

PROFICIENCY TESTING

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October, 2017
Vilnius, Riga

The Merck logo is located in the bottom right corner of the slide. It consists of the word "MERCK" in a bold, blue, sans-serif font. The letters are slightly spaced out, and the overall color is a vibrant blue that matches the slide's theme.

Proficiency testing presentation **Overview**



1 Principle of PT and Process

2 Presentation of Merck range

3 Interpretation of Results

What is Proficiency Testing (PT)

A variety of applications



Proficiency Testing is a **product & service** combination
ISO 17025 accredited laboratories

- PT studies must be part of a quality management system
- Studies are at **planned** intervals through the year, laboratories can choose to participate in our quarterly or semi-annual PT programs, or simply purchase PT samples
- Mandatory to purchase a PT if available, if not, it is required to demonstrate that it does not exist
- Participants results are **compared** to produce the evaluation report
- Concept of “fit for purpose”

What is Proficiency Testing (PT)

Proficiency Testing – What for?

What **guarantees** can you give to ensure that your **results are correct ?**

- Validated methods
- Certified Reference Materials
- Internal QC management system
- Accreditation - **ISO/IEC 17025**

What is Proficiency Testing (PT)

Proficiency Testing – What for?

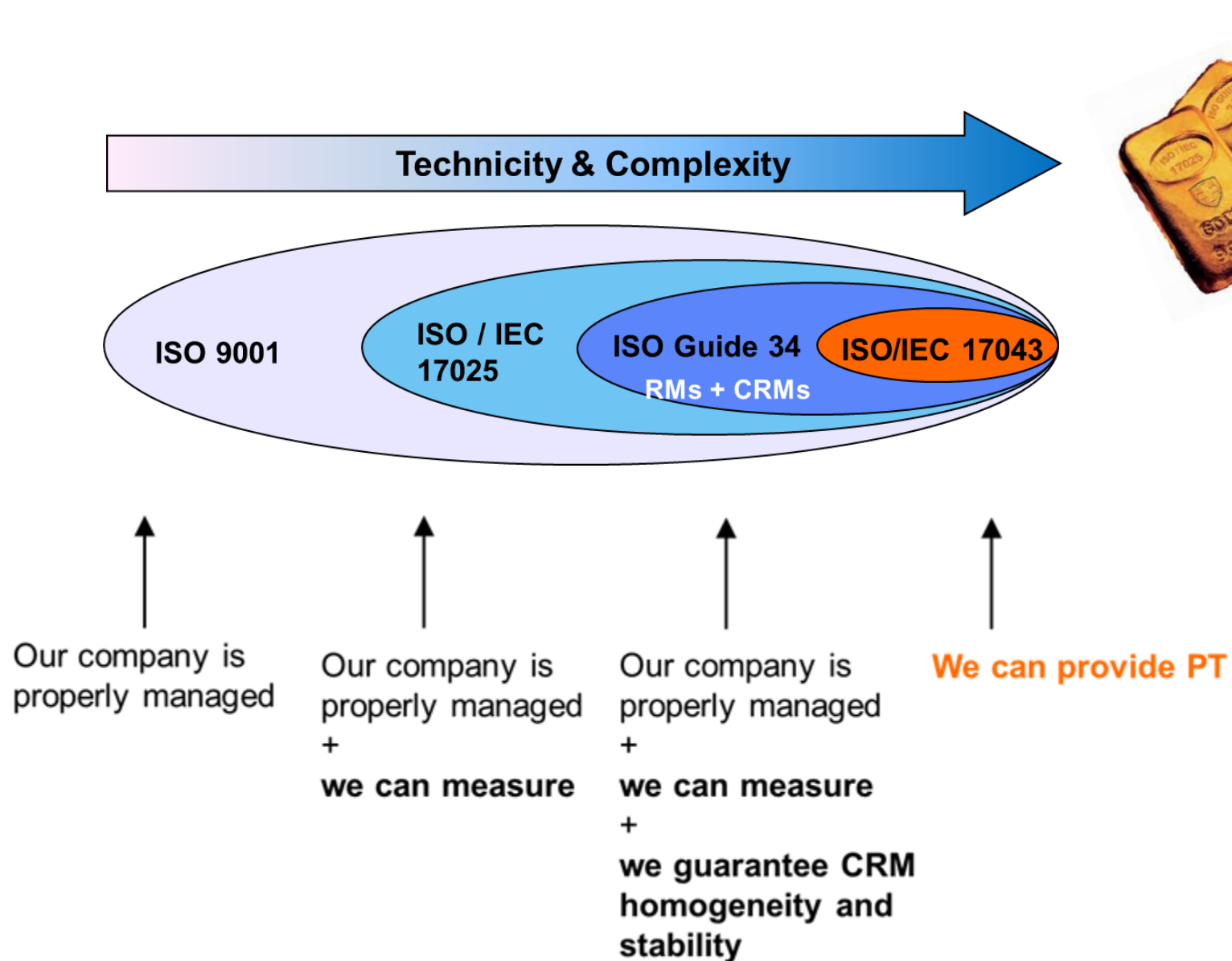
What **guarantee** can you give to ensure that your **results are correct** ?

- Validated method
- Certified Reference Material
- Internal QC management system
- Accreditation - **ISO/IEC 17025**

internal controls
is there a bias ?

Participating in PT = Control of the bias against an external reference

What is Proficiency Testing (PT) Who can provide PT?



Where do we produce reference materials?

5 global production sites with the highest standards

RT Pharma Secondary standards, matrix environmental CRMs, proficiency testing schemes

Laramie , WY, USA



Bellefonte, PA USA

Supelco Solution RMs and CRMs, mixes and customer standards

Certipur® inorganic and elemental CRMs

Darmstadt, Germany



Buchs Switzerland



Analytical standards (RMs) and CRMs, TraceCert®

Round Rock TX, USA

Cerilliant® clinical, toxicology and pharma CRMs and RMs

Quality

- ISO Guide 34
- ISO 17025
- ISO 17043
- ISO 13485
- ISO 9001
- GMP



Our current studies
The **MERCK** offering

We are a PT provider with over **20 years**
experience

Manufacture our **PT samples**
to **CRM** grade

More than **20'000** PT samples a year are
sent to over **2'500 labs worldwide**



www.sigma-aldrich.com/PT

MERCK

Our current offering for PT **Environmental samples**

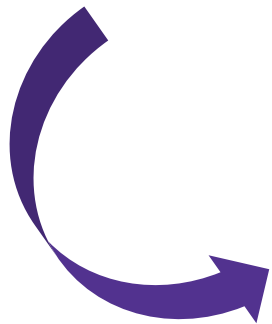
Matrices

- Drinking Water
- Waste Water
- Sea Water
- Soils
- Air

+ Range of **Matrix Modifiers**
Products list [here](#)

Analytes

- Metals
- PAHs
- Drugs
- Pesticides
- Micro-Organisms



www.sigma-aldrich.com/PT

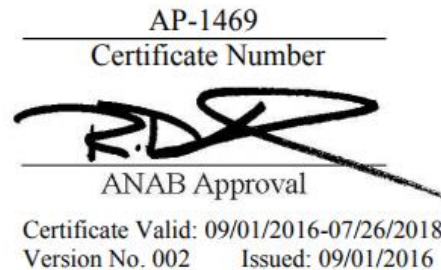
Our current studies
The **MERCK** offering

Flexibility
& **Reliability**

Participate in our PT Studies and **YOU** can choose your samples in each scheme

Our environmental laboratory proficiency testing programs are:

- accredited by ACLASS to ISO/IEC 17043: 2010 (Certificate No AP-1469)
- recognized by all accreditation bodies worldwide



	Metals and Inorganics	Organics	Gases	Physical Properties
Drinking Water (WS)	✓	✓	—	✓
WP	✓	✓	—	✓
Soils and Solid Waste	✓	✓	—	—
Air	✓	✓	✓	—
Micro	—	✓	—	—

The MERCK offering

What are our advantages?

Flexibility
& Reliability

water:

- **Matrix Modifiers** – Specific water matrix modifiers are available for hard, waste and sea water to simulate real water samples.
- **Choice of Formats** – Most RTC water PT samples are available as concentrates or ready to use volumes.

solids:

- RTC Soil PT samples behave as **real soils**, and unless there is no alternative, they are not simply spikes added to a blank soil.

supply:

- **CRMs Match PT Samples** – For every PT sample, a CRM is available.

reporting:

- **Third Party Reports** – Evaluation reports can be sent to an authorized third party at no additional cost.
- **Online Reporting** – Results can be uploaded and all PT documents can be viewed and downloaded through our secure website.
- **Certificates of Excellence and Proficiency** – Issued to laboratories that demonstrate excellence throughout the year.

Our current studies
The **MERCK** offering

Flexibility
& **Reliability**

Water Supply – Low Level (WS)

	Metals and Inorganics	Organics	Physical Properties	
WS	<ul style="list-style-type: none"> • Anionic Surfactant (MBAS) • Anions • Bromate and Bromide • Chlorate and Chlorite • Chromium VI • Cyanide (total) • Residual Free Chlorine (RFC), Silica • Trace Metals 	<ul style="list-style-type: none"> • Adipate • Pesticides • Endothall, Glyphosate • DBCP • Herbicides • PCB Congeners • Total Organic Carbon (TOC) 	<ul style="list-style-type: none"> • Phthalate • Dioxin, Diquat • Paraquat, EDB • Gasoline Additives • Organic Disinfection By-products • VOCs • Trihalomethanes 	<ul style="list-style-type: none"> • pH • Acidity • Turbidity • Colour • Oxygen Demand • Corrosivity/Sodium

116 samples to choose from
4 distribution rounds through the year

Information can be found at : <http://www.sigmaaldrich.com/PT>

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Our current studies
The **MERCK** offering

Flexibility & Reliability

Water Pollution – Mid to High Level (WP)

	Metals and Inorganics	Organics	Physical Properties	
WP	<ul style="list-style-type: none"> • Anionic Surfactant (MBAS) • Anions • Chromium VI • Nutrients • Cyanide • Demand • Minerals • Phenolics • Residues • Solids • Residues • Solids • Sulfide (Total and Soluble) • Trace Metals (Total and Soluble) 	<ul style="list-style-type: none"> • Acid Compounds • Diesel and Gasoline, Total Recoverable Petroleum Hydrocarbons • PAHs • Volatile Organic Compounds 	<ul style="list-style-type: none"> • Base/Neutrals Compounds (BNA) • Organophosphorus and Organochlorine Pesticides • PCB Congeners 	<ul style="list-style-type: none"> • pH (incl. in seawater) • Acidity • Turbidity • Colour • Volatile Residue / Fixed Solids • Odour • Tannin and Lignin

139 samples to choose from
6 distribution rounds through the year

Information can be found at : <http://www.sigmaaldrich.com/PT>

Our current studies

The **MERCK** offering

Soil and Solid Waste Proficiency Testing – **Flexibility & Reliability** Organics and Inorganics

	Metals and Inorganics	Organics	Physical Properties	
Soil and Solid Waste	<ul style="list-style-type: none">• Anions• Chromium VI• Cyanide• Metals (Soil and Sludge) Nutrients	<ul style="list-style-type: none">• BNAs• Pesticides and Herbicides• TPH/EPH (banded and speciated)*• PCB Congeners• VOAs	<ul style="list-style-type: none">• BTEX/MTBE• Diesel, Gasoline• PAHs by HPLC (Low Level)• PCBs	<ul style="list-style-type: none">• Corrosivity• Flash Point• Heat of Combustion• Oxidizer Screen• Reactivity• Solids in Soil• Specific Gravity

Sewage sludge also available

Blank soils samples CLN*

37 samples to choose from

4 distribution rounds through the year

Information can be found at : <http://www.sigmaaldrich.com/PT>

Our current studies
 The **MERCK** offering
Air Proficiency Testing

Flexibility
 &
Reliability

	Metals and Inorganics	Organics	Gases	Physical Properties
Air	<ul style="list-style-type: none"> • Method 29 <ul style="list-style-type: none"> – Metals in Impinger Solution – Metals on Filter Paper – Mercury on Filter Paper – Mercury in Impinger Solution • Method 13, 14 <ul style="list-style-type: none"> – Anion on Filter Paper – Flouride in Impinger Solution • Method 12 <ul style="list-style-type: none"> – Lead on Filter Paper – Lead in Impinger solution • Method 8 <ul style="list-style-type: none"> – Sulfuric acid in Impinger solution • Method 26 <ul style="list-style-type: none"> – HCl/Halides/Halogens in Impinger solution • Method 61/7199 <ul style="list-style-type: none"> – Chromium (VI) in Impinger solution 	<ul style="list-style-type: none"> • Method TO-4, TO-10A <ul style="list-style-type: none"> – PCBs on PUF – OCP on PUF • Method TO-13A <ul style="list-style-type: none"> – PAHs on PUF • Method 0010 <ul style="list-style-type: none"> – Semivolatiles on PUF or Sorbent Tube • Method TO-11A <ul style="list-style-type: none"> – Aldehydes/Ketones on Sorbent 	<ul style="list-style-type: none"> • Method 6 <ul style="list-style-type: none"> – Sulfur Dioxide in Impinger Solution • Method 7 <ul style="list-style-type: none"> – Nitrogen Oxide – (NOx) in Impinger Solution 	<ul style="list-style-type: none"> • Method 5 <ul style="list-style-type: none"> – Particulate Matter in Impinger Solution – Particulate Matter on Filter Paper

23 samples to choose from
2 distribution rounds through the year

Our current studies
The **MERCK** offering

Flexibility & Reliability

Microbiology Proficiency Testing

	Water Supply	Water Pollution	Soils/Solids
Microbiology	<ul style="list-style-type: none"> ▪ <i>Pseudomonas aeruginosa</i> ▪ Fungi and Yeast ▪ <i>E. coli</i> ▪ <i>Salmonella</i> ▪ Standard Plate Count ▪ <i>Streptococcus/Enterococcus</i> ▪ <i>Enterococci, Salmonella - P/A</i> 	<ul style="list-style-type: none"> ▪ Total and Fecal <i>Streptococcus</i> ▪ <i>Enterococcus, Clostridium perfringens</i> ▪ <i>Listeria</i> ▪ <i>E. coli</i> 	<ul style="list-style-type: none"> ▪ <i>Enterococcus, Streptococcus</i> ▪ Standard Plate Count ▪ <i>Legionella</i> ▪ <i>E. coli</i> ▪ <i>Salmonella</i>

32 samples to choose from
4 distribution rounds through the year

Information can be found at : <http://www.sigmaaldrich.com/PT>



MERCK
CERTIFIED REFERENCE MICROORGANISMS

The Simple Way to Ensure Accurate Results, Every Time
Vitroids™ and LENTICOLE® Discs

- Defined CFU range and low standard deviation (ISO/IEC 17025)
- Fast, reliable and easy to use



Why use certified reference materials (CRMs) in Microbiology?
Quality control is an essential element of a laboratory's quality assurance system and characterised authenticated reference materials are necessary for effective quality control. Ready-to-use microbiological controls minimise the need for maintaining control strains in the test laboratory and guarantee that an authenticated control culture is used for every quality control test.

What are Vitroids™ and LENTICOLE® discs?
Vitroids™ and LENTICOLE® discs contain viable microorganisms in a certified quantity (generally accredited according to ISO/IEC 17025), produced under reproducible conditions compliant with ISO Guide 34:2009 using authenticated strains from NCTC, NCTM and IGCN. Consisting of pure cultures of bacteria or fungi in a solid water soluble matrix, they are stable for at least one year and are in a viable state with a shelf life of 1-3 years. The within batch variation for every product is very low (in some cases less than 4% standard deviation). Each batch is provided with a comprehensive certificate of analysis that specifies the mean number of colony forming units (CFU), an expanded uncertainty about the mean, details about the method used to determine the product data and the number of passages (subcultures) from the original strain.

For Vitroids you can match these products with WDM numbers to align clearly with ISO 11120 regulations. For example, **V10005321 (VP)** relates to Vitroids "000037" is the WDM number "2" indicates the CFU range level of 50-50 du.

Applications:

- QC to assure the quality of test results (water, food, beverage, environmental etc)
- Performance testing of media, acc. ISO 11133
- Validation of new methods and method development
- Start material for proficiency testing or ring trials
- Staff training
- Starter cultures

Logos: NCPF, NCTC, IGCN, CEPT, M

MERCK

Our current offering for PT Pharmaceutical samples

20 PTs available



Program Areas	Analyte Groups	Specification, Standard Method, or Techniques to be Used	Analytes / Parameters Included
Pharmaceutical	Impurities	Various	Residue on Ignition Water Determination (Karl Fisher) Loss on Drying HPLC GC
Pharmaceutical	Identification	Various	Refractive Index Infrared Spectroscopy Melting Range/Point uv/vis
Pharmaceutical	Physical Properties	Various	pH Conductivity TOC
Pharmaceutical	Assay	Various	Titration
Pharmaceutical	Microbiology	Various	Microbial Limit Sterility Microbiological – Aerobic Count



www.sigma-aldrich.com/PT

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Our current offering for PT Complete solution for Residual Solvent Analyses

Capillary GC Columns , Pharmaceutical Secondary CRMs, Proficiency Testing and Headspace Grade Solvents

Proficiency Testing samples for Residual Solvent Analyses:

Product #	Description
PEP019	Residual Solvents Class IIA PT Proficiency Testing Material
PEP020	Residual Solvents Class IIB PT Proficiency Testing Material
PEP018	Residual Solvents Class 1 PT Proficiency Testing Material

complete solution for residual solvent analyses

There is a variety of solvents used in pharmaceutical processing. In the process of preparing a pharmaceutical product, you can potentially retain residual organic solvents in the final preparation. The trend has been to use less toxic solvents during the manufacture of pharmaceutical preparations. In this bulletin, we discuss the complete solution for residual solvent analyses: capillary GC columns, special solvents and standards.

Current guidelines published by the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) describes a list of specific solvents, along with daily exposure limits.

Certified Reference Material, Pharmaceutical Secondary standard	Order No. & Pack Size
Residual Solvent - Methylene Chloride; traceable to USP	PHR1171-1x1,2ml
Residual Solvent - Chloroform; traceable to USP	PHR1116-1x1,2ml
Residual Solvent - Benzene; traceable to USP	PHR1118-1x1,2ml
Residual Solvent - Toluene; traceable to USP	PHR1117-1x1,2ml
Residual Solvent Class II - Trichloroethylene; traceable to USP	PHR1119-1x1,2ml
Residual Solvent Class II - Acetonitrile; traceable to USP	PHR1120-1x1,2ml

Solutions for Proficiency Testing	
Product	Order No. & Pack Size
Residual Solvents Class IIA PT Proficiency Testing Material	PEP019-1g
Residual Solvents Class IIB PT Proficiency Testing Material	PEP020-1g
Residual Solvents Class 1 PT Proficiency Testing Material	PEP018-1g

These proficiency testing samples are produced in accordance with ISO/IEC 17043:2010. All information regarding the use of this material can be found in the reporting packet supplied for each sample.

Headspace Grade Solvents for the analysis of residual solvents acc. to Ph Eur and USP
Merck offers application-oriented quality that helps to achieve accurate and reliable analytical results every day. Merck solvents we specify precisely the concentrations of the various residual solvents defined in ICH guidelines. In addition, we perform a headspace application test for every batch produced. This ensures the maximum safety and reliability for daily work as well as for audit.

Extract from Certificate of Analysis:

GC/HS		
Every residual solvent of class 1 acc. ICH	≤ 1	µg/g
Every residual solvent of class 2 acc. ICH	≤ 10	µg/g
Every residual solvent of class 3 acc. ICH	≤ 50	µg/g

Suitable as solvent for the analysis of residual solvents of ICH classes 1, 2 and 3 according to Ph Eur and USP.
Formic acid and acetic acid are not detected

SupraSolv® Headspace solvents for the analysis of residual solvents according to Ph Eur and USP

Product	Packaging	Order No.
N,N-Dimethylacetamide (DMA) SupraSolv®	500 ml	1.00399.0500
	1000 ml	1.00399.1000
N,N-Dimethylformamide (DMF) SupraSolv®	500 ml	1.00202.0500
	1000 ml	1.00202.1000
	2500 ml	1.00202.2500
Dimethyl sulfoxide (DMSO) SupraSolv®	500 ml	1.01900.0500
	1 000 ml	1.01900.1000
	2 500 ml	1.01900.2500

solvents. No single column is capable of being outlined by the United States and European columns of different chemistries (2,3). We with the EP and USP methods for the analysis

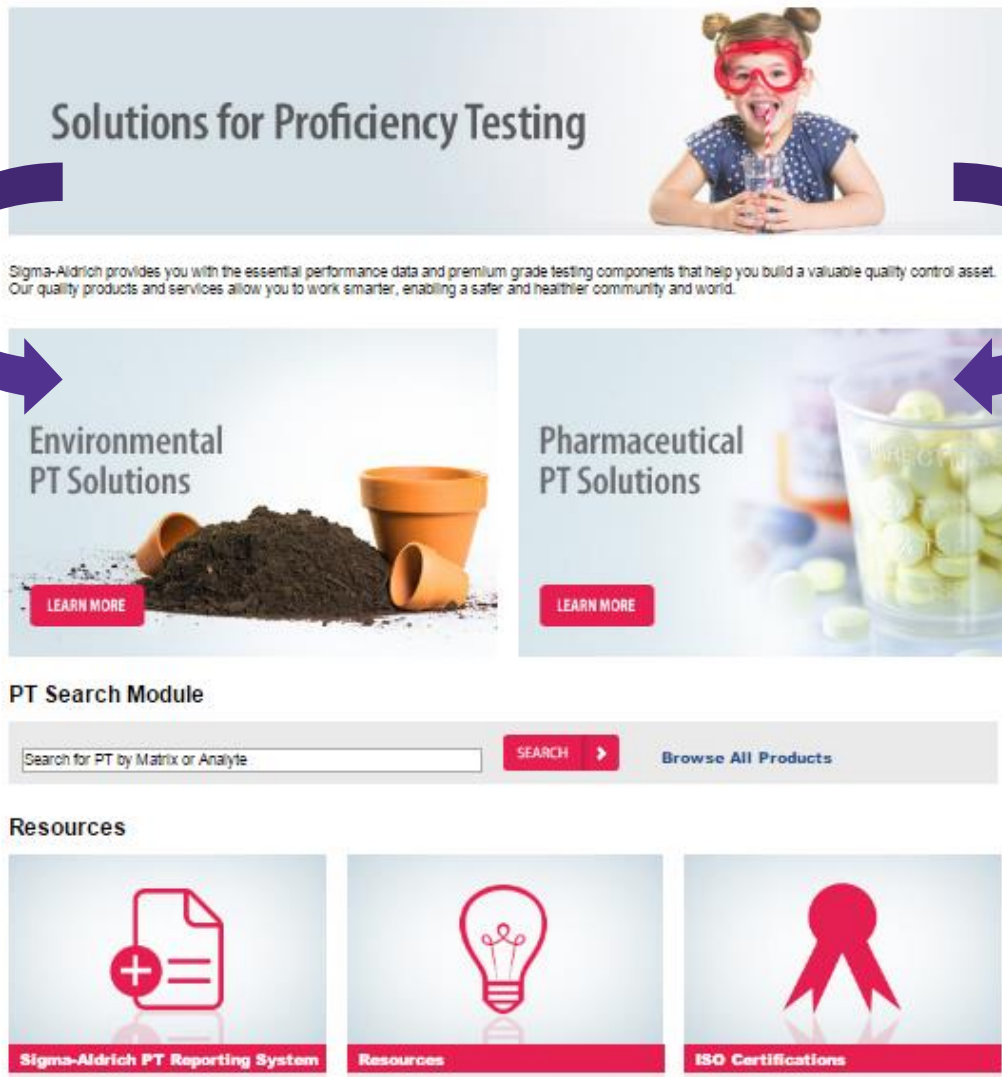
Method	I.D. (mm)/ L (m)/ dI (µm)	Order No.
<467>, Method I	0.53/10/5	28279-U
<467>, Methods EP Method 2.4.24 Primary column	0.53/10/3	25396
<467>, Method P Method 2.4.24 - secondary column	0.53/10/1	25301-U

Order No. & Pack Size
PHR1061-1x1,2ml
PHR1064-1x1,2ml
PHR1065-1x1,2ml
PHR1066-1x1,2ml
(varied) J2978-2ml
PHR1170-1x1,2ml



Our current studies

Where to find more information



Solutions for Proficiency Testing

Sigma-Aldrich provides you with the essential performance data and premium grade testing components that help you build a valuable quality control asset. Our quality products and services allow you to work smarter, enabling a safer and healthier community and world.

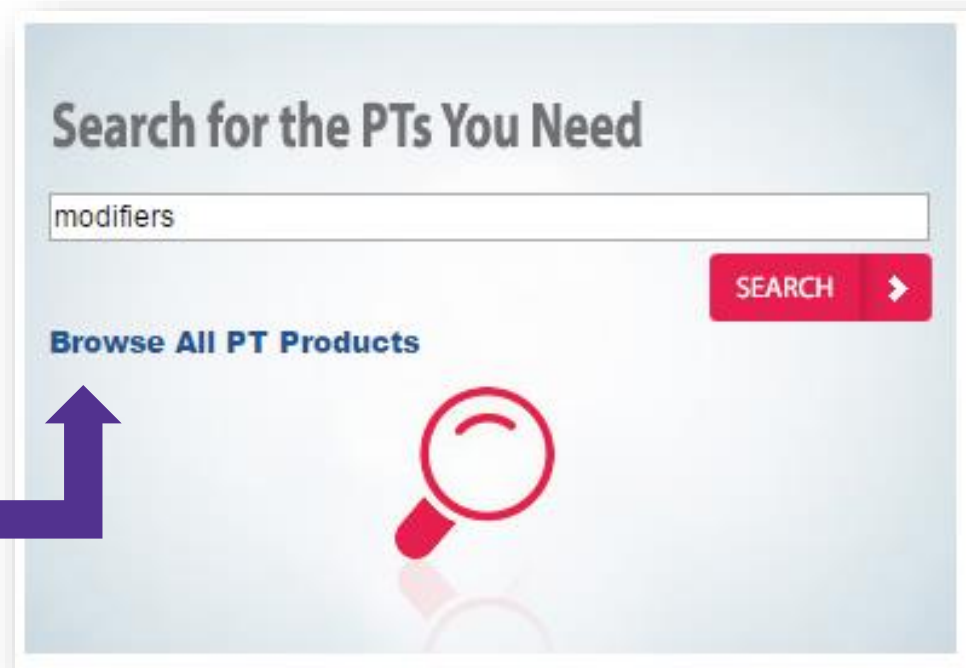
Environmental PT Solutions
LEARN MORE

Pharmaceutical PT Solutions
LEARN MORE

PT Search Module
Search for PT by Matrix or Analyte [SEARCH] Browse All Products

Resources

- Sigma-Aldrich PT Reporting System
- Resources
- ISO Certifications



Search for the PTs You Need

modifiers [SEARCH]

Browse All PT Products

www.sigmaaldrich.com/PT



PT

time to participate!

MERCK

Our PT current studies

How to register



Sigma-Aldrich provides you with the essential performance data and premium grade testing components that help you build a valuable quality control asset. Our quality products and services allow you to work smarter, enabling a safer and healthier community and world.



PT Search Module

Search for PT by Matrix or Analyte [Browse All Products](#)

Resources



<http://www.sigmaaldrich.com/PT>

Sigma-Aldrich PT Reporting System



User Login

Fields with * are required.

Email Address *

Password *

Remember me next time

Quick Guides [Reset Password](#) [Register New Account](#) [Register DMRQA](#) [System Tour](#)

<https://pt.sigmainformatics.com/>

register before ordering to obtain your **LABCODE**

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Environmental Analytical Standards Proficiency Testing

Environmental PT Process



1

Registration & Order

Prior to ordering for the first time, the lab needs to have a lab code that is obtained by registering on Sigma-Aldrich online PT reporting portal.

Environmental Analysis Proficiency Testing

Environmental PT Process



1

Registration & Order

Prior to ordering for the first time, the lab needs to have a lab code that is obtained by registering on Sigma-Aldrich online PT reporting portal.



2

Delivery

Blind samples are distributed accordingly to schedule. Each participant receives their samples.



3

Open Study

The study is open. Each lab analyzes the blind samples.

Sigma-Aldrich PT Reporting System



User Login

Fields with * are required.

Email Address *

Password *

Remember me next time

Login

Environmental Analysis Proficiency Testing

Environmental PT Process



1

Registration & Order

Prior to ordering for the first time, the lab needs to have a lab code that is obtained by registering on Sigma-Aldrich online PT reporting portal.



2

Delivery

Blind samples are distributed accordingly to schedule. Each participant receives their samples.



3

Open Study

The study is open. Each lab analyzes the blind samples.



4

Reporting

Each lab report results through the PT Portal before the study closes.

Sigma-Aldrich PT Reporting System



User Login

Fields with * are required.

Email Address *

Password *

Remember me next time

Login

Environmental Analysis Proficiency Testing

Environmental PT Process



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Reporting

Each lab report results through the PT Portal before the study closes.



5

Data Processing

Sigma-Aldrich process the data to issue each individual evaluation report.



6

Evaluation Report

Reports are sent as PDFs via the PT Portal. If specified when entering the results, we will send a copy to your accreditation body.



THE REPORT

HOW to **interpret**

MERCK

PT Report

What you can find in the report for all tested parameters

The report is sent in a PDF format and contains:

- **One evaluation report** per laboratory per study
- Assigned value
- Reported value
- **Z scores** for each reported value with our recommendation
- Accepted window
- Evaluation
- At a planned PT study, participant results are compared to produce the evaluation report, therefore you can find for all tested parameters in the report also:
 - Study Mean
 - Study standard deviation
- **Explanations** on our statistical evaluation
- Information on our PT provider accreditation

PT Report Interpretation of Results

Important Statistical Concepts

Assigned value: most often calculated from the consensus of results using **robust statistics** – ISO/IEC 17043

σ_{PT} : proficiency testing standard deviation

$$Z_{\text{score}} = \frac{(\text{Reported Value} - \text{Assigned Value})}{\sigma_{PT}}$$

External learning resource:

Eurachem guides and application notes:

<https://www.eurachem.org/index.php/publications>

PT Report Z score

Based on the Z score, we will deliver one of the following result recommendations:



Acceptable , **Questionable** or **Unsatisfactory**

If you get a warning or a fail you will be required to initiate a planned program of corrective actions to investigate

PT Report

PT Schedule - 2017

Wastewater (view product list)	
WP16-1	January 13 – February 26, 2016
WP16-2	March 23 – May 6, 2016
WP16-3A	May 11 – June 24, 2016
WP16-3B	July 6 – August 19, 2016
WP16-4	Sept 21 – Nov 4, 2016
WP16-5	Nov 23- Jan 6, 2017
WP17-1	January 18 – March 3
WP17-2	March 29 – May 12
WP17-3A	May 17 – June 30
WP17-3B	July 12 – August 25
WP17-4	September 27 – November 11
WP17-5	November 22 – January 5
Quick-Turn Study – (non-scheduled proficiency test that is available at any time)	

Drinking Water (view product list)	
WS16-1	Jan 27 – March 11, 2016
WS16-2	April 6 – May 20, 2016
WS16-3	July 13 – August 26, 2016
WS16-4	Sept 28 – Nov 11, 2016
WS17-1	January 18 – March 3
WS17-2	March 29 – May 12
WS17-3	July 12 – August 25
WS17-4	September 27 – November 11
Quick-Turn Study – (non-scheduled proficiency test that is available at any time)	

Can be found at :

www.sigmaaldrich.com/PT

<https://www.sigmaaldrich.com/analytical-chromatography/proficiency-testing/study-schedule.html>

Quick-Turn (QT) Study – On-Demand PT

When a laboratory needs to perform a PT at short notice, Quick-Turn PT rounds are available for the majority of the sample portfolio

Quick-Turns are provided for the same cost as scheduled samples

In most case laboratories use these samples for:

- Supporting new method validation
- A tool for corrective action
- To demonstrate analytical competence
- To train new staff

How Quick-Turn Works

1. Find the samples required and request they are sent as a Quick-Turn
2. Samples will be dispatched as soon as possible
3. You have 45 days from time of shipment to complete the analysis
4. If the analysis is completed quicker than the 45 days, submit your results via PT Portal.
In the day the results are submitted, the study will close
5. Within 48 hours of data submission you will receive an evaluation report

Proficiency Testing EPTIS Database

- Helps you find a Proficiency Testing Scheme for your laboratory
- Sigma-Aldrich RTC is recognized by EPTIS
- Our PT scope is regularly updated (the last update 7/28/2017)

<http://www.eptis.org/>

ID	COUNTRY	PT PROVIDER	PT SCHEME	LAST CHANGED
143316	United States	 Sigma-Aldrich RTC, Inc	 RTC Laboratory Proficiency Testing Program: Waste Water	2017-07-28
	PT provider	(Sigma-Aldrich RTC, Inc)		
143525	United States	 Sigma-Aldrich RTC, Inc	 RTC Laboratory Proficiency Testing Program: Drinking Water	2017-07-28
	PT provider	(Sigma-Aldrich RTC, Inc)		
143424	United States	 Sigma-Aldrich RTC, Inc	 RTC Laboratory Proficiency Testing Program: Soil/Sediment	2017-07-28
	PT provider	(Sigma-Aldrich RTC, Inc)		
143481	United States	 Sigma-Aldrich RTC, Inc	 RTC Laboratory Proficiency Testing Program: Air	2017-07-28
	PT provider	(Sigma-Aldrich RTC, Inc)		
143614	United States	 Sigma-Aldrich RTC, Inc	 RTC Laboratory Proficiency Testing Program: Pharmaceutical	2017-07-28

eptis

 **BAM**

Bundesanstalt für
Materialforschung
und -prüfung

MERCK

Further PT Readings

AMC technical briefs: Royal Society of Chemistry

What is PT? Guide for end-users of chemical data.

http://www.rsc.org/images/proficiency-testing-technical-brief-18A_tcm18-214885.pdf

PT: assessing z-score in the longer term.

http://www.rsc.org/images/proficiency-testing-z-scores-technical-brief-16_tcm18-214838.pdf

Understanding and action on scores obtained in PT schemes.

http://www.rsc.org/images/proficiency-testing-technical-brief-11_tcm18-214875.pdf

Robust statistic: a method of coping with outliers.

http://www.rsc.org/images/robust-statistics-technical-brief-6_tcm18-214850.pdf

Proficiency Testing Home Page:

www.sigmaaldrich.com/PT

Proficiency Testing Lab Registration Form:

<https://pt.sigmainformatics.com/RTC/index.php>

Questions?

Local sales representative or to
Zuzana Antalová, FMM EE&R+

Technical dedicated support

Ptservice@sial.com



Thank you!

