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- CE IVD (In Vitro Diagnostics) compliant



Pipet Tips, Sterile	Volume, µL	For Use With	Cat. No.	Rack of
5 mL, Graduated	1000–5000	Eppendorf and Biohit, 1-5 mL	89368-988	49/ 30.37
5 mL, Graduated	1000–5000	Gilson® and Rainin®, 1-5 mL	89368-984	49/ 29.67
5 mL	1000–5000	1-5 mL Pipettors	89368-992	49/ 27.36
10 mL	5000–10,000	5-10 mL Pipettors	89368-996	36/ 26.56

Description	Size, mL	Packaging	Cat. No.	Case of 500
SBS Recyclable Rack	15	25/Rack, 10 Bags/Case	89049-172	282.34
Bulk Bag	15	50/Bag, 10 Bags/Case	89049-170	242.27
SBS Recyclable Rack	50	25/Rack, 10 Bags/Case	89049-176	346.13
Bulk Bag	50	50/Bag, 10 Bags/Case	89049-174	261.61

Featured tips are sterile and packaged in composite racks. Visit vwr.com for additional options in resealable bags.

Improving Pesticide Data Quality Using a Certified MS Syringe Filter



Pesticides are important to ensure a sustainable global food supply. However, the use of such compounds must be regulated to protect public health. In recent years, regulations have become more stringent evidenced by Maximum Residue Limits (MRL) getting lower as well as the elimination of some pesticides. To ensure pesticide application is in compliance with legislation, testing methods capable of assaying multiple analytes at detection and quantitation limits below the MRL, are crucial.

To meet the rigorous requirements of today's analyses, many labs are using liquid chromatography coupled with mass spectrometry (LC-MS). Samples and mobile phases used in this analyses should be filtered using a 0.2µm pore size membrane. Many mass spectrometry labs are reluctant to filter samples, due to concerns about the introduction of extraneous compounds which are extracted from the filter membrane or housing. Filter adhesives, if used, can also contribute to this issue. The extracted excipients can lead to false positives if the peak is misidentified as a pesticide. Also, if the extracted substance causes ion suppression or co-elutes with an analyte of interest, a false negative could result. According to SANCO requirements¹, for a method to be valid, it must have a false negative rate that is less than 5%. Also the desired false positive rate should be less than 5%. In addition, any extraneous peaks produced during the analysis must be carefully considered to prevent affecting data interpretation. Requirements specifically state that equipment used in the analysis, such as filter aids, must be thoroughly checked for interferences. Given this requirement, a filter with low extractables is essential in the analysis of pesticides.

Filtering samples and mobile phases are recommended to protect the liquid chromatograph by



preventing particulates from blocking the column and therefore improving data quality. Filtering samples will reduce the matrix effect which can contribute to either the suppression or enhancement of analyte ionisation. The data in **Figures 1 and 2** shows how the Pall Acrodisc® MS certified syringe filter gives consistent performance across three concentrations. The competitors are inconsistent, showing suppression or enhancement, as shown at the 0.05ppm level for Competitor A.

The Pall Acrodisc MS certified filter doesn't yield extraneous compounds from leachables or extractables. The data presented shows that the sample prepared using the Pall Acrodisc MS filter matches the baseline profile of the unfiltered blank used as a control. Samples processed with competitor A's PVDF show a large peak at about 2.4 minutes as well as a few smaller peaks around one minute. Competitor B's PTFE filter shows a broad peak at one minute as well as something eluting in the void. There are also small anomalies at about three minutes, and another at five. Clearly something is being extracted from the filter housing and/or membrane.

Acrodisc MS Syringe Filters,				
Diameter	Pore Size	Effective Filtration Area	Cat. No.	Pack of
13 mm	0.2 µm	1.0 cm ²	30621-078	60/ 175.85
25 mm	0.2 µm	3.9 cm ²	89194-420	50/ 246.65

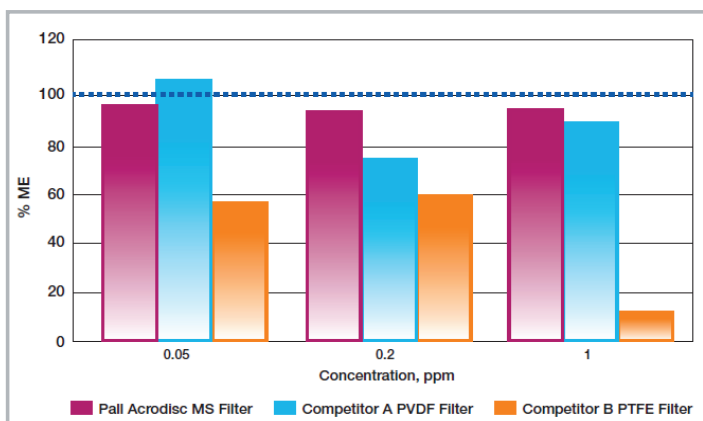


Figure 1: Note: Dashed lines on each chart () indicate no matrix effect (i.e. % ME = 100%).

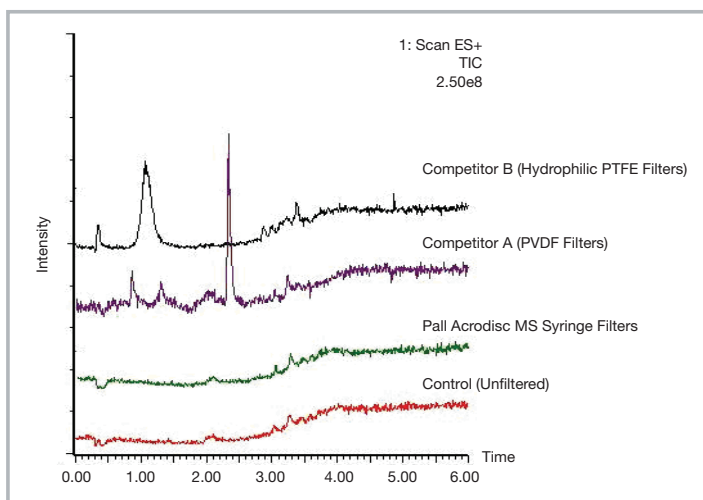


Figure 2: Note: All chromatograms are displayed on the same scale.

Sample filtration is an important part of sample preparation in the analysis of pesticides. Due to the concern of extracted components, this practice is often avoided. The Pall Acrodisc MS syringe filter proves to be the best choice for improving data quality while protecting the analysis and the mass spectrometry system.

Pall Acrodisc MS syringe filters with WWPTFE (water-wettable polytetrafluoroethylene) membrane are available in both 13 and 25mm sizes.

References

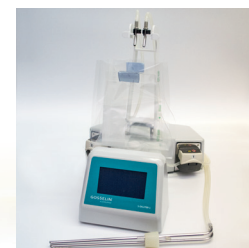
1- Method Validation and Quality Control Procedures for Pesticide Residue Analysis in Food and Feed. SANCO, Document Number SANCO/12495/2011, obtained from http://ec.europa.eu/food/plant/plant_protection_products/guidance_documents/docs/qualcontrol_en.pdf

2- Data generated by Pall Corporation scientists Gilbert E. Tumambac, Weibing Ding, and Larry Scheer, Pall Corporation, Ann Arbor, MI, USA for application notes Reduction of Matrix Effects from Filter Effluents Using Pall Acrodisc® MS Syringe Filters for LCMS Sample Preparation and Low Extractable Syringe Filters for LCMS Applications

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Improved Determination of Antioxidants in Edible Oils Using Solid Core LC Columns

by Mark Tracy, Thermo Scientific, Sunnyvale, CA



Abstract

Phenolic antioxidants are commonly used as preservatives in foods containing edible oils and fats to prevent development of rancidity. AOAC Method 983.15 is used to assay levels of these compounds in finished food products. The method uses a C18 column but can suffer from matrix interference effects. In this work, we demonstrate the suitability of both Thermo Scientific™ Accucore™ C18 and Thermo Scientific™ Accucore™ Polar Premium columns for this application.

Introduction

Phenolic antioxidants are commonly used as preservatives for edible oils and fats to prevent rancidity. Synthetic phenolic antioxidants are subject to maximum limits for reasons of safety¹ and to minimum limits for reasons of effectiveness². AOAC Official Method 983.15 was developed to assay levels in finished food products³. The method specifies a general-purpose C18 column, which is satisfactory in many cases; however, food is a complex matrix and the method is prone to interferences. Choosing the right column to manage interferences is a necessary part of developing a rugged method. The AOAC method originally included only nine synthetic antioxidants, but this has been extended to include vitamin E, vitamin E acetate, and ethoxyquin.

Accucore HPLC columns use Core Enhanced Technology™ to facilitate fast and highly efficient separations. The 2.6µm diameter particles are not totally porous, but have a solid core and a porous outer layer. The optimized phase bonding creates a series of high coverage, robust phases. The tightly controlled 2.6µm diameter of the Accucore particles results in much lower backpressures than typically seen with sub-2µm materials.

Experimental Details

Consumables

Acetonitrile, LC/MS
Methanol, LC/MS
Water, purified with Millipore® Mili-Q® Advantage A10® System
Acetic Acid
n-Heptane
Phenolic Antioxidants Kit Containing:
Nordihydroguaiaretic Acid (NDGA)
3,5-di-t-butyl-4-hydroxytoluene (BHT)
tert-butylhydroquinone (TBHQ)
2,6-di-t-butyl-4-hydroxymethylphenol (Ionox-100)
2,4,5-trihydroxybutyrophenone (THBP)
Ethoxyquin
Propylgallate
Vitamin E and Vitamin E Acetate were purchased separately.

Solutions

Stock solutions of standards were prepared at 1.0 mg/ml in acetonitrile.

Sample Preparation

Samples were prepared according to AOAC Official Method 983.15. The foodstuffs were warmed to separate the water from the fat. Approximately 5.5g of oil or fat was dissolved in 20mL of heptane and extracted three times with 50mL of acetonitrile. The combined acetonitrile fraction was evaporated to about 4mL, and reconstituted with isopropanol to make 10mL.

Separation Conditions

Consumables

Instrumentation: Thermo Scientific™ Dionex™ UltiMate™ 3000 system consisting of LPG-3400RS quaternary pump, WPS-3000RS autosampler, DAD-3000RS diode array detector, and TCC-3000RS column oven

Columns: Accucore C18, 2.6µm, 100 x 3 mm
Accucore Polar Premium, 2.6µm, 100 x 3 mm

Mobile Phases: **A:** acetonitrile/methanol/acetic acid (49.25:49.25:0.5 v/v);
B: water/acetic acid (99.5:0.5 v/v)

Flow Rate: 0.80 mL/min.

Gradient:

Time	%A	%B	Curve
-4	25	75	5
0	25	75	5
5	100	0	4
10	100	0	5

Column Temp: 30°C
Injection Volume: 2 µL
UV Detection: Diode Array 200-400 nm, 280 nm shown; data rate 5 Hz, filter 1.0s

Data Processing

Software: Thermo Scientific™ Dionex™ Chromeleon™ 6.8 Chromatography Data System

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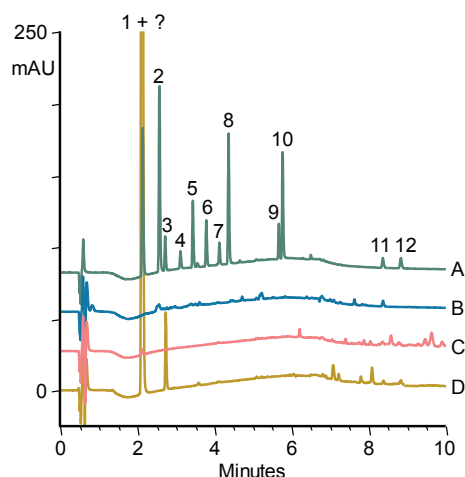


Figure 1: Antioxidants using Accucore C18. A: Standards 50 µg/mL in acetonitrile. B: Olive oil extract. C: Butter fat extract. D: Margarine oil extract. Peaks 1: Propylgallate, 2: THBP, 3: TBHQ, 4: Ethoxyquin, 5: NDGA, 6: BHA, 7: Ionix-100, 8: Octyl gallate, 9: BHT, 10: Lauryl gallate, 11: Vitamin E, 12: Vitamin E acetate.

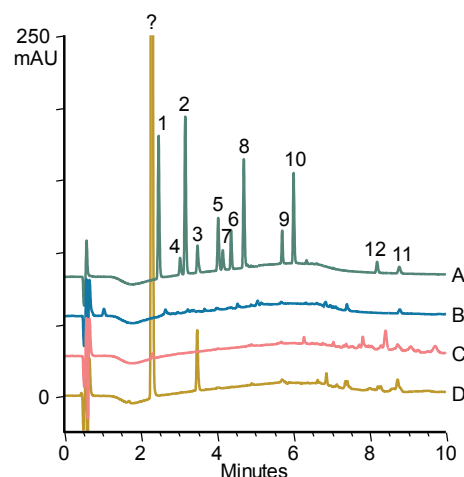


Figure 2: Antioxidants using Accucore Polar Premium shows alternate selectivity. A: Standards 50µg/mL in acetonitrile. B: Olive oil extract. C: Butter fat extract. D: Margarine oil extract. Peaks 1: Propyl gallate, 2: THBP, 3: TBHQ, 4: Ethoxyquin, 5: NDGA, 6: BHA, 7: Ionix-100, 8: Octylgallate, 9: BHT, 10:Lauryl gallate, 11: Vitamin E, 12: Vitamin E acetate.

Results

Only Accucore C18 and Accucore Polar Premium columns resolved all twelve peaks in the standards mix from a number of evaluated columns. There were minor differences in the elution order and the selectivity against matrix interferences was different. The margarine and butter contained an unidentified component that coeluted with propyl gallate from the C18 column (Figure 1). This is not a declared ingredient for either sample. The UV spectra of the peaks in the standard and the samples did not match.

Conclusion

The Accucore C18 and Accucore Polar Premium columns provide excellent performance for AOAC Official Method 983.15 for antioxidants in edible oils.

References

- [1] US Food and Drug Administration, 21CFR172 Subpart B (Preservatives).
- [2] D.L. Madhavi, S.S. Deshpande, D.K. Salunkhe, "Food Antioxidants: Technological, Toxicological and Health Perspectives," p. 160-190, Marcel Dekker, Inc. NY (1996).
- [3] AOAC Official Methods of Analysis, Method 983.15, Phenolic Antioxidants in Oils, Fats and Butter Oil (1994).

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Accucore Polar Premium	10039-010	10039-004	10038-998	10038-694	10039-012
Accucore Phenyl-X	10039-032	10039-026	10039-020	10039-014	10039-034
Accucore Urea-HILIC	10039-076	10039-070	10039-064	10039-058	10039-078
Accucore C30	10039-054	10039-048	10039-042	10039-036	10039-056
Accucore 150-Amide-HILIC	10038-900	10038-894	10038-888	10038-880	10038-902
	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	
Accucore XL C18	10038-682	10038-676	10038-670	10038-664	10038-688
Accucore XL C8	10037-656	10037-650	10037-644	10037-548	10038-658

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Description	Cat. No.	Each
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Liquid Sample Instrumentation Platform for Free Fatty Acid, Malonaldehyde, Percent Fat, and Total Glycerin	75870-846	12,600.00
Liquid Sample Consumables Platform for All Kits	75870-848	472.50
Soild Sample Instrumentation Platform for Peroxide and Alkenal	75870-838	14,175.00
Soild Sample Instrumentation Platform for Free Fatty Acid, Malonaldehyde, Percent Fat, and Total Glycerin	75870-840	13,650.00
Soild Sample Consumables Platform for All Kits	75870-842	525.00
SafTest Test Kits, 100 Preps		
Peroxide, 0.00 - 0.200 MEQ/kg of Sample	75870-816*	498.75
Free Fatty Acid, 0.1–2.01% Free Fatty Acid	75870-818*	315.00
Malonaldehyde, 0.00–0.32 mg/kg of Sample	75870-820*	498.75
Alkenal. 0.0–1200 µmol/kg Alkenals	75870-822*	498.75
Percent Fat, 0.06–0.33% of Sample	75870-836*	498.75
Total Glycerin, 0.008–0.06% of Sample	75870-886*	498.75

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Melting Point Apparatus, with NIST Traceable Certificate	75840-014	2971.04

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B10P pH Meter	pH	B10P Meter (89231-662) and Refillable Glass pH Electrode (89231-580)	89231-664	964.39
B20PI pH/ISE Meter	pH	B20PI Meter (89231-692) and pH Probe (89231-580)	89231-694	1559.29
B30PCI pH/Conductivity/ISE Multimeter	pH, Conductivity	B30PCI Meter (89231-696), pH Probe (89231-580), and Conductivity Probe (89231-614)	89231-698	1902.61
B10C Conductivity Meter	Conductivity	B10C Meter (89231-676) and Conductivity Probe (89231-614)	89231-678	1349.62
B40PCID Multimeter	pH, DO	B40PCID Meter (89231-684), pH Probe (89231-580), and DO Probe (89231-624)	89231-704	2411.73
B40PCID Multimeter	DO	B40PCID Meter (89231-684) and Dissolved Oxygen Probe (89231-624)	89231-670	2175.15
B40PCID Multimeter	pH, DO, Conductivity	B40PCID Meter (89231-684), pH (89231-586), Conductivity (89231-618), and DO (89231-624) Probe	89231-686	2984.90



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	PHC101	PHC108	PHC1201	PHC281	PHC301	PHC705A	PHC705	PHC725	PHC729	PHC735	PHC745	PHC805
Red Rod Technology						•	•	•	•	•	•	
Type of Sample												
High solids content										B	A	
Alkaline solutions				B	A							
Non aqueous media											A	
TRIS buffer				B						A		
High viscosity										B	A	
Ultra-pure water										A	B	
Semi-solid samples (cheese, meat etc.)		A										
Application/Industry												
Water/Environment												
Low ionic strength				B								A
Wastewater	A		B									
Pool/Spa			A		B							
Sea water				A							B	
Drinking water				A				B				
Boiler/Cooler				A							B	
Chemical												
Galvanic baths												A
Photography baths												A
Paint												A
Lacquer												A
Agriculture												
Soils (in water)										A		
Soils with high level of salt										A		
Irrigation water			A									B
Suspensions							A				B	

A = Recommended Choice B = Alternative
 All probes read from 0-14 pH except PHC101 (2-14), PHC108 (2-12), and PHC729 (0-12)
 Temperature range: 0-50°C for PHC101; 0-60°C for PHC108; 0-80°C for PHC201; PHC281, PHC301, PHC805; 0-100°C for PHC705A, PHC729; 10-100°C for PHC705, PHC725, PHC725, PHC745

	PHC101	PHC108	PHC1201	PHC281	PHC301	PHC705A	PHC705	PHC725	PHC729	PHC735	PHC745	PHC805
Biology/Pharmacy												
Agar		B				A						
Blood									B		A	
Ultra-pure water										A	B	
Cosmetics												
Fat, cream, cosmetics		B									A	
Emulsions										B	A	
Skin									A			
Food & beverage												
Soft drinks								A		B		
Cacao and derivatives											A	
Wine, mustard, vinegar										A		B
Juices, canned vegetables										A	B	
Hops, beer					B			A				
Liquor								A		B		
Oil, creams, mayonnaise		B									A	
Jam		B								A		
Milk								A		B		
Yogurt, curdled milk		B								A		
Brine			B							A		
Cheese, meat, fruit		A										
Bread dough		A										
Paper/Textiles												
Paper										A		
Paper pulp or paste		B									A	
Textiles (fabrics and prints)									A			
Textiles (dyes and colorings)										A		
Leather									A			
Fur (treatment bath)				B							A	

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117 (4)	32 x 25 x 22	35 min. to 37°C	89511-420	2550.41
194 (6.85)	36 x 25 x 29	35 min. to 37°C	89511-422	2888.39
Forced Air Incubators				
66 (2.3)	28 x 21 x 22	15 min. to 37°C	89511-424	2534.37
104 (3.6)	32 x 25 x 22	30 min. to 37°C	89511-426	3339.81
178 (6.3)	36 x 25 x 29	30 min. to 37°C	89511-428	3752.52
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Assembled AVCS Kits				
Color	Cap Type	Cat. No.	Pack of 100	
Clear	Clear Ivory PTFE/Red Rubber	89239-436	59.03	
Clear, ID Patch	Red PTFE/White Silicone/Red PTFE	89239-440	78.32	
Amber, ID Patch	Blue PTFE/White Silicone, Pre-slit	10119-724	98.48	

Visit vwr.com/promotions and search **Promo Code 4906** for all options.

Offer expires 12.31.2017.

VWR Sustainability Promotion

Buy \$1000 or more from the VWR Collection of Brands on a single VWR purchase order between April 1st and December 15, 2017 and have 10 trees planted in your name through the Arbor Day Foundation.

VWR Will match that donation for a total of 20 trees planted!

Visit vwr.com/promotions and search **Promo Code 4360** for complete details.



Offer expires 12.15.2017.

Analytical Instrument & Balance Rebates

Cash in on Excellence with METTLER TOLEDO

METTLER TOLEDO

Value up to \$400

Purchase a METTLER TOLEDO balance or analytical instrument and receive a rebate of up to \$400

\$400 Rebate

Excellence Plus Balances (XPE)
Entry Level Titrators (V20/C20/G20)
Benchtop Density Meters & Refractometers
Melting Point Excellence (MP50/MP70)
Spectrophotometers



\$300 Rebate

Excellence Balances (XSE/XS)

\$200 Rebate

NewClassic Balances (MS-TS)
EasyPlus Titrators



Visit vwr.com/promotions and search **Promo Code 4011** for all options.

Offer expires 12.31.2017.

NEW Sentino® Microbiology Product Family

Buy one Sentino Pump and get one pack of 50 MicroCheck® Filter Funnels FREE!

Microbiology Testing is Now as Easy as 1-2-3

1. Select the membrane
2. Select the device
3. Select the equipment

Over \$140 value



Description	Cat. No.	Price
Sentino Microbiology Pump	10841-650	Ea./ 1436.87
MicroCheck II Beverage Monitor Filter Funnels		
0.8 µm, White	87004-340	Pk. 50/ Free
0.45 µm, White	87004-338	Pk. 50/ Free
0.8 µm, Black	87004-344	Pk. 50/ Free
0.45 µm, Black	87004-342	Pk. 50/ Free

Visit vwr.com/promotions and search **Promo Code 4717** to learn more.

Offer expires 12.31.2017.

VWR Take Back Program

Order any product from the VWR Collection Laboratory Catalog (Lit # 92690REV) or NIST Calibrated Equipment Catalog (Lit # 93301) and VWR will take back any similar product of any brand from these catalogs to be recycled.

Recycling not only transforms waste into valuable resources, but also benefits the environment on both a local and global level. The effort saves energy, prevents pollution, decreases greenhouse gases and conserves natural resources. Together we can make a difference by helping you recycle your unwanted laboratory equipment.

Visit vwr.com/promotions and search **Promo Code 4096** to learn more.

Offer expires 12.31.2017.

Free Thermo Scientific Chromatography Products



Buy \$1,000 of qualifying products for Food and Beverage Safety and get \$250 free off any Thermo Scientific Chromatography product.

Qualifying products*

- HyperSep Dispersive (QuEChERS)
- Trace Gold GC Columns
- Accucore Columns

Value up to \$250

*Promotion applies to any Thermo Scientific Chromatography-branded product available on vwr.com. To qualify, purchase a minimum of \$1,000 in Thermo Scientific Chromatography products.

Visit vwr.com/promotions and search **Promo Code 4940** to redeem.

Offer expires 12.31.2017.



designed for protection

Free Lab Safety Supplies

1. Buy five cases of qualifying VWR Examination Gloves, and get one FREE pack of VWR Protective Eyewear with Wraparound Lens, Cat. No. 89187-986.
2. Buy three cases of any VWR Protective Eyewear, and get one FREE pack of VWR Lens Cleaning Wipes, Cat. No. 89203-550.



Two Great Offers!

Visit vwr.com/promotions and search **Promo Code 4089** to learn more.

Offer expires 12.31.2017.

Thin Layer Chromatography Plates



Buy three packs of any MilliporeSigma TLC plates and receive one pack FREE!

Our MilliporeSigma TLC portfolio comprises over 170 high-quality products — each setting new standards in quality, efficiency and utility.

- Layers with unparalleled robustness and surface homogeneity
- Innovative ProteoChrom® HPTLC plates for peptide and protein analysis
- New TLC sprayer and spray solutions to help streamline work



Free TLC Plates

Visit vwr.com/promotions and search **Promo Code 4124** to learn more.

Offer expires 12.31.2017.



designed for reliability

VWR® Ultra Low Temperature Freezers

Choose one of four available limited-time packages!

1. VWR ULT Freezer with two shelves of sliding door racks
2. VWR ULT Freezer with chart recorder and two shelves of sliding door racks
3. VWR ULT Freezer with LN₂ back-up and two shelves of sliding door racks
4. VWR ULT Freezer with CO₂ back-up and two shelves of sliding door racks



Act today!

Multiple Freezer options are available, visit vwr.com/promotions and search **Promo Code 4287** for qualifying products and information.

Offer expires 12.31.2017.

MilliporeSigma Advanced Analytics Chemicals



Buy a minimum of \$500 in MilliporeSigma Advanced Analytics Products—Any Solvents, Inorganics, or Chromatography Products*, and we'll MATCH Your Purchase with Free Products!

*For complete offer details, visit vwr.com/milliporesigma.

Value of FREE product will be based on list price with a cap of \$1,500. Free product may not exceed purchased amount.



Value up to \$1500

Visit vwr.com/promotions and search **Promo Code 4169** to learn more.

Offer expires 12.31.2017.

Balance Trade-In Offer

Are the balances in your lab extinct?

Trade in your old METTLER TOLEDO (or competitor) balance and receive a 15% Total Cash Back Rebate on your new METTLER TOLEDO balance purchase through VWR!

Purchase any qualifying METTLER TOLEDO balance. 15% Cash Back based on final purchase price. Rebate may not exceed \$1,000.



Visit vwr.com/promotions and search **Promo Code 3466** for more information and to redeem.

Offer expires 12.31.2017.

Sample Preparation for the Determination of Vitamin C in Orange Juice by HPLC and UHPLC



GE Healthcare

Susan Barker, Marketing Modality Leader for GE Healthcare Life Sciences

Vitamin C or ascorbic acid is usually determined by HPLC in contract labs and the quality control labs of fruit juice manufacturers. Juice samples are often filtered prior to injection in order to remove any particles that may damage or block the columns or instrument. The adoption of UHPLC by many QC labs has increased the importance of filtration of both samples and mobile phase. It is important to consider that the size of the frits and particles contained within UHPLC columns are much smaller than on regular HPLC packings. UHPLC columns with sub $<2\mu\text{m}$ packings create a smaller interstitial radius (the space between particles in the UHPLC column) creating the potential for high backpressure and filter clogging.

The most commonly used method for analyzing juice is to filter samples for HPLC or UHPLC using a syringe filter that incorporates a membrane filter ($0.2\mu\text{m}$ or $0.45\mu\text{m}$).

Challenge: Orange juice is hard to filter

Orange juice contains a large amount of pulp and insoluble particulates which may lead to rapid clogging of the syringe filters used to prepare samples for HPLC or UHPLC. In order to reduce this risk, a centrifugation step is often added before filtration. Some labs use a series of syringe filters with different pore size membrane filters or several syringe filters in order to obtain enough sample for the analysis.

The combination of these additional processes is time-consuming and leads to increased cost of consumables.

The solution from GE Healthcare: Whatman™ GD/X™ all-in-one filter

- Saves time by reducing the number of steps in the sample preparation process
- Reduces costs by reducing the number of consumables used

The GD/X syringe filter device is ideal for use with hard to filter samples such as juice products. Three pre-filtration layers prevent premature membrane clogging and enable the processing of three to seven times more sample volume compared to single layer filters.

How does it work?

GD/X consists of multiple layers, which allows efficient serial filtration resulting in higher capture efficiency.

Larger particles are retained in the upper level of the pre-filter, preventing premature clogging of the membrane surface that can occur with standard syringe filters.

The specific combination of this high efficiency glass fiber pre-filter with a membrane of either 0.2 or $0.45\mu\text{m}$ pore size, speeds up and simplifies sample preparation.

GD/X is already a reference for hard to filter samples

GD/X filters are widely used for fruit juices, fermentation products, and in environmental testing and pharmaceutical industries.

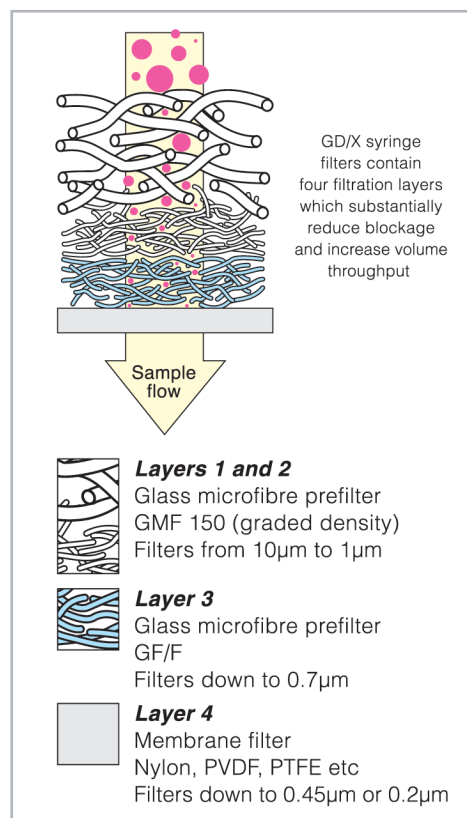
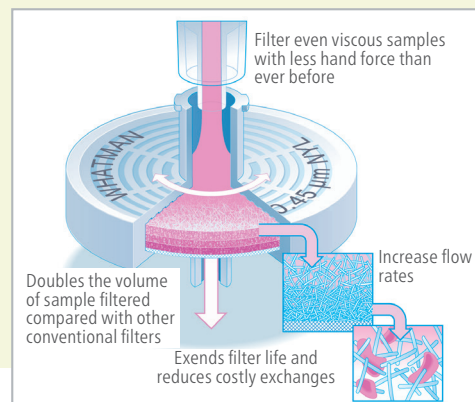
They only need to filter their sample through GD/X and often don't need centrifugation or the use of several filters.

Flexible membrane choice

GD/X is available with a variety of filtration membranes, with pore sizes of $0.2\mu\text{m}$ or $0.45\mu\text{m}$. GD/X can effectively be used for any hard to filter samples.* Supplied in packs of 150.

GD/X 25 Syringe Filters

Diameter, mm	Pore Size, μm	Cat. No.	Pack of
13	0.2	28138-102	150/ 496.14
13	0.45	28138-104	150/ 496.14
13	0.45	28138-142	1500/ 3557.50
25	0.2	28138-154	150/ 626.20
25	0.2	28138-192	1500/ 4090.53
25	0.45	28138-156	150/ 626.20
25	0.45	28138-194	1500/ 4090.53



*Not suitable for aqueous solutions. GD/X is available with different membrane types, sterile, and in 13 and 25mm versions.

GD/X and Whatman are trademarks of GE Healthcare companies.
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Thermo Scientific™ Orion™ Meters

Now's the time to enjoy the measure of confidence. Thermo Scientific Orion meters are designed to offer an easier way to test. Simple interfaces with onscreen prompts allow for easy training and consistent testing.

For Versatility in the Lab

Thermo Scientific™ Orion™ Versa Star Pro™ meter has a four channel design, allowing you to mix-and-match measurement modules as needed.

For Everyday Testing

Thermo Scientific™ Orion Star™ A210 series meters offer dedicated single and dual parameter measurement capabilities.

For a Budget-Friendly Solution

Thermo Scientific Orion Star A110 series meters offer an economical solution for single parameter measurement needs.

For an All-in-One Solution

Thermo Scientific Orion meters are available in kit versions, providing you with the electrodes, buffers, and solutions you need at a great value.



Trade-in and save up to 20%!

For a limited time, trade in your old benchtop meter and get special pricing on a new Thermo Scientific Orion benchtop meter! We'll also make sure your old meter is disposed using Responsible Recycling (R2) methods. For more information, and a complete listing of many additional available options, visit vwr.com/promotions and search **Promo Code 4797**. Offer expires 12.31.2017.

No redemption necessary, simply use these special promotional VWR catalog numbers when placing order. (available for a limited time, must be used at the time of purchase, and may be ordered via the "ORDER ENTRY" link on vwr.com. Promotional part numbers cannot be found via Search on wr.com.) For assistance with ordering, please contact VWR Customer Service at 1.800.932.5000.

Description	Cat. No.	Each
Versa Star Pro pH/ISE Benchtop Meter Kit	MP89206-392	1775.16
Versa Star Pro 2 x pH/ISE Benchtop Meter Kit	MP89206-396	2057.67
Versa Star Pro pH & Conductivity Meter Kit	MP89206-400	1857.49
Star A211 pH Benchtop Meter Durable Kit	MP89260-360	883.80
Star A214 pH/ISE Meter pH & Ammonia Kit	MP89206-334	1885.45
Star A214 pH/ISE Meter pH & Fluoride Kit	MP89206-336	2022.92
Star A214 pH/ISE Meter pH & Sodium Kit	MP89206-338	1741.17
Star A215 pH/Conductivity Benchtop Meter Kit	MP89206-342	1524.37



Spectroquant® Prove Kits for food, beverage and dairy



Your benefits

Safe & Convenient:

- Live ID provides the method and selects the right settings. Test-specific lot and expiry data are saved with each result.
- Direct insertion of round cell tests without opening any lids.



Robust & Easy-to-clean:

- Materials and design of Spectroquant® Prove are engineered to last and resistant to most chemicals used in labs.
- Removable cell holder allows easy cleaning.

Learn more at vwr.com/milliporesigma

Description	Bandwidth, nm	Light Type	Wavelength, nm	Display	Cat. No.	Each
Spectroquant Prove 100, VIS	4	Tungsten	320 to 1100	Resistive Touch Screen	EM1.73016.0001	4753.18
Spectroquant Prove 300, UV/VIS	4	Xenon Flash	190 to 1100	Resistive Touch Screen	EM1.73017.0001	7386.15
Spectroquant Prove 600, UV/VIS	1.8	Xenon Flash	190 to 1100	PSAP Glass Touch Screen	EM1.73018.0001	9496.47

BACTRON Anaerobic Chambers



Bactron systems have airtight construction of stainless steel and rigid Plexiglas for unobstructed vision and integrity. The exclusive cuffs form a comfortable seal around the operator's arms permitting bare hand manipulation of plates and specimens inside the working chamber, making work more comfortable and efficient.

Unlike anaerobic jars, which expose samples to oxygen during plating, isolation, sub-culturing, and susceptibility testing, the Bactron's are a complete workstation where samples can be prepared, incubated, and evaluated in an oxygen free environment. The user has complete access to individual samples within the incubator and may determine the presence of anaerobic bacteria at any time during incubation. In addition, increasing attention to hospital acquired infections has made quick, accurate detection of anaerobes that cause infections extremely important.

Bactron chambers have full third party verified safety compliance certificates and meet EN61010, UL61010, and Can/CSA61010 standards.

Specifications

Temperature Range:	5°C above ambient to 70°C
Temperature Uniformity:	+/- 0.5°C at 37°C



Electrical	Capacity, L, (cu. ft.)	Plate Capacity	Cat. No.	Each
110-120V; 50/60Hz; 1080W	Airlock: 14 (0.5); Working Chamber: 388 (13.7); Incubator: 34 (1.2)	300	10210-216	13,733.88
110-120V; 50/60Hz; 1080W	Airlock: 31 (1.1); Working Chamber: 498 (17.6); Incubator: 39.6 (1.4)	300	89409-530	26,147.37
110-120V; 50/60Hz; 1320W	Airlock: 31 (1.1); Working chamber: 498 (17.6); Incubator: 130 (4.6)	600	89409-534	29,998.05
110-120V; 50/60Hz; 1920W	Airlock: 31 (1.1); Working chamber: 498 (17.6); Incubator: 178 (6.3)	900	89409-536	31,536.61



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RICCA Chemical Company provides AA, ICP, Ion Chromatography, and Organic standards that meet ISO Guide 34 and ISO 17025 requirements with our line of VeriSpec Standards, guaranteeing our products are providing precise and accurate results. Spend \$500 or more on VeriSpec Standards and redeem three free products.

Certified Reference Materials Spectroscopy Standards

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- ICP/ICP-MS standards available in both single and multi-element solutions
- Products include elements required by the EPA Contract Laboratory Program plus many other elements
- Standards are NIST traceable and are manufactured with high purity solutes and solvents
- Standards are manufactured to ISO 17025/Guide 34 standards
- ISO 9001 Quality Management System
- Ion Chromatography Standards are available in both single and multi-ion solutions

Organic Standards

- Reagents for Hydrocarbons, PAH's and VOC analysis. Single and mixed component standards available
- ASTM and EPA Method Reagents

Custom Capabilities

- Custom standards available—blends, packaging and labeling!



Over 1,000 available options—
visit vwr.com/RICCA to see the VWR portfolio of
qualifying products for this exclusive offer!

Description	Size	Cat. No.	Value
Acetate Buffer, pH 4.0, for Residual Chlorine Analysis	500 mL	RC50-16	45.10
Borate Buffer, pH 9.5, for Ammonia and Organic Nitrogen Analysis	500 mL	RC104016	35.93
EDTA Titrant, 0.100 Molar (M/10)	1 L	RC273032	57.31
Sodium Hydroxide, 0.100 Normal (N/10)	1 L	RC735032	38.41
pH Test Strips, 0 – 14, 100/box	Box/100	RC8880-1 *	30.33
Turbidity Standard, 1000 NTU – Formazin	500 mL	RC8825-16 *	64.26
Turbidity Standard, Primary Standard Stock Formazin Suspension, 4000 NTU	500 mL	RC8830-16*	77.09
TISAB II with CDTA, for Fluoride Analysis using Ion Selective Electrodes	500 mL	RC867016	53.64
Water, ACS Reagent Grade, ASTM Type 1, ASTM Type 11	4 L	RC9150-1	29.90
Water, HPLC Grade, ACS Reagent Grade, Suitable for UV Spec and LC	1 L	RC9153-32	35.99
Water Hardness Buffer, Odorless	500 mL	RC9205-16*	34.49
Water Hardness Indicator, 0.5% (w/v) Eriochrome Black T in 2-Methoxyethanol	120 mL	RC93004	21.46

To redeem visit vwr.com/promotions and search **Promo Code 4976**. Orders must be placed between 4.1.2017 thru 12.31.2017; last redemption date is 1.31.2018. Promotional amount must be met on single purchase order.

*These specific products are not available in Canada. Please contact your VWR Sales Representative to learn about easy access to similar options available in your region. For assistance with ordering, please contact VWR Customer Service at 1.800.932.5000.



We put space to work.

Superior ingredients.



The ideal base solution—
Choose from multiple stainless steel shelf styles.

Just the right mix—
Configure shelving or carts to fit any process or application.



Cat. No. Series
19766-540



Cat. No.
82000-940

Premium results.



Cat. No. Series
97002-812



Maximize every inch—
Worktables to fit the task at hand.

24" DEEP NEW! Space Saver Work Tables now available

To learn more, contact your VWR Sales Representative or visit vwr.com.



designed for every day use

VWR® Sterile Sample Bags

Transport and store solids, semisolids, and liquids for environmental and carcass sampling, quality assurance procedures, and food industry applications.



- Pliant, highly resistant virgin polyethylene sterile tubing with no side seals
- Wire closure insures airtight seal, and wide-sealed bottoms provide added leakproof protection

Capacity, mL (oz.)	Thickness, mil	W x H, cm	Cat. No.	Pack of	Case of 1,000
450 (15)	2.5	11.4 x 22.9	82007-706	500/ 172.94	289.53
650 (22)	3	14 x 22.9	82007-708	500/ 208.83	349.63
1650 (55)	3	17.8 x 30.5	82007-726	250/ 131.52	457.70



designed for every day use

VWR Signature™ Aerosol Filter Pipet Tips



Natural barrier aerosol tips incorporate a special high recovery polyethylene filter that traps aerosols and prevents cross-contamination by keeping the pipettor barrel clean.

- For use with most pipettors
- Certified RNase-, DNase-, endotoxin-, metal-, and human DNA-free

Description	Volume, µL	Length, cm	Cat. No.	Pack of	Case of
Ultrafine Point Tips	100–1000	8.9	16466-008	576/ 145.32	4608/ 844.19
Bevel Point Tips	1–50	5.1	53510-072	960/ 181.21	9600/ 1383.04

Packaging: 96/hinged rack. Tips are sterile; visit vwr.com to find nonsterile tips and additional packaging and volume options.



Microflex[®] XCEED[®] Certified Ergonomic Nitrile Exam Gloves

Ergonomically designed to reduce hand fatigue

Unparalleled Comfort & Sensitivity

Offers a more comfortable, and lighter weight glove versus most other examination gloves with its less than 3mil palm thickness and our advanced proprietary nitrile formulation which delivers an increased tactile sensitivity.

Reduced Muscle Effort

Designed to reduce hand fatigue and help workers be more productive while exerting less muscle effort. As the first exam glove to earn an Ergonomic Certification from U.S. Ergonomics, an industry leader in ergonomic standards, Microflex XCEED reduces the risk of strain, which can lead to Carpal Tunnel Syndrome and other musculoskeletal injuries.

Reliable Durability

Up to 60% stronger than leading nitrile brands and up to 90% stronger than leading latex brands, this surprisingly thinner and lighter examination glove, provides reliable durability and longevity for the wearer.

Leading Protection

Offers confident protection from pinholes and other quality issues, by setting the standard with acceptable pinhole rates that are below the already stringent level set by regulatory organizations.

Protection from Type 1 Allergies

Contains no natural rubber latex or powder.

Industries

- Laboratory
- Food & beverage
- Manufacturing
- Industrial Safety
- Healthcare
- Dental
- Automotive
- Tattoo artistry

Applications

- Analytical testing
- Biotechnologies
- Dairy & food processing
- Intricate parts handling
- Laboratory analysis and testing
- Light assembly tasks
- Light-duty maintenance
- Paint & spray shops
- Patient examinations
- Pharmaceutical manufacturing
- Preparing pharmaceutical products
- Protection from blood and other bodily fluids



Specifications

Color	Blue
Length	23.5 cm (9 ¹ / ₄ "
Filtering Capacity	0.5 mL

Size	Cat. No.	Box of	Case of
X-Small	89174-538	250/ 53.43	2,500/ 443.40
Small	89174-540	250/ 53.43	2,500/ 443.40
Medium	89174-542	250/ 53.43	2,500/ 443.40
Large	89174-544	250/ 53.43	2,500/ 443.40
X-Large	89174-546	230/ 53.43	2,300/ 443.40

Packaged in value-sized boxes that are environmentally friendly and time- and cost-efficient.

Food and Beverage Solutions

Maximum Productivity and Compliance

METTLER TOLEDO

METTLER TOLEDO food and beverage solutions offer the uptime, ease-of-use, and data integrity needed to maximize productivity and achieve full compliance.

- XPE balances: Best-in-class weighing performance.
- S220 pH meter: Reliable and robust. Quick analysis, long life.
- G20S titrator: Fast and precise with intuitive operation.
- Moisture analyzers, specific gravity meters, brix meters,
- UV/VIS spectrophotometers, and service to meet your needs.



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VWR COLLECTION *designed for reliability*

VWR® Ultra Low Temperature Upright Freezers

- Temperature Range: -86 to -50°C (-123 to -58°F)
- Microprocessor temperature control system
- Advanced monitor/alarm system
- Automatic voltage compensator
- Non-CFC, non-HFCF, nonflammable refrigerants

Packages also available with shelves, racks, backup systems, and more—see page 11!



Volume, L (cu. ft.)	Electrical	Cat. No.	Each
368 (13)	120V, 60Hz	10160-724	15,034.08
368 (13)	208/230V, 60Hz	10160-726	15,041.63
490 (17.3)	120V, 60Hz	10160-728	15,235.05
490 (17.3)	208/230V, 60Hz	10160-730	15,235.05
651 (23)	120V, 60Hz	10160-732	15,573.29
651 (23)	208/230V, 60Hz	10160-734	15,573.29
793 (28)	208/230V, 60Hz	10160-736	16,250.87

VWR® High-Purity Nitrogen Generator

System is engineered to transform standard compressed air into 99.99% or 99.9999% nitrogen.

- Eliminate dangerous gas cylinders from lab
- Use for Gas Chromatography, LC/MS, ICP, and Thermal Analysis
- Non-CFC, non-HFCF, nonflammable refrigerants



Nitrogen purification utilizes pressure swing adsorption for the removal of oxygen, carbon dioxide, and water vapor. After nitrogen is purified, the gas is filtered through high efficiency coalescing prefilters and a 0.01µm (absolute) membrane filter.

Volume, L (cu. ft.)	Cat. No.	Each
UHP Nitrogen Generator	26000-008	13,977.01

Centrifuge 5920[®] R, Refrigerated Extraordinary High Capacity and Performance

Centrifuge 5920 R features a compact and ergonomic product design. It has similar dimensions as competing refrigerated 3L models and yet features a superior capacity of up to 4 x 1,000 mL, thus making it the ideal instrument for high-throughput applications. It features a powerful state-of-the-art refrigeration system with advanced temperature management to keep your samples safe.

Centrifuge 5920 R accommodates standard 1L Nalgene[®] bottles setting a new standard in the table top centrifuge segment. In contrast to other custom-made 1L bottles, the Nalgene bottle is more narrow and allows for a more visible pellet when compared to wider bottles. The higher capacity enables you to process a higher volume in fewer runs.

- Max. capacity: 108 x 15 mL, 52 x 50 mL, 8 x 250 mL, 4 x 1000 mL, or 28 x MTP, or 8 x DWP
- Fixed-angle rotors for high-speed molecular biology applications
- Very low noise level for a pleasant work environment
- Advanced bucket design with universal capacity for tubes and plates: no need to purchase separate buckets



Specifications

Speed Range	200–13,700 rpm
Electrical	120 V, 50–60 Hz
Power consumption	1,650 W
Timer	10 s to 99 h 59 min, with continuous run function, short-spin



Unique two-stop lid for easy access to samples and the rotor



Aerosol-tight Eppendorf QuickLock[®] caps and lids

Description	Maximum Capacity	Maximum RCF	Includes	Temperature Range	Cat. No.	Each
Centrifuge 5920 R	4 x 1,000 mL/4 x 7 MTP	25,062 x g	99 Programs	-11 °C to +40 °C	75874-302	13,465.00
Centrifuge 5920 R, with Rotor S-4x1000	4 x 1,000 mL/4 x 4 MTP	20,913 x g	High-capacity Buckets and Adapters for 15 mL/50 mL Conical Tubes, 35 User-defined Programs	-9 °C to +40 °C	75874-304	15,700.00
Centrifuge 5920 R, with Rotor S-4x1000	4 x 1,000 mL/4 x 7 MTP	25,062 x g	High-capacity Buckets and Adapters for 15 mL/50 mL Conical Tubes, 250 mL Bottles, and Plates; Round Buckets and Adapters for 1 L Bottles	-11 °C to +40 °C	75874-310	19,275.00
Centrifuge 5920 R, with Rotor S-4xUniversal Large	4 x 750 mL/4 x 7 MTP	25,062 x g	Buckets and Adapters for 13/16 mm Blood Collection Tubes	-11 °C to +40 °C	75874-306	15,900.00
Centrifuge 5920 R, with Rotor S-4xUniversal Large	4 x 750 mL/4 x 7 MTP	25,062 x g	Buckets and Adapters for 15 mL/50 mL Conical Tubes	-11 °C to +40 °C	75874-308	15,900.00

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