VWR®
We Enable Science

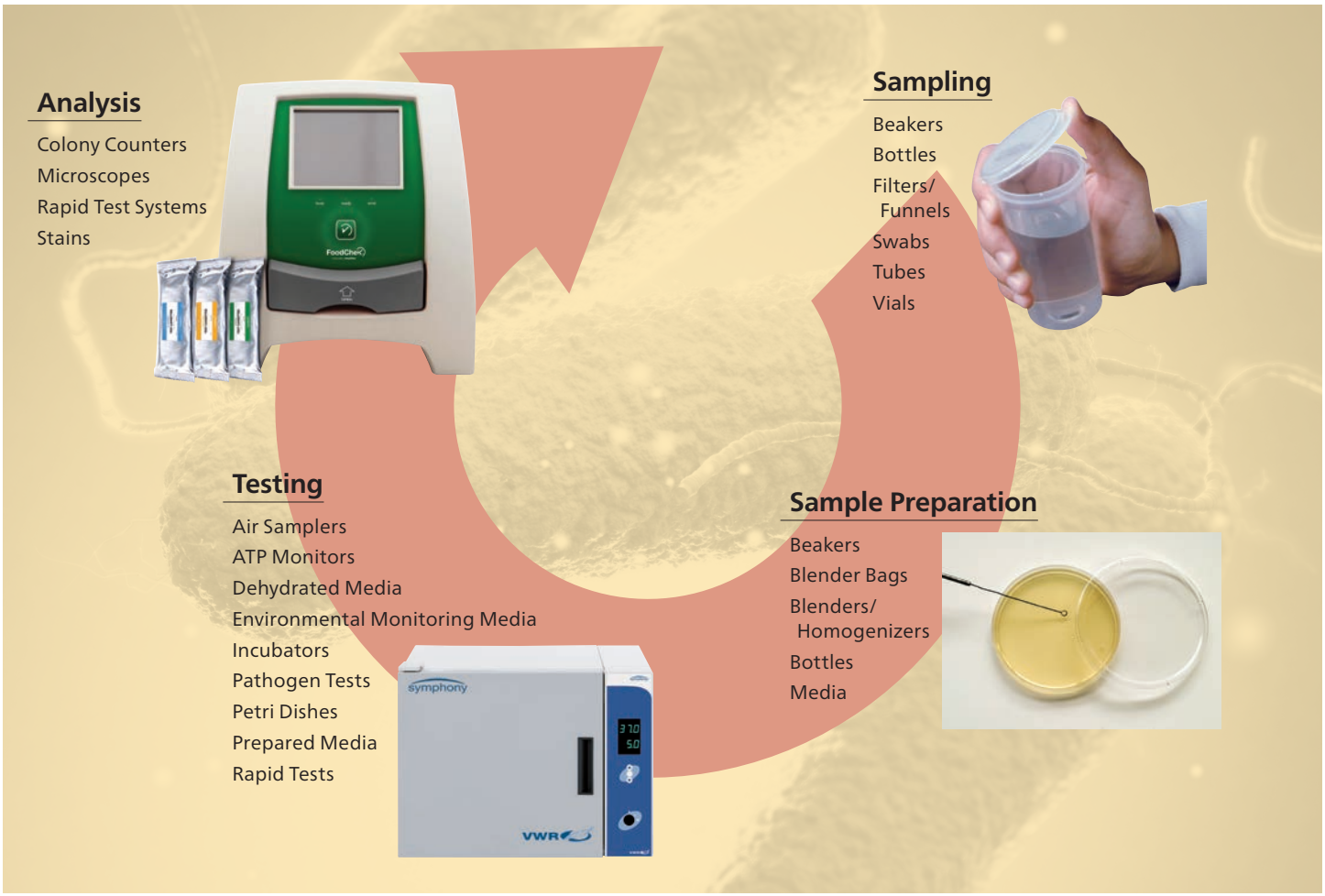
F&B FOCUS

SERVICING THE FOOD & BEVERAGE MARKET

Volume 1 • Spring 2015

Advancing Microbiology Applications for Food & Beverage

FOOD & BEVERAGE MICROBIOLOGY WORKFLOW



Microbiology Applications for Food & Beverage

Safety of food has always been a priority for food and beverage manufacturers. With the inception of FSMA the need for rapid, reliable testing has only increased. VWR is here to help with a broad array of media, rapid tests, consumables, and instruments to support all your needs.

For contract pricing, contact your VWR Sales Representative.

VWR has All You Need for the food and beverage industry, offering the most extensive product portfolio and services supporting food analytical labs and production facilities.

"All You Need" for Food Analysis Catalog: comprehensive offering of products to support food testing

VWR Custom Manufacturing Services: providing high-quality chemicals and services for food quality testing

VWR**CATALYST*™ ***Services Portfolio: deliver process improvements to your lab or production facility

- *VWR Furniture catalog*: from design to project completion
- *Industrial Supplies catalog*: janitorial, MRO, and much more
- *Production Insight*: products and articles to support production
- *VWR Safety Diamond*: products to meet your safety needs

VWR COLLECTION

VWR® Vacuum Filtration Systems featuring Pall Membranes

Designed for the sterile preparation of buffers, tissue culture media, microbiological media, and other biological fluids. Systems feature large diameter Pall membranes for guaranteed performance and maximum throughput.

Includes a filter funnel, 15 mL or 50 mL centrifuge tube with polypropylene screw cap, and vacuum hose adapter. Designed to filter fluids directly into the tube, eliminating the potential for contamination and spills during post-sterilization transfer.

Size	Pore Size, µm	Cat. No.	Case of 12
250 mL	0.1	**89220-694**	**125.10**
500 mL	0.1	**89220-696**	**159.06**
1 L	0.1	**89220-698**	**200.20**
250 mL	0.2	**97066-200**	**100.37**
500 mL	0.2	**97066-202**	**148.09**
1 L	0.2	**97066-204**	**190.35**
250 mL	0.45	**97066-206**	**100.37**
500 mL	0.45	**97066-208**	**148.09**
1 L	0.45	**97066-210**	**190.35**

Visit **vwr.com** to find full assembly with centrifuge tube options, as well as those with funnel only, bottle-top or centrifuge tube.

EnviroMax® and EnviroMax Plus®

The Ultimate in Environmental Sampling from the Swab Experts at Puritan

We spent time in the marketplace with different end-users, from food production to cosmetics to pharmaceutical firms. We saw how you work - listened to what you need - then went to our R&D team to design best-in-class environmental swabs.

- Oversized - perfect for sampling surfaces or large equipment parts
- Quick-turn open and leak-resistant cap
- Swabs are securely attached to caps
- Rigid paddle inside foam is ideal for reaching into crevices
- Maximized collection and elution
- EnvioMax Plus Swabs are pre-moistened with 50% neutralizing buffer & 50% 0.1% peptone water

Puritan
Quality since 1919

Specifications

Handle Length	147.32 mm
Overall Length	152.09 mm
Tip Diameter	15.54 mm
Tip Length	56.38 mm

Description, Tip	Sterility	Swab Length, mm	Cat. No.	Price
EnviroMax Dry Swabs				
Pointed	No	147.32	**89221-726**	Pk. 25/ **54.04**
Pointed	No	147.32	**89221-728**	Cs. 250/ **492.80**
Pointed	Yes	147.32	**89221-730**	Pk. 25/ **58.49**
Pointed	Yes	147.32	**89221-732**	Cs. 250/ **516.72**
Rounded	No	145.03	**89221-734**	Pk. 25/ **54.04**
Rounded	No	145.03	**89221-736**	Cs. 250/ **492.80**
Rounded	Yes	145.03	**89221-738**	Pk. 25/ **58.49**
Rounded	Yes	145.03	**89221-740**	Cs. 250/ **516.72**
EnviroMax Plus Pre-Moistened Swabs				
Pointed	Yes	147.32	**89221-742**	Pk. 25/ **58.78**
Pointed	Yes	147.32	**89221-744**	Cs. 250/ **508.39**
Rounded	Yes	145.03	**89221-746**	Pk. 25/ **58.78**
Rounded	Yes	145.03	**89221-748**	Cs. 250/ **508.39**

VWR COLLECTION

VWR® Blender Sample Bags

Standard bags are made of highly transparent polypropylene and have wide-sealed bottoms to prevent leaks and a tear-off sterile barrier top to ensure sterility up to the time of use.

FILTRA-BAG® bags are made of a mix of polyethylene and nylon. The dividing filter membrane allows for optimal solution and bacterial flow between the compartments during blending. Residue and semi-solid or solid substances remain in the compartment where the sample was inserted. Liquid can be extracted from the other compartment for an accurate aliquot that is free of solid particles.

SECURE-T® bags are made of heat extruded polyethylene tubing for internal sterility and to eliminate the need for side seals. Bags are malleable yet durable, with superior wall strength. May be used in general purpose blending or analysis testing.

Description	Capacity	Thickness, mil.	Cat. No.	Pack of	Case of
Transparent Polypropylene	650 mL	3	**82007-698**	500/ **133.78**	1000/ **231.84**
FILTRA-BAG, Open Top	1.63 L	3	**10048-880**	100/ **110.13**	400/ **440.52**
FILTRA-BAG, Safety Tab, Flat Wire Closure	710 mL	3	**89085-570**	100/ **82.25**	400/ **284.99**
FILTRA-BAG, Tear-Off Top	1.63 L	3	**89085-572**	100/ **91.95**	400/ **317.96**
SECURE-T, Tear-Off Top	1.63 L	4	**11216-902**	250/ **86.41**	1000/ **299.42**
SECURE-T, Tear-Off Top, Write-On Strip	1.63 L	3	**89003-820**	250/ **67.75**	1000/ **258.95**

OHAUS

Meet the Newest Valor Food Scales

Valor 2000

Valor 7000

The new OHAUS Valor Series of compact food scales are reliable and durable products that will increase your food weighing and processing productivity. Dual displays, user-friendly menu and setup, along with the speed and accuracy of the results provide for a seamless and hassle-free user experience that is second to none.

Buy a Valor 7000 and receive a Free Accessory!
(Choose Ethernet Kit, RS232 Kit, USB Kit, or In-Use Cover Set -
See page 13 for more information and redemption details.

OHAUS Model	Capacity, kg (lb)	Readability, g (lb)	Cat. No.	Each
Valor 2000 Models				
V22PWE1501T	1.5 (3)	0.0002 (0.0005)	**10123-886**	**440.04**
V22PWE3T	3 (6)	0.0005 (0.001)	**10123-888**	**440.04**
V22PWE6T	6 (15)	0.001 (0.002)	**10123-890**	**440.04**
V22PWE15T	15 (30)	0.002 (0.005)	**10123-878**	**440.04**
Valor 4000 Models				
V41XWE1501T*	1.5 (3)	0.0002 (0.0005)	**10123-926**	**482.10**
V41XWE3T*	3 (6)	0.0005 (0.001)	**10123-896**	**482.10**
V41XWE6T*	6 (15)	0.001 (0.002)	**10123-898**	**482.10**
V41XWE15T*	15 (30)	0.002 (0.005)	**10123-900**	**482.10**
Valor 7000 Models				
V71P1502T	1.5 (3)	0.05 (0.0001)	**89497-046**	**551.14**
V71P3T	3 (6)	0.1 (0.0002)	**89497-048**	**551.14**
V71P6T	6 (15)	0.2 (0.0005)	**89497-050**	**551.14**
V71P15T	15 (30)	0.5 (0.001)	**89497-052**	**551.14**
V71P30T	30 (60)	1 (0.002)	**89497-054**	**551.14**

Includes Stainless Steel Housing

BOEKEL™
Boekel Scientific

Paddle Blender

The Boekel Scientfic Triple Mix Paddle Blender is designed for use in food safety testing and macro sample preparation applications. The unit is designed to be used with standard and filter-type food sample preparation bags. The unique three paddle design provides excellent homogenization and mixing.

The large process viewing window and easy-to-use digital control system allows users to view the sample status without opening the door. The unit features an easy to clean design with removable paddles and drip tray. To facilitate use in high throughput labs, an Auto-Run feature is included, allowing users to set and repeat the same times and rpm's in a continuous fashion.

- Three paddle design for homogenization and mixing
- Easy to use digital control system with an auto-run feature
- Large process viewing window
- Easy to clean design with drip tray and removable paddles
- Two-year Warranty

Specifications

Speed Range	75 – 300 RPM; 5 RPM increments
Capacity	80 – 400 mL bags
Timer	0 – 999 minutes 59 seconds
Operating Temperature Range	10°C to 30°C

Electrical	Cat. No.	Each
115V, 50/60Hz, 150W	**10040-414**	**5529.94**
230V, 50/60Hz, 150W	**10040-416**	**5781.93**

Protecting your laboratory environment
LABCONCO®

Rediship Purifier® Logic®+ Class II Biosafety Cabinets
Designed for the HUMAN Experience

These Biosafety Cabinets raise the bar for not only safety, but comfort, too. They were designed for the human body and our habits. We call it Inclination™ Technology — features that reinforce what humans are inclined to do. We believe the more comfortable you are, the safer you will be. Features include:

Performance: Constant Airflow Profile™ (CAP) technology works with the ECM for precise airflow control

Safety: MyLogic™OS visible on a large, color LCD display; NSF-listed

Comfort: Features include true line-of-sight display, curved inlet grille for forearm support, and flush-mounted electrical receptacle covers with dampened hinges for easy opening and closing

Sustainable Design: Contributes toward a building's energy use reduction LEED points; has 94.9% recyclable content when the cabinet's lifetime is completed

Description	Dimensions, W x D x H, in.	Cat. No.	Each
3' with Stand, 10" Sash	42-5/16 x 36-1/2 x 13-5/8	**89413-124**	**10,185.00**
4' with Stand, 10" Sash	54-5/16 x 48-1/2 x 19-7/8	**89413-128**	**11,475.00**
5' with Stand, 10" Sash	66-5/16 x 60-1/2 x 26-7/8	**89413-132**	**12,780.00**
6' with Stand, 10" Sash	78-5/16 x 72-1/2 x 32-7/8	**89413-136**	**14,140.00**

Contact your VWR Sales Representative for more information on additional options and accessories. Purifier Logic+ and accessories are available for delivery through the VWR REDISHIP Program.

VWR COLLECTION

VWR® Nitrile 200 Powder-Free Gloves

Manufactured from 100% premium nitrile, VWR Nitrile 200 Powder-Free Examination Gloves provide hand protection against biohazards and a broad range of chemicals. 100% latex-free, these gloves eliminate adverse reactions associated with natural rubber latex proteins. Gloves are rigorously tested and manufactured under stringent process controls according to ISO 9001 and ISO 13485.

Specifications

Length	23 cm (9")
Cuff Thickness	2.4 mil
Finger Thickness	3.9 mil
Palm Thickness	2.8 mil

Size	Cat. No.	Box of 200	Case of 10
X-Small	**89428-746**	**31.09**	**242.41**
Small	**89428-748**	**31.09**	**242.41**
Medium	**89428-750**	**31.09**	**242.41**
Large	**89428-752**	**31.09**	**242.41**
X-Large	**89428-754**	**31.09**	**242.41**
XX-Large	**89428-756**	**31.09**	**242.41**

VWR COLLECTION

VWR® Light-Duty Tissue Wipers

- Virgin fiber tissue
- Absorbent, strong, and low-linting
- Antistatic, film-windowed boxes

Custom-sized dispensers hold wiper box securely for one-handed access

Wipers come in antistatic film-windowed dispenser boxes. Custom-size dispensers hold wiper box securely, providing one-handed access to wipers. Dispensers are made from 6mm (¼") white PVC and can be wall-mounted or placed on a bench. Double-faced tape allows semi-permanent installation and holds dispenser securely. Medium and large dispensers feature keyhole openings for screws, providing for permanent installation. Item **82003-820** features perforated top and bottom access for all standard dispensers.

Packaging	W x L, cm	Thickness	Cat. No.	Pack of	Case of
280/Box	11.4 x 21.3	1-Ply	**82003-820**	280/ **5.79**	16,800/ **270.30**
140/Box	35.6 x 42.4	1-Ply	**82003-822**	140/ **18.86**	2100/ **187.97**
90/Box	35.6 x 42.4	3-Ply	**82003-824**	90/ **28.09**	1350/ **288.03**

Dispensers	Cat. No.	Each
Small, for 11.4 x 21.3L cm Wipers	**14233-756**	**14.76**
Medium, for 35.6 x 42.4 cm Wipers	**14233-758**	**22.04**
Large, for 35.6 x 42.4 cm Wipers	**14233-760**	**27.19**

VWR COLLECTION

VWR® Microbiological Incubators

VWR Forced Air incubators provide an even higher temperature uniformity and stability for reproducible results in microbiology and research labs. Compared to gravity convection units the temperature recovers more quickly after opening door and when replacing samples. Optimal conditions are maintained even with larger loads.

VWR Gravity Convection incubators with unique airflow design provide best conditions for delicate samples. Drying out is kept at a minimum level, even in open containers. Besides incubation in microbiology, bacterial and yeast research, the VWR incubators are used in food/beverage/pharmaceutical testing, and for heated storage.

- Two convection choices - gravity or forced air
- Three table-top sizes: 60L, 100L, 180L and a 400L floor model
- Intuitive, easy to use controller
- Excellent temperature uniformity and stability
- Stainless steel interior with round corners for easy cleaning
- Flexible shelving

Volume, cu. ft.	Uniformity at 37°C	Stability at 37°C	Shelves Supplied*/Max	Cat. No.	Each
Forced Air Incubators					
2.3	± 0.2°C	± 0.1°C	2/13	**89511-424**	**2301.33**
3.6	± 0.3°C	± 0.1°C	2/16	**89511-426**	**3039.11**
6.3	± 0.4°C	± 0.1°C	2/19	**89511-428**	**3414.42**
13.4, Free-standing	± 0.3°C	± 0.2°C	2/39	**89511-430**	**6248.73**
Gravity Convection Incubators					
2.6	± 0.6°C	± 0.2°C	2/13	**89511-418**	**1798.51**
4	± 0.6°C	± 0.2°C	2/16	**89511-420**	**2317.28**
6.85	± 0.6°C	± 0.2°C	2/19	**89511-422**	**2617.05**

*Additional perforated shelves and wire shelves are available, visit **vwr.com**.

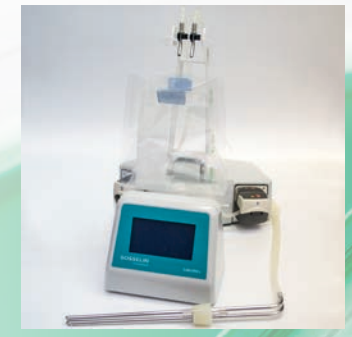
All You Need For Food Sample Preparation

Our range of consumables and equipment for sample preparation includes not only a comprehensive selection of products, but also a choice of materials to meet every need.

- Beakers
- Benchtop equipment
- Blender **NEW!**
- Blender bags
- Bottles
- Bag clips
- Conical and straight containers
- Centrifuge tubes
- Diluter **NEW!**
- Disposable glass tubes
- Erlenmeyer flasks
- Filters
- Loops
- Needles
- Petri dishes
- Pipets and pipet controllers

GOSSELIN™

A Corning Brand



FALCON®

A Corning Brand

CORNING | FALCON AXYGEN GOSSELIN PYREX

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Solutions for Automated Water Pathogen Detection

by Dr. R. Stephen Brown, Associate Professor, Department of Chemistry and the School of Environmental Studies at Queen's University, Ontario, CA

Safe Water is a Critical Need

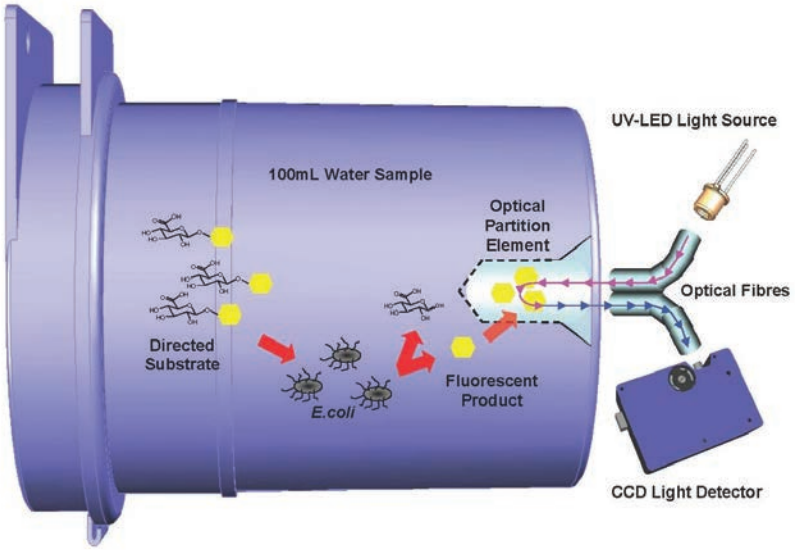
Water plays a central role in our lives, and access to safe water is essential for everyone – from those living in the world's largest cities to the smallest towns and as a key element of industrial processes producing everything from the most basic foods to today's most advanced microelectronics. Water destined for human and industrial consumption is required to be quality tested for a wide variety of contaminants, including potentially harmful microorganisms. While many water quality parameters such as pH, chlorine and turbidity can be measured in near real-time by on-line measurement instrumentation, microbiological testing presents a unique challenge. The requirement to detect a single *E. coli* cell in a 100mL water sample has been compared to the challenge of finding a single coffee bean in 40,000 Olympic-sized swimming pools.

The majority of microbiological water quality tests rely on traditional microbiological methods that were developed decades ago. Water samples are sent to a laboratory where they are filtered and subsequently placed into a growth culture media that is typically incubated for 24 hours. After the incubation period, each sample is inspected by a trained technician for signs of bacterial growth. Chemical additives in the growth media cause colonies of specific target bacteria to change color or to appear fluorescent under ultraviolet light. While these methods are the current gold standard, they require 24-48 hours for samples to be transported, analyzed and the laboratory results to become available. In the event of contamination, delays in receiving test results increase the risk of public exposure, requiring costly remedial action or product recalls.

The Innovation: Introducing the TECTA Automated Microbiology Solution

The impact of highly-publicized events involving contamination of municipal water supplies has driven the need to develop new microbiological test methods that are faster and easier to use than traditional methods, while maintaining the sensitivity and reliability that have been trusted for decades.

In 2001, a consortium of university researchers and water quality experts proposed an innovative approach – a novel way of automating the test by using a polymer-based optical sensor to detect the same types of fluorescent indicators of bacteria used in the trusted current methods. Pathogen Detection Systems, Inc. was subsequently formed to provide municipalities and industries worldwide with the automated microbiology solutions that were developed as a result of this research.



ENDETEC VEOLIA

U.S. EPA Approved

The innovative capabilities of the TECTA system are made possible by a patented polymer based optical sensor, the "Optical Partition Element", that is built into every test cartridge. Each cartridge contains pre-measured amounts of growth media that support the enrichment of any target bacteria that are present in the sample. As target bacteria such as *E. coli* or Coliforms begin to multiply, they emit a specific enzyme that interacts with a proprietary chemical substrate in the cartridge, releasing fluorescent molecules from the substrate. These fluorescent indicators rapidly move from the water sample into the polymer optical sensor located within the cartridge, enabling automated detection by a low-cost ultraviolet optical detection system that is built into the TECTA instrument.

The novel combination of the polymer-based optical sensor and ultraviolet optical detection system provides several key advantages. The fluorescent indicators are extracted and concentrated within the polymer of the optical sensor, facilitating both rapid detection at the earliest possible time and eliminating the risk of off-color samples or turbidity within the water sample obscuring the fluorescent indicator. When placed in the TECTA instrument the test is monitored continuously throughout the incubation process – providing alerts of contaminated samples as soon as possible and eliminating the requirement to wait until the end of a fixed incubation process (typically 18-24 hours). This unique early alerting capability allows the system to provide results within 2-18 hours, depending on the level of sample contamination. In addition to a "presence/absence" result, the system is capable of providing an estimate of the number of bacteria that were present in the original sample – an important indicator of the level of severity of an adverse microbiological test result.

Dr. R. Stephen Brown's research is focused on instrumentation and methodology related to water quality monitoring and environmental toxicology. He has published over 80 peer-reviewed papers, five book chapters, and has six issued patents. He has given many invited seminars and conference presentations on his research and on technology transfer. He co-founded the company Pathogen Detection Systems, now a subsidiary of Veolia Environment in the ENDETEC group. He continues to work with ENDETEC as Chief Scientist to develop and commercialize new water monitoring technologies.

TECTA™ Automated Microbiology System

TECTA is the first automated microbiological testing system approved by U.S. EPA for regulatory compliance testing of municipal drinking water systems required under the Total Coliform Rule.

The system saves precious time and money by being able to test onsite without the need for a microbiologist. It requires much less manual labor and use of disposable products – the test cartridge is pre-filled with all required test reagents eliminating the need for any handling, dilution, or mixing of reagents for test samples.

- Shows positive results with single cell sensitivity and provides an estimate of the number of bacteria present
- Simplifies the FSMA process, easily handling the increased number of tests
- Approved by the U.S. EPA for drinking water regulatory compliance monitoring

Description	Cat. No.	Price
TECTA Automated Rapid Microbial Detection System	**10218-898**	Ea./ **19,750.00**
Combined *E. Coli* and Total Coliform Test, 100 mL	**10220-374**	Box 48/ **472.00**

Epower™
QC Microorganisms for Multiple Application Enumerated Challenges

Epower QC microorganisms can be used to perform many essential quality control functions including microbial detection and enumeration, equipment calibration, method validation, bioburden determination, antibacterial effectiveness and lethality testing. Available in concentrations ranging from 10^2 to 10^8 CFU per pellet, Epower lyophilized microorganism preparations are extremely versatile. Epower pellets can be used individually, or several pellets can be combined for a mixed microorganism population challenge.

- Easily manipulated to deliver a wide variety of CFU levels
- Packaged in a resealable vial containing ten pellets of a single quantitative QC microorganism strain
- Saves time and reduces labor by delivering a specific number of colony forming units (CFU)
- Doesn't require frozen conditions - lower shipping costs
- Documentation of phenotypic, macroscopic, and microscopic test results
- Peel-off Certificate of Assay included for quality control documentation; meets USP guidelines
- Lower price than competitive products

Over 45 strains available!
Visit **vwr.com** or talk to your VWR Sales Representative to learn more.

Microbiologics®

VWR® AMRESCO® LIFE SCIENCE

Same Pure Product.
New Pure Brand.

Introducing a NEW VWR Life Science Brand!

Together, with VWR's expertise in delivering solutions and AMRESCO's pure product, we bring you our manufactured specialized solutions to better enable your science under one name - VWR.

Sterile Water	Size	Cat. No.	Price	
Low Endotoxin, Tissue Culture Grade	500 mL	**VWRL0200-0500**	Ea./ **9.95**	Cs. 10/ **84.50**
Low Endotoxin, Tissue Culture Grade	1 L	**VWRL0200-1000**	Ea./ **17.95**	Cs. 6/ **101.50**
Purified, Molecular Biology Grade	500 mL	**VWRL0201-0500**	Ea./ **7.95**	Cs. 10/ **67.50**
Purified, Molecular Biology Grade	1 L	**VWRL0201-1000**	Ea./ **13.95**	Cs. 6/ **81.50**
Nuclease-Free	100 mL	**97062-790**	Ea./ **19.33**	–
Nuclease-Free	500 mL	**97062-794**	Ea. /**34.21**	–

Minimal Premixed *E. coli* Media

- Save time using premixed and ready-to-use media
- Homogenous, high-quality powders

Culture of bacteria is an important area in genetic and molecular biology research. Researchers need a variety of microbiological growth media that will support organisms in an efficient and productive manner. Selecting the media that will best serve the necessary requirements will allow an increase in both the bacterial yield and DNA expression.

Description	Size, g	Cat. No.	Each
H Medium Broth	500	**97063-460**	**76.80**
M63 Medium Broth	100	**97063-466**	**13.67**
M63 Medium Broth	500	**97063-468**	**47.50**
M9CA Medium Broth	100	**97063-396**	**12.23**
Tryptone Broth	100	**97063-422**	**17.64**
Tryptone Broth	500	**97063-424**	**75.59**

eppendorf

Complete Pipetting

From pipettes to calibration to bottletop dispensing

The Eppendorf complete liquid handling solution offers your lab a single solution for superior quality tips, calibration services and liquid handling products.

> Eppendorf liquid handling products meet the highest needs for precision, ergonomics and robustness
> Eppendorf offers a variety of tips in the purity grade your lab needs
> Eppendorf also offers calibration services for all Eppendorf and non-Eppendorf brand pipettes

Description	Volume Range	Cat. No.	Each
Research® Plus Pipette, Adjustable	1000–10,000 µL	**89125-310**	**394.21**
Reference® 2 Single Channel Pipettor, Adjustable Volume	0.25–2.5 mL	**10032-684**	**433.70**
Xplorer® Plus Electronic Pipette	0.5—10 mL	**89234-006**	**1033.82**
Repeater® M4 Mechanical Dispenser Starter Kit*	1 µL–10 mL	**10054-496**	**580.83**
Top Buret™ H Digital Bottle Top Dispenser	0.01–999.9 mL	**89133-974**	**1221.84**
Varispenser® Bottletop Dispenser	1–5 mL	**89133-950**	**512.46**
Varispenser Bottletop Dispenser	10–50 mL	**89133-956**	**727.26**

*Starter Kit includes Combitip® Rack, Combitip® assortment pack 1µL to 1 mL dispensing volume (for use with Combitip® advanced 0.1–50mL).

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MONEY SAVING OFFERS

Visit **us.vwr.com/promotions** and enter promo code in the "FIND" box for promo details and redemption information. See promotion terms and disclaimer at us.vwr.com/promotions.

MColorpHast™ pH Indicator Test Strips

Promo Code 4307

Free pH Strips

- Convenient method for accurate colorimetric pH indication
- Covalently bound indicator dyes prevent bleeding even in strong alkaline solutions
- Can be immersed in samples for extended periods, so that even weakly buffered solutions can be accurately tested without contaminating the sample

Buy a six-pack of the following pH indicator strips

Description	pH Measuring Range	Cat. No.	Each
Universal Indicator	0-14	EM1.09535.0007	123.02
Intermediate Indicator	0-6.0	EM1.09531.0007	123.00
Intermediate Indicator	5.0-10.0	EM1.09533.0007	123.00
Special Indicator	4.0-7.0	EM1.09542.0007	123.00
Special Indicator	6.5-10.0	EM1.09543.0007	123.00

No. of Test Strips: 600 (6 packs of 100)

Get two packs of the following pH indicator strips

Description	pH Measuring Range	Cat. No.	Each
Universal Indicator	0-14	EM1.09535.0001	Free
Intermediate Indicator	0-6.0	EM1.09531.0001	Free
Intermediate Indicator	5.0-10.0	EM1.09533.0001	Free
Intermediate Indicator	7.5-14.0	EM1.09532.0001	Free
Intermediate Indicator	2.0-9.0	EM1.09584.0001	Free
Special Indicator	0-2.5	EM1.09540.0001	Free
Special Indicator	2.5-4.5	EM1.09541.0001	Free
Special Indicator	4.0-7.0	EM1.09542.0001	Free
Special Indicator	6.5-10.0	EM1.09543.0001	Free
Special Indicator	11.0-13.0	EM1.09545.0001	Free

No. of Test Strips: 100

Thermo Scientific Orion ROSS Ultra pH Electrodes

Promo Code 4323

Save 30%

Thermo SCIENTIFIC

Consistent Confidence in Your pH Measurements

For a limited time, instantly save 30% on selected Thermo Scientific™ Orion™ ROSS Ultra™ pH electrodes.

Thermo Scientific Orion ROSS Ultra pH electrodes stabilize quickly, provide highly accurate and precise measurements, and have an extended sensor life.

See page 15 in this issue for more information.

Thermo Scientific Orion ROSS Ultra Electrodes	Cat. No.	Each	
Glass, Refillable pH/ACT Triode™	MP89187-024	460.07	Save 30%
Epoxy, Refillable pH/ACT Triode	MP97011-870	423.78	
Epoxy, Refillable pH/ATC Triode, 3 m Cable	MP97011-872	361.31	
Epoxy, Low-Maintenance Gel pH/ATC Triode, 1.5 m Cable	MP97015-738	474.37	
Epoxy, Low-Maintenance Gel pH/ATC Triode, 3 m Cable	MP97015-740	491.29	
Epoxy, Low-Maintenance Gel pH/ATC Triode	10324-578	284.40	Special Introductory Pricing
Epoxy, Refillable pH/ATC Triode	10324-580	332.40	
Glass, Refillable pH/ATC Triode	10324-314	334.80	

pH Range: 0 to 14 for all featured electrodes, and all have waterproof BNC connectors

Compact Dry™ Microbiology Media

Promo Code 4312

HARDY DIAGNOSTICS A Culture of Service™ | compact DRY

Compact Dry is a ready-to-use system reducing the time needed to perform microbial testing on food, beverage, meat, cosmetics, and raw materials. See page 14 for more information on this simple and effective system for colony counting.

Get a FREE sample sleeve of your choice - no purchase necessary!

See page 14 in this issue for more information.

Free Sample!

Description	Used For	Cat. No.	Pack of 100	Sample (4 Plates)
Compact Dry CF	Detection of Coliforms	10145-952	152.60	Free
Compact Dry EC	Detection of Coliforms and E. coli	10145-954	185.15	Free
Compact Dry TC	Total Viable Bacterial Count	10145-968	129.15	Free
Compact Dry XSA	Detection of Staphylococcus aureus	10145-970	217.39	Free
Compact Dry YM	Differentiation of Yeasts and Mold	10145-972	202.33	Free

Bel-Art Sterileware Senseable Scoop

Promo Code 4206

FREE SAMPLE PACK of Sterileware® Metal Detectable Sampling Tools includes:

(1) **89233-982** Blue, 60 mL Sterileware Senseable Scoop;
(1) **89093-480** Black, 125 mL Sterileware Senseable Scoop;
(1) **89233-986** Blue, 250 mL Sterileware Senseable Scoop

FDA grade – safe for food, drug, and cosmetic contact. See page 23 for product ordering information.

Offer expires 8.31.2015

Scienceware® Bel-Art Products

Free Sample Pack!

Free Carousel Stand

Promo Code 4332

value $148!

with Purchase of an Eppendorf Research Plus or Reference 2 Six-Pack

Research plus—Remarkably light both in terms of weight and pipetting forces setting new standards for ergonomic operation. It also features a spring loaded tip cone for secure tip attachment and low ejection forces and is fully autoclavable.

Reference 2—In addition to all the features above, the Reference 2's one-button design minimizes the risk of aerosol contamination and reduces thumb strain even further.

6-Pack includes six single-channel, adjustable volume pipettes, one full box of Eppendorf epT.I.P.S. for each pipette (excludes 5 and 10 mL pipettes) and one carousel stand.

Description	Cat. No.	Each
Reference 2, 6-Pack		
0.5–10, 10–100, 30–300, 100–1000 µL, 0.5–5 mL, and 1–10 mL	**89131-967**	**2070.00**
0.1–2.5, 0.5–10, 2–20, 10–100, 20–200, and 100–1000 µL	**89126-241**	**2070.00**
Research plus, 6-Pack		
0.5–10, 10–100, 30–300, 100–1000 µL, 0.5–5 mL, and 1–10 mL	**89429-358**	**1800.00**
0.1–2.5, 0.5–10, 2–20, 10–100, 20–200, and 100–1000 µL	**89126-236**	**1800.00**

Offer expires 6.30.2015.

Valor® 7000 Food Weighing Scales

Promo Code 4331

OHAUS

Buy an OHAUS Valor® 7000 Scale and Receive a FREE Accessory. See page 4 for qualifying catalog numbers and ordering information.

The Valor 7000 compact food scale is built with features designed to improve food weighing and portioning productivity.

- Dual displays and touchless sensors
- User-friendly menu and setup
- Fast and accuarate results

up to $250 value

Choose One FREE Accessory	Cat. No.	Each
Ethernet Kit	**89497-036**	**109.28**
RS232 Kit	**89497-038**	**109.28**
USB Kit	**89497-040**	**109.28**
In-Use-Cover, Set (10)	–	**250.00**

Must redeem within 6 weeks of purchase date; limit one per lab. Offer expires 12.31.2015, or while supplies last.

VWR® Manufacturing
We Enable Science Through Custom Services

VWR Provides Custom Manufacturing Services for Food Quality Testing

The Right Ingredients for Faster Speed to Market



VWR provides high-quality chemicals and services, customized to fit the unique needs of food quality testing. Our global footprint and experience in molecular and diagnostic applications will ensure **rapid speed to market** so that your products can get to where they are needed most.

OUR CORE CAPABILITIES SUPPORTING FOOD QUALITY TESTING NEEDS INCLUDE:

- Aseptic manufacturing
- Precision small-volume filling
- Cleanroom manufacturing and filling suites
- Handling and filling of temperature- or light-sensitive materials
- Powder handling, including particle size reduction, blending, and filling
- Handling and segregation of biological and animal origin components
- Homogeneous blending of complex powder blends
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Focus on your core business, and let VWR take care of sourcing, production, testing, and documentation of your chemicals. For more information, call 1.800.932.5000 or visit vwr.com/manufacturing.

Global Manufacturing Sites

Seven VWR manufacturing sites provide a global footprint to accommodate life science applications in biotechnology, biopharmaceutical, diagnostics, and research, encompassing research and development to full-scale production.

HARDY DIAGNOSTICS
A Culture of Service™

Compact Dry™ for Bacterial Counts

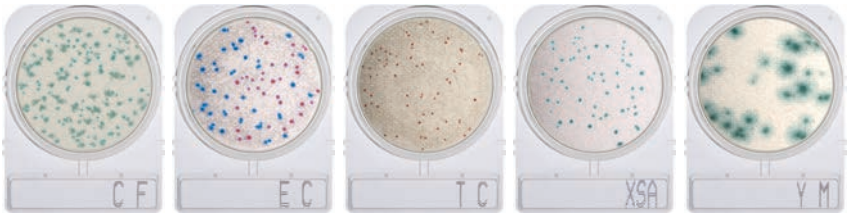
Hardy Diagnostics, an FDA licensed and ISO certified biomedical manufacturer, has developed Compact Dry, a simple method for cultivating and counting common food-borne microorganisms.

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.

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

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.

Compact Dry CF - easy tool for the detection of coliforms
Compact Dry EC - detects both *E. coli* and coliforms
Compact Dry TC - medium for total viable bacterial count
Compact Dry XSA - determines presence of Staphylococcus aureus
Compact Dry YM - differentiates yeasts and mold by color



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

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

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**

Description	Incubation Temperature	Incubation Time	Cat. No.	Pack of 100
Compact Dry CF	35°C	18-24 hr.	**10145-952**	**152.60**
Compact Dry EC	35°C	20-24 hr.	**10145-954**	**185.15**
Compact Dry TC	35°C	44-48 hr.	**10145-968**	**129.15**
Compact Dry XSA	35°C	24 hr.	**10145-970**	**217.39**
Compact Dry YM	25°C	3-7 days	**10145-972**	**202.33**

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

Consistent Confidence in Your pH Measurements

Thermo SCIENTIFIC

When measuring pH in the food and beverage industry, an incorrect reading can cost you time and money. It is critical that the pH measurements you perform day-to-day are fast, accurate and reproducible. Thermo Scientific™ Orion™ ROSS Ultra™ Triode™ pH/ATC electrodes stabilize quickly, provide highly accurate and precise measurements, and have an extended sensor life.

Why take chances with lower quality?

Thermo Scientific Orion ROSS Ultra Electrodes	Body Material	Junction	Connectors (pH/Temperature)	Cat. No.	Each	
Refillable pH/ATC Triode	Glass	Ceramic	BNC, 8-pin MiniDIN	**MP89187-024**	**460.07**	
Refillable pH/ATC Triode	Epoxy	Glass Fiber	BNC, 8-pin MiniDIN	**MP97011-870**	**423.78**	
Refillable pH/ATC Triode, 3 m Cable	Epoxy	Glass Fiber	BNC, 8-pin MiniDIN	**MP97011-872**	**361.31**	**Instantly Save 30%**
Low-Maintenance Gel pH/ATC Triode, 1.5 m Cable	Epoxy	Glass Capillary	BNC, 8-pin MiniDIN	**MP97015-738**	**474.37**	
Low-Maintenance Gel pH/ATC Triode, 3 m Cable	Epoxy	Glass Capillary	BNC, 8-pin MiniDIN	**MP97015-740**	**491.29**	
Low-Maintenance Gel pH/ATC Triode	Epoxy	Glass Capillary	BNC, RCA	**10324-578**	**284.40**	**Special Introductory Pricing**
Refillable pH/ATC Triode	Epoxy	Glass Fiber	BNC, RCA	**10324-580**	**332.40**	
Refillable pH/ATC Triode	Glass	Ceramic	BNC, RCA	**10324-314**	**334.80**	

All featured electrodes have a pH range of 0 to 14, have waterproof BNC connectors, and are compatible with TRIS buffers.

For a limited time, instantly save 30% on selected electrodes (items with special 'MP' catalog numbers). Special pricing expires 7.31.2015.

Detection of Pathogenic *Vibrio parahaemolyticus* in Marine Food using Lateral Flow Technology

Lisa John, Jörg Slaghuis, & Heike Wulff; Merck Millipore, BioMonitoring R&D, Darmstadt, Germany

Introduction

Foodborne illnesses impact consumer safety on a global scale. It is estimated that one in three people in industrialized countries may be affected by foodborne illness per year. In the United States, 48 million people get sick, 128,000 are hospitalized, and 3,000 die from foodborne illness annually. In the EU, 320,000 cases of foodborne illness are documented each year, although the real number is likely much higher.

Traditional microbiological methods for detection of pathogens in food can require up to five days to obtain a simple yes/no result. This time-consuming process slows the workflow, holding the food in quarantine and preventing its release. This can result in a considerable delay before products can be put into the market. Immunoassays based on the principle of lateral flow technology allow for convenient detection of pathogens within 24-48 hours, depending on parameter. These tests are available for a broad range of pathogens and follow a simple "pregnancy test" design to provide results in a quick, readable format and deliver definite results in as little as twenty minutes after sample enrichment. Lateral flow tests offer all the benefits of traditional testing methods with the addition of simplicity, speed, reliability and convenience. When used as part of a monitoring program, they allow streamlining of testing protocols, ensuring the safety of finished products and shortening holding times.

This article describes development and evaluation of a lateral flow test for pathogenic *Vibrio parahaemolyticus*, a major cause of foodborne illness throughout the world, primarily associated with consumption of contaminated raw or undercooked seafood. (Please note that the lateral flow test for *V. parahaemolyticus* is not commercially available.)

Approximately 4500 cases of *V. parahaemolyticus* infection are reported each year in the United States. Numbers are expected to increase worldwide due to greater consumption of raw seafood and the globalization of seafood trade.

The thermostable direct hemolysin (TDH) toxin is known as the major virulence factor of *V. parahaemolyticus*. Standard detection methods of *Vibrio parahaemolyticus* vary by country, but in all cases are labor-intensive and require three to seven days for results. Because raw seafood quickly experiences deterioration, rapid detection methods are necessary for effective identification of possible contamination.

For this application, a Gold Labelled ImmunoSorbent Assay (GLISA), an immunochromatographic rapid test based on lateral flow technology (**Figure 1**), was used. The lateral flow assay (LFA) detects the toxin TDH using monoclonal gold-labelled antibodies. If the antigen is present, it reacts with the gold-labelled toxin-specific antibodies and migrates to the binding zone. The gold-labelled toxin-specific antibodies then link to a second specific antibody. Due to the gold-labelling, a distinct red line is formed. The rest of the sample continues to migrate to the control zone and links to a third antibody-specific antibody. The red line formed in the control zone demonstrates that the test is functioning correctly.

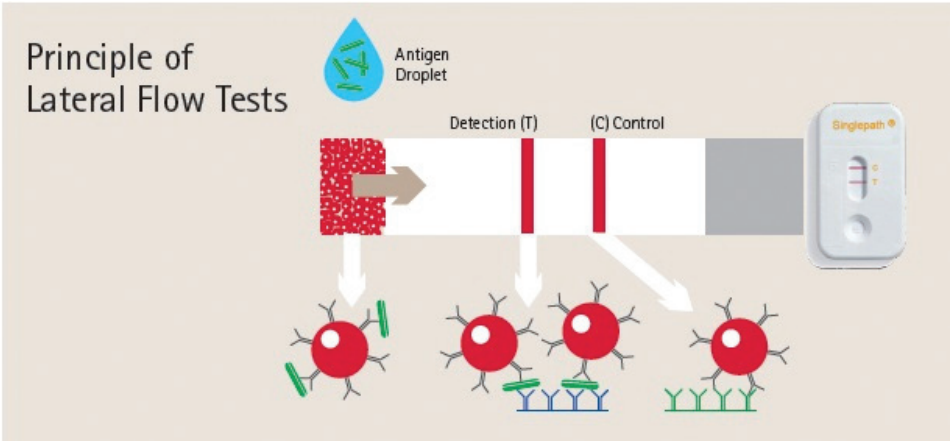


Figure 1: Lateral flow tests are designed to screen for the presence of pathogenic and toxigenic bacteria in food matrices. The kits are based on immunochromatographic principles and use antibody-linked colloidal gold particles to react specifically with its complimentary antigenic determinant to provide a visual reaction read-out.

Methods

Three studies were performed to evaluate the assay for TDH toxin:

- Limit of detection
- Inclusivity/exclusivity
- Evaluation with artificially contaminated food samples

To establish the limit of detection, four different TDH positive strains of *V. parahaemolyticus* pure cultures were diluted and tested with the LFA. Pure TDH was also tested.

Inclusivity and exclusivity of the LFA were evaluated by testing a total of 102 isolates and reference strains. Bacteria were cultured in Peptone water (acc. to ISO 6579) plus 2% NaCl pH 8.5 or in CASO Broth for 18 - 24 hours at 37 °C. A total of 160 µl of suspension was transferred onto the sample port of the test device. The result was read after 30 minutes.

For evaluation with artificially contaminated food samples, fish and seafood products (oysters, shrimp and sushi (e.g. nigiri and maki with salmon and tuna), n=90 total) were spiked with a TDH-positive *V. parahaemolyticus* strain and analyzed comparatively by the developed test and the reference method according to ISO/TS 21872-1:2007 (**Figure 2**). For inoculation, stressed and non-stressed cultures were used. Samples were enriched directly following inoculation or after storage for seven days at -20 °C. Enrichments were incubated for eight hours and 24 hours. Centrifugation of the sample was evaluated as a pre sample treatment for performance improvement; 160 µl of sample was transferred to the LFA. The result was read after 30 minutes.

Results

The detection limit of TDH was 125 pg/ml and 3.3 x 106 to 1.9 x 107 cfu/ml for TDH-positive *V. parahaemolyticus*, strain-dependent. The LFA achieves an inclusivity rate of 81% and exclusivity rate of 100%. For the inclusivity six tdh-gene positive *V. parahaemolyticus* isolates were tested negative by LFA (**Figure 3**). They are of environmental origin (e.g. seawater and zooplankton) and were tested for TDH production by Latex agglutination test KAP-RPLA (Denka Seiken, Japan). Two of them showed no agglutination (TDH negative) and therefore were excluded in the LFA inclusivity rate calculation.

For fresh food, detection rate of the LFA after 24 hour incubation, in combination with no centrifugation step, was significantly lower than the rate obtained by other methods. In the group of frozen samples, detection after 24 hour enrichment (independent from centrifugation step) was significantly higher than after eight hour enrichment.

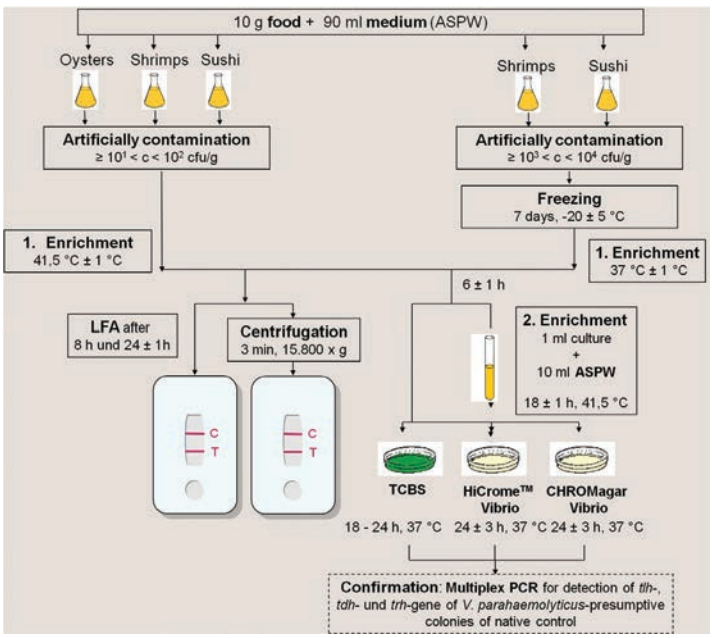


Figure 2: Test procedure of food experiments. Comparison of LFA method ISO/TS 21872-1:2007

Species		n	Result LFA	Inclusivity/ Exclusivity
v. parahaemolyticus	*tdh* - gene positive	n = 21	n = 17 positive	Inclusivity 81%
	tdh - gene negative	n = 69	n = 69 negative	Exclusivity 100%
other *Vibrio* spp.	*V. hollisae* ATCC 33564 *V. cholerae* Eltor Ogawa NIH 41 *V. vulnificus* ATCC 27562 *V. vulnificus* ATCC 33149 *V. mimicus* ATCC 33653 *V. alginolyticus* H6533	n = 6	n = 6 negative	Exclusivity 100%
non-*Vibrio*	*E. coli* ATCC 25922 *C. freundii* ATCC 8090 *A. hydrophila* ATCC 7966 *P. shigelloides* ATCC 14029	n = 4	n = 4 negative	Exclusivity 100%

Figure 3: Results of inclusivity and exclusivity testing

Method of Detection	Type of Food: Fresh	Type of Food: Frozen	Type of Food: Total
LFA 8 h/ without centrifugation	**100%** (94.5% - 100%)[1] n = 53	**91.7%** (77.5% - 98.2%)[1] n = 36	**96.6%** (90.4% - 99.3%)[1] n = 89
LFA 8 h/ with centrifugation	**100%** (94.4% - 100%)[1] n = 52	**91.6%** (77.5% - 98.2%)[1] n = 36	**96.5%** (90.4% - 99.3%)[1] n = 88
LFA 24 h/ without centrifugation	**85.2%** (72.9% - 93.4%)[1] n = 54	**100%** (92.0% - 100%)[1] n = 36	**91.1%** (83.2% - 96.1%)[1] n = 90
LFA 24 h/ with centrifugation	**100%** (94.6% - 100%)[1] n = 54	**100%** (92.0% - 100%)[1] n = 36	**100%** (96.7% - 100%)[1] n = 90
Reference method	**100%** (94.6% - 100%)[1] n = 54	**100%** (92.0% - 100%)[1] n = 36	**100%** (96.7% - 100%)[1] n = 90

n number of samples, which were included in statistical analysis (viz. excluding samples with invalid test results)

[1] confidence interval

Figure 4: Results of food experiments

For both fresh and frozen food types, 100% sensitivity was achieved by LFA after 24 hour enrichment in combination with sample centrifugation. Performance was equivalent to the ISO/TS 21872-1:2007 reference method (100% sensitivity) and time-to-result was achieved four days faster. The preliminary centrifugation treatment of the sample significantly increases the detection rate (p=0.035). None of the negative controls were contaminated with TDH-positive *V. parahaemolyticus*, but sporadically with TDH-negative *V. parahaemolyticus*. All negative controls reacted negatively by LFA. Therefore, the specificity of the LFA was 100%.

Conclusion

Food experiments with artificially contaminated seafood samples showed that TDH-positive *V. parahaemolyticus* was reliably detected in inoculation concentrations of 101 to 102 cfu/g in fresh food and 103 to 104 cfu/g in frozen food after 24 hour incubation (**Figure 4**).

A GLISA for the detection of pathogenic *V. parahaemolyticus* in food was developed by targeting the toxin TDH. The detection limit of TDH was 125 pg/ml and 3.3 x 106 to 1.9 x 107 cfu/ml for TDH-positive *V. parahaemolyticus*. In internal studies (n=102) a sensitivity of 81% and specificity of 100% was determined for the developed test.

Experiments show that *V. parahaemolyticus* in seafood can be detected much faster using lateral flow technology than with traditional methods. Detection was completed in 24 hours with enrichment plus one hour sample pre-treatment and assay performance compared to three to seven days for standard detection methods.

To protect product integrity and improve consumer safety, rapid methods for detection of contamination in food are increasingly important. Tests based on lateral flow technology are user-friendly, does not require specialized, cost-intensive equipment, unlike alternative methods such as PCR. Pathogen detection can therefore be performed more efficiently and cost-effectively.

[1]*World Health Organization (2012). Initiative to estimate the Global Burden of Foodborne Diseases. Retrieved March 7, 2013, from http://www.who.int/foodsafety/foodborne_disease/ferg/en/index.html*

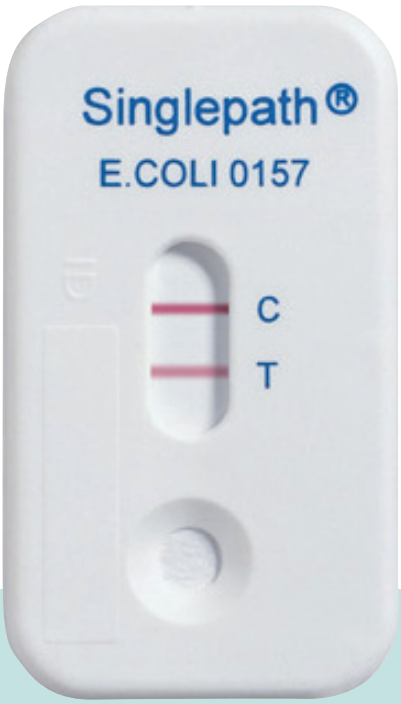
[2]*Centers for Disease Control and Prevention (2012). CDC Estimates of Foodborne Illness in the United States. Retrieved November 20, 2012, from http://www.cdc.gov/foodborneburden/2011-foodborne-estimates.html*

[3]*European Food Safety Authority. Food-borne Zoonotic Diseases. Retrieved November 20, 2012, from http://www.efsa.europa.eu/en/topics/topic/foodbornezoonoticdiseases.htm*

[4]*FAO/WHO [Food and Agriculture Organization of the United Nations/World Health Organization]. 2011. Risk assessment of Vibrio parahaemolyticus in seafood: Interpretative summary and Technical report. Microbiological Risk Assessment Series No. 16. Rome. 193pp*

[5]*Centers for Disease Control and Prevention (2012). CDC Estimates of Foodborne Illness in the United States. Retrieved July 29, 2013, from http://www.cdc.gov/nczved/divisions/dfbmd/diseases/vibriop/*

Fed Up with the Challenges of Food Safety?
Simplify Your Process



Singlepath® & Duopath® Lateral Flow Tests
Convenient, Rapid Food Pathogen Detection

EMD Millipore's Singlepath and Duopath Lateral Flow Tests are immunoassays for detecting pathogens. They offer all the benefits of traditional testing methods with the addition of simplicity, speed, reliability, and convenience. Covering the major pathogens, the tests act as mini-laboratories in the 'pregnancy test' format and always include a built-in control reaction. Use in combination with our granulated culture media to ensure optimal test performance. Singlepath *E. coli* 0157, Singlepath Salmonella, Singlepath Campylobacter, and Duopath Vertoxins rapid tests are AOAC-RI approved.

Reliable: Same accuracy standards as classical detection methods

Comprehensive: Tests cover six most relevant pathogens in food

Fast: Definite results within 20 - 30 minutes

Easy-to-use: Clear yes/no results after simple sample application

Safe: Additional positive control and specially adapted enrichment media for precise, reliable results

Economic: Rapid results save operating costs by expediting product release while ensuring product reliability

Lateral Flow Tests are available for:

- *E. coli*
- Bacillus cereus Emetic Toxin Marker
- Campylobacter
- L'mono
- Salmonella
- Cereus Enterotoxins
- Legionella

Description	Cat. No.	Each
Singlepath *E. coli* 0157	**EM1.04141.0001**	**183.08**
Singlepath Bacillus cereus Emetic Toxin Marker	**EM1.04154.0001**	**178.00**
Singlepath Campylobacter	**EM1.04143.0002**	**348.19**
Singlepath L'mono	**EM1.04148.0002**	**225.97**
Singlepath Salmonella	**EM1.04140.0001**	**199.00**
Duopath Cereus Enterotoxins	**EM1.04146.0001**	**368.23**
Duopath Legionella	**EM1.04147.0001**	**305.29**

Each test system includes 25 tests.

EMD MILLIPORE

Analysis of Free Chlorine in Poultry Chiller Water using DPD-Free Chlorine Reagent

Guidance for improving performance of free chlorine measurements

Pat Wiese, Applications Chemist, Hach Company

Poultry processors are required to maintain a free chlorine level sufficient to control pathogenic bacteria found on bird carcasses. Bird carcasses are chilled at 32 to 34ºF in a continuous counter-flow chlorinated water system. The challenge to the processor is to maintain a free chlorine level of 0.5 - 5.0 mg/L free chlorine in a chiller water which has a huge and changing chlorine demand load due to fresh carcasses being constantly added. The analysis of free chlorine in these chiller "red" waters is challenging and somewhat controversial as to whether the analysis is accurate. In order to attack this question there are multiple variables that need to be addressed and some assumptions that must be made.

First, the free chlorine concentration is variable throughout the system. The free chlorine concentration will be much higher at the point of chlorination than it will be at the opposite end of the chiller where fresh carcasses are being added. The chlorine concentration will vary at sampling sites between these two points. This needs to be taken into consideration when making chlorine additions or when comparing analysis results between different samples or sampling sites.

Second, the chiller waters are cold and the reaction rate of chlorine with the organic matter present is slow. The rate of reaction depends on the type and structure of the organic matter, temperature, and chlorine concentration. It is important to recognize that the "dynamic equilibrium" existing in the sample may be disrupted or shifted when the sample is removed from the system. A sample removed will slowly warm with the residual free chlorine becoming more reactive. This leads to further reaction of the free chlorine with any existing chlorine demand and hence will lead to decreased free chlorine values if the free chlorine analysis is delayed. This becomes important when samples are transported to a lab, or if samples are being analyzed online by a process analyzer. This can be illustrated by taking a sample and analyzing for free chlorine. Allow the remaining portion of sample to remain at room temperature for 15 - 30 minutes. Reanalyze the sample. The free chlorine values will usually be lower or entirely gone. This is often interpreted as the free chlorine test not giving reproducible results when, in fact, the free chlorine concentration in the sample has actually changed since the original analysis.

Third, DPD reagents for free chlorine react slowly with other inorganic and organic chlorine species present in the sample. The rate at which they react or "interfere" in the free chlorine determination depends on the form and concentration of these compounds present. The instructions for determining free chlorine using DPD Free Chlorine Reagent are written to read the sample as soon as possible after reagent addition and always to read the sample before one minute. Free chlorine reacts immediately with DPD Chlorine Reagent. The reaction time can be extended to one minute to allow any bubbles to dissipate or for particles present in the sample to settle before taking the reading. This effect of interfering compounds is illustrated when a sample is read at one minute after reagent addition and then reread again after five or ten minutes. The free chlorine value will be higher after five or ten minutes. This is often interpreted as "My free chlorine value keeps increasing!" This continual drifting higher of the free chlorine value should actually be attributed to interference from the other chlorinated compounds present in the sample and the value obtained at one minute or less is considered most accurate.

Fourth, the physical aspects of the sample such as temperature, background red color, particles, and turbidity need to be addressed. The colorimeter or spectrophotometer must always be zeroed on the sample or the sample dilution being analyzed before addition of the DPD reagent. This will automatically subtract the background due to color and turbidity. One precaution should be noted. If bubbles or large particles are present in the sample,

these should be allowed to dissipate or settle out before zeroing the DR 1900 Portable Spectrophotometer, or other Hach Instrument.

Fifth, sampling technique must be considered. Contamination from chlorine demand from previous samples will cause low results. Fats and other organics adhere to container and sample cell walls, reacting with any free chlorine present in the sample. Sampling containers should not be reused unless pretreated for chlorine demand. Glass containers are preferred, but often are not allowed in the processing area. Pre-treat the sample containers to remove any chlorine demand by soaking the container in a dilute bleach solution (1mL commercial bleach to 1L of deionized water) for at least one hour. Rinse each container or cell thoroughly with deionized or organic-free water before using. After testing is completed, rinse the sample cells and sampling containers with deionized water and fill with the weak bleach solution. This will insure that the cells and bottles are ready to use for the next testing period.

These strategies need to be incorporated into all testing protocols in order to develop confidence in the test results and to ensure that the results are useful in making process adjustments and controlling pathogenic bacteria levels. To see the Hach method for determining free chlorine in poultry chiller water visit **vwr.com/hachDR1900**.

DR 1900 Portable Spectrophotometer

It is time to bring your spectrophotometer up to speed with the rest of your life. The new DR 1900 Spectrophotometer from Hach offers you the reliability you've come to know, with additional features that will make it a staple in your lab for the future.

- Small and streamlined footprint that saves valuable bench space and offers true portability
- Large, easy-to-read backlit display
- Intuitive user interface that doesn't require training
- Accepts the widest range of vial sizes
- Over 220 commonly used pre-programmed methods

Description	Cat. No.	Each
DR 1900 Portable Spectrophotometer	**10145-568**	**3250.69**

HQd Water Quality Meters & Probes

Hach's user-friendly meters allow even new users to easily navigate without errors. And only HQd digital probes store calibration history and automatically recognize testing parameters and method settings – reducing possible errors while saving you time and hassle.

The durable design is built to do the job no matter where you put it to work.

Description	Cat. No.	Each
General Purpose pH Kit	**10146-094**	**1982.51**
General Purpose pH Kit, High-Performance	**10146-096**	**2111.91**
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Description	Cat. No.	Each
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TitraLab AT1000 Titrator,1 Syringe,1 Pump	**10662-254**	**2710.00**
TitraLab AT1000 Titrator,1 Syringe,2 Pumps	**10662-256**	**3030.00**
TitraLab AT1000 Titrator,2 Syringe,2 Pumps	**10662-258**	**3420.00**
TitraLab KF1000, KF, 1 Syringe, 2 Pumps	**10662-260**	**3810.00**

PALL Laboratory

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Sentino Membrane Dispenser	**10147-394**	Ea./ **1900.00**
Sentino Filter Funnel, 100 mL	**10147-760**	Cs. 100/ **90.08**
Sentino Filter Funnel, 250 mL	**10147-762**	Cs. 80/ **89.67**
Sentino Filter Funnel Adaptor	**10147-386**	Ea./ **141.77**
Sentino Filter Funnel, 3-Place Manifold	**10147-390**	Ea./ **1065.51**
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For more information see pages 8-9 in this issue!