contain no sediment or turbidity (unlike bottle conditioned beers which contain yeast, or wheat beers which have a characteristic cloudiness). If sediment does occur it is largely due to the yeast responsible for the fermentation, so the finished fermentation is filtered to remove the spent yeast. To ensure the finished product is free from sediment, the filtration needs to be as efficient as possible to remove the yeast.

Whatman™ produces a wide of filters suitable for use in many of these in- process and QC test methods. A selection of Whatman filters were tested against the recognized standards in several ASBC methods. These tests were **1)** Removal of turbidity from wort, **2)** CO<sub>2</sub> removal from finished beer (required prior to further testing) and **3)** Yeast removal post fermentation. To learn more about how Whatman filters performed in these methods and download the full application note please visit [vwr.com/foodandbeverage](http://vwr.com/foodandbeverage).

## MEBAK Methods

1.4.3.1 Soluble extract in wet spent grains obtained by pressing (rapid method)	2.8.3 Limit of attenuation in wort (rapid method EBC)
1.4.3.2 Soluble extract in wet and dry spent grains obtained by rinsing (EBC)	2.9.1 Degassing a sample (EBC)
1.4.4.2 Available residual extract	2.10.3.2.1 Total glucose - hydrolysis method
1.4.5 Iodine value of brewery spent grains	2.12.2 Spectrophotometric color (EBC)
1.6.1 Solids in wort (labor veritas method)	2.14.2.2 Alcohol chill haze test, CHAPON (cold sensitivity)
1.6.2 Solids or trub material (field method)	2.16.3 Tannoids
1.6.3 Cold trub	2.17.3 Determination of hop bitter substances in wort and beer (EBC)
2.6.2 Coaguble nitrogen (thermal coagulation of protein)	2.20.1 membrane filterability test of beer
2.6.3.1 Nitrogen fractionation (precipitation with magnesium sulphate)	2.21.3.3 4-vinyl guaiacol and 4-vinyl phenol detection
2.6.3.2 Nitrogen fractionation (precipitation with phosphomolybdic acid)	2.21.8.3 Detection of SO <sub>2</sub> with continuous flow rate
2.8.1 Limit of attenuation in wort (fermentation tube method)	2.22.1 Chloride, sulphate, nitrate, and phosphate in beer (EBC)
2.8.2 Limit of attenuation in wort (reference method—EBC)	2.22.5 Sulphate ions

**Table 1:** Listing of analytical methods employing filtration. Numbers refer to the designation within the MEBAK Guide.

## References

- <sup>1</sup>MEBAK Collection of Brewing Analysis methods, ISBN: 978-3-9805814-7-9
- <sup>2</sup>Kühbeck et al, Influence of Lauter Turbidity of Wort Composition, Fermentation performance and Beer Quality – A Review, J Inst. Brew. 112(3) 215-221, 2006

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Chromolith HighResolution RP-18e Column	4.6 x 50	EM1.52021.0001	527.50
Chromolith HighResolution RP-18e Column	4.6 x 100	EM1.52022.0001	837.04
Chromolith HighResolution RP-18e Guard Column, Set of 3	4.6 x 5	EM1.52025.0001	256.28
Chromolith HighResolution RP-18e Guard Column Kit: Includes 1 Holder and 3 Guard Columns	4.6 x 5	EM1.52024.0001	353.33



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## Measuring Haze in Beer

*Water Analysis Instruments,  
Thermo Scientific*

### Goal

The following application note describes how to simply and quickly measure the haze or “turbidity” in beer using a Thermo Scientific™ Orion™ AQUAfast™ AQ3010 Turbidity Meter.

### Introduction

The haze observed in beer is something the chemistry world refers to as “turbidity”. Depending on the type of beer, it can be a desired or undesired effect. Haze can result from proteins, polyphenols, and even carbohydrates in colloidal form. When beer haze is observed only in cold temperatures, and then disappears once the beer warms up, this is known as “chill haze”. The Thermo Scientific Orion AQUAfast AQ3010 Turbidity Meter can be used to quickly and simply measure the haze or “turbidity” in various types of beers. Additional instructions for testing the chill haze of beer samples can be found at the end of the application note.<sup>1</sup>

### Recommended Equipment

- Orion AQ3010 Turbidity Meter
- Orion AC3V25 Turbidity Vials
- Stir rod or stirring equipment
- (For chill haze testing) Thermometer, water or ice-bath at 0°C

### Required Reagents and Solutions

- Orion AC3015 Turbidity Standards
- Turbidity-free water (TFW), e.g., prepared by reverse osmosis (RO) or by filtration through 0.2 µm filter, whichever yields acceptable results.
- Solution Preparation: none required
- Meter setup: none required

### Meter Performance Check/ Calibration Verification

**Note:** Orion AC3015 styrene divinylbenzene (SDVB) polymer turbidity standards never need mixing. Do not shake the standards as this will introduce bubbles and cause them to read inaccurately until the bubbles dissipate.

Check meter accuracy by reading one or more turbidity standards (included with the meter) at the level of interest. For example, read the zero (0.02) and the 20 NTU standard. The zero should read <0.1 NTU and the 20 NTU standard should read within ±10%, e.g., 18–22 NTU.

### If the meter performance check fails, take the following corrective actions:

1. Wipe the vial carefully with a lint-free wipe to remove all fingerprints and liquid drips from the exterior, handle the vial by the cap only, and remeasure.
2. Tap the vial gently three times and let the vial sit for 60 seconds to allow for bubbles to release, then remeasure.
3. Using a clean vial (which reads <0.1 NTU when filled with TFW), pour a fresh portion of turbidity standard into the vial, wipe carefully, and measure.

### Sample Vial (Cuvette) Storage, Soaking, and Rinsing

Store vials filled with TFW. Immediately after use, clean sample vials with laboratory detergent and rinse multiple times with TFW. Note: Standards may be stored in supplied glass sample vials until the standard reading is no longer in specification. See Meter Performance Check section for corrective actions when a standard reads out of specification.

### Sample Preparation

Beer samples must be degassed prior to testing, as bubbles will cause biased high results. Remove a portion of the beer, not including any settled sediments, to a beaker. Stir the beer until all the gas has been released. If uncertain about degassing time, stir until further stirring does not change the turbidity reading.

### Calibration

The meter is shipped precalibrated. The meter performance is very stable and does not require frequent calibration. If a standard reading is not within criteria, take all necessary corrective actions (as described in the Meter Performance Check section) to improve meter readings. If corrective actions fail and recalibration is necessary, perform the recalibration only on the points that failed and do so with fresh portions of standard poured into clean vials. Ensure that all fingerprints and liquid drips have been removed from the exterior of the vial with a lint-free wipe before using. Handle vials by the cap only.

### Analysis

After the sample has been degassed, wipe the sample vial to remove all traces of liquids and fingerprints, place into meter, and press the measure key. Take duplicate reading(s) until results agree within 5%.

### Quality Control (QC)

Recommended QC procedures include: calibration verification, turbidity-free water analysis (optional), and sample duplicates.

### Notes for Improved Accuracy of Low-Level Samples

If improved accuracy is desired, pay close attention to sample vial cleanliness, TFW quality, handling of standards and samples, use of matching vials, storage of vials in TFW, and scratches or imperfections in the vials.

For improved low-level accuracy, ensure that a clean vial filled with TFW reads <0.1 NTU before using that vial to test beer. If a clean vial does not read <0.1 NTU, discard it or set it aside for further cleaning. If no clean vials read <0.1 NTU, the TFW may need degassing or a cleaner source of TFW may be required.

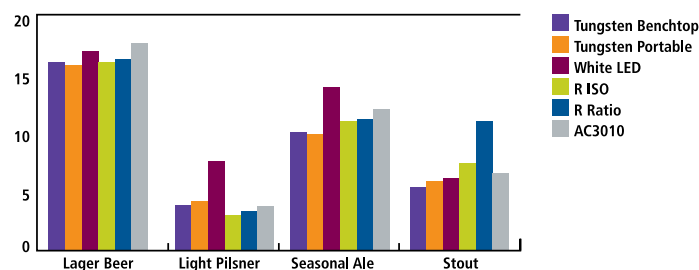
### Result Statistics

Four types of beers, a DI water (TFW) sample, and a 10 NTU standard were tested at room temperature. The lager beer was visually the most turbid and the light pilsner was the clearest beer. The stout was dark to the eye, but had a relatively low turbidity.

### Summary

The table and chart below show that AQ3010 results compare well with other turbidity meter results. All results are in NTUs.

	Tungsten Benchtop	Tungsten Portable	White LED Portable	IR ISO	IR Ratio	AQ3010
DI	0.06	0.12	0.03	0.03	0.03	0
Lager Beer	15.5	15.2	16.3	15.5	15.6	17.1
Light Pilsner	3.6	3.9	7.2	2.8	3	3.5
Seasonal Ale	9.7	9.5	13.5	10.6	10.9	11.6
Stout	5.2	5.7	5.8	7.1	10.6	6.3
10 NTU	9.71	10.6	10.2	9.34	9.84	10.2



### Notes for Chill Haze Testing

- Place beer in 0°C bath and hold 24 hours.
- Pre-chill the sample vial in 0°C bath.
- Without disturbing settled matter, transfer a portion of the sample to the pre-chilled sample vial. While holding at 0°C, stir to degas the beer sample. Use a thermometer to verify the sample temperature. The thermometer may be used to stir and degas the sample.
- Without warming the vial, place the cap on the sample vial, hold the sample vial by the cap and quickly wipe dry the degassed sample vial at 0°C. Place into meter immediately, and take the reading for chill haze.

Description	Cat. No.	Price
Thermo Scientific Orion AQUAfast AQ3010 Turbidity Meter	10014-932	Ea./ 940.00
<b>Accessories</b>		
Replacement Turbidity Vials	10014-934	Pk. 3/ 61.10
Primary Turbidity Standards	10014-936	Ea./ 140.00

### Reference

- AOAC Method 970.14, Haze (Total) of Beer after Chilling, AOAC International, [www.aoc.org](http://www.aoc.org).

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Ivory PTFE/Red Rubber	89239-436	55.06
Red PTFE/White Silicone/Red PTFE	10119-692	78.04
Red PTFE/White Silicone	10119-718	66.75
<b>Assembled AVCS Kits, with ID Patches</b>		
Ivory PTFE/Red Rubber	89239-438	57.62
Ivory PTFE/Red Rubber	10119-688	76.96
Red PTFE/White Silicone/Red PTFE	89239-440	73.03
Red PTFE/White Silicone	89239-442	63.51
Blue PTFE/White Silicone	10119-722	87.53

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- Evaluation of the effectiveness of antioxidants
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- Product oxidation can be achieved by combining the OXITEST with GC
- Oxidative stability test of incoming raw materials and outgoing finished products

Description	Electrical	Dimensions, W x D x H, mm	Cat. No.	Each
OXITEST Oxidation Stability Reactor	900W	365 x 190 x 485	10184-080	17,986.00

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Description	Cat. No.	Each
Standard Starter Kit	89080-000	827.99
Micro Starter Kit	89080-002	874.42
Promotional Pack	89080-004	1059.10

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Mobile Post	188 (74)	—	83007-480	41.02
Mobile Post	83.8 (33)	—	83007-474	32.81
Mobile Post	137.2 (54)	—	83007-476	34.87
Mobile Post	218.4 (86)	—	83007-482	46.11
Mobile Post	33 (13)	—	83007-470	24.61
Mobile Post	160 (63)	—	83007-478	38.97
Shelf	—	45.7 x 152.5 (18 x 60)	82003-266	146.65
Shelf	—	53.3 x 76.2 (21 x 30)	83007-454	114.82
Shelf	—	61 x 76.2 (24 x 30)	83007-462	123.94
Shelf	—	61 x 121.9 (24 x 48)	82003-280	151.65
Shelf	—	61 x 182.9 (24 x 72)	82003-284	210.22
Shelf	—	61 x 137.2 (24 x 54)	83007-466	179.52
Shelf	—	45.7 x 61 (18 x 24)	83007-444	97.39
Shelf	—	53.3 x 137.2 (21 x 54)	83007-458	157.93

Description	Height, cm (in.)	W x L, cm (in.)	Cat. No.	Each
Solid Mat Overlay Kit	—	53.3 x 91.4 (21 x 36)	22233-478	42.00
Solid Mat Overlay Kit	—	53.3 x 152.4 (21 x 60)	22233-482	54.27
Solid Mat Overlay Kit	—	53.3 x 121.9 (21 x 48)	22233-480	46.15
Solid Mat Overlay Kit	—	53.3 x 182.9 (21 x 72)	22233-484	65.64
Stationary Post	68.6 (27)	—	83007-468	29.71
Stationary Post	137.2 (54)	—	22233-498	34.87
Stationary Post	83.8 (33)	—	22233-496	32.81
Stationary Post	33 (13)	—	22233-494	24.61
Stationary Post	218.4 (86)	—	22233-504	46.11

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35.6 x 42.4 cm (14 x 16 3/4")	3-Ply	82003-824	90/ 28.09	1,350/ 288.03

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MB25*	110	5	Ø 90 (Ø 3.5)	11377-288	4252.38
MB23**	110	10	Ø 90 (Ø 3.5)	46620-408	4853.98

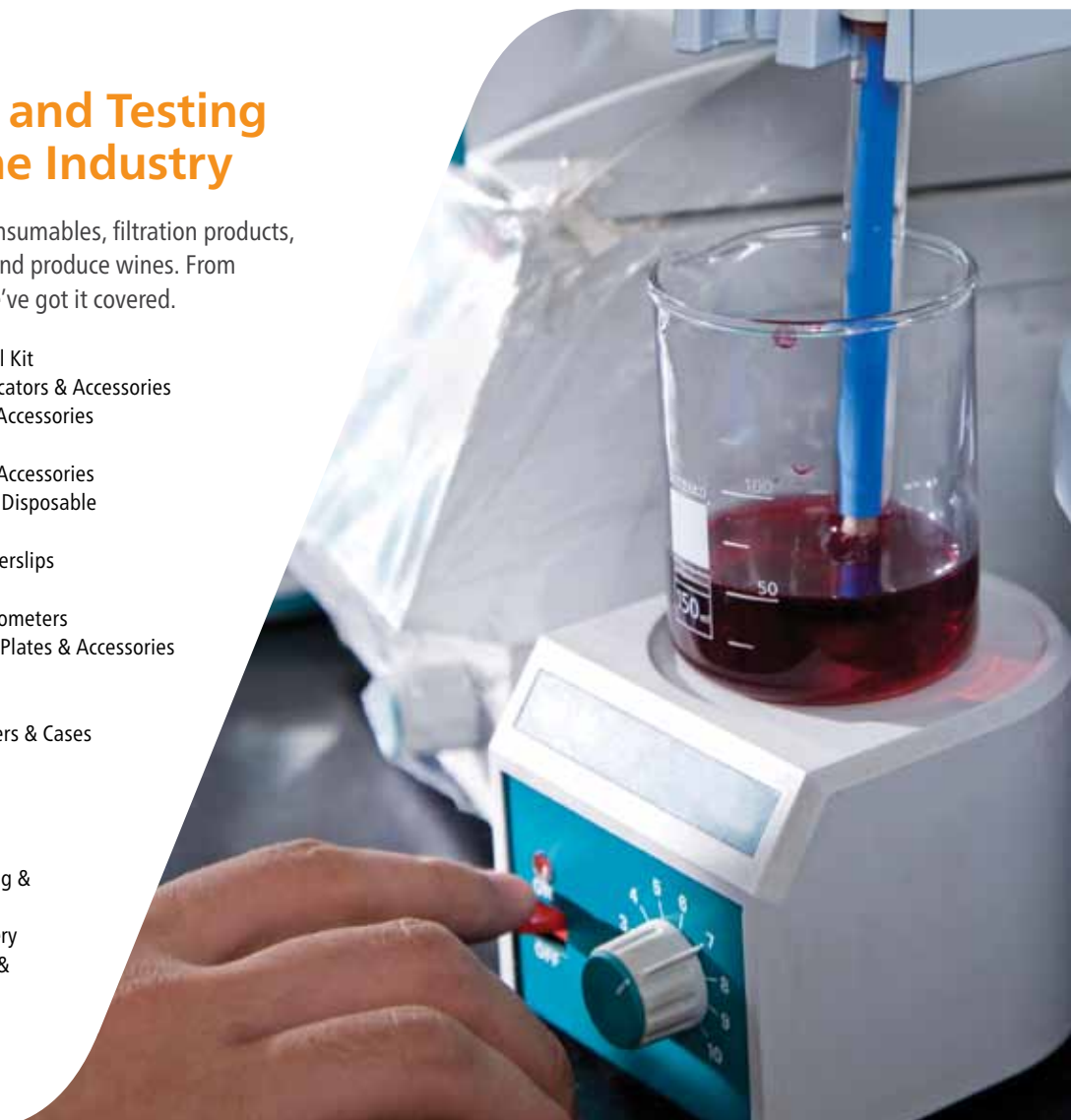
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