PSS

Driving GPC/SEC Forward

GPC/SEC Services

About PSS

Driving GPC/SEC Forward

PSS GmbH was founded in 1985 by 2 PhD students at the Physical Chemistry Department, University of Mainz, Germany, producing polymer standards at the University facilities. In the following years PSS expanded staff and products including tailor-made polymers, organic and aqueous GPC/SEC columns, GPC/SEC software and moved 2001 to own facilities located in Mainz, Germany. PSS-USA opened its office in 1994, operates and serves North and South American customers from Warwick, Rhode Island. To date, PSS has successfully gained leadership in the overall GPC/SEC market, making innovative contributions not only in Germany and the USA, but around the world.

PSS is fully dedicated to the advancement of macromolecular liquid chromatography, by means of materials design, synthesis, manufacturing, consulting, service, and innovative research, applying the highest standard of expertise and reliability. Our close relationship with our customers has helped us to continuously improve the quality of our products and services. Our high caliber staff, mostly chemists, is experienced, creative and trained in problem solving. Corporations, universities, and organizations in more than 60 countries use our products and profit from our outstanding service and know-how.

Certified DIN ISO EN 9001

PSS is certified (DIN ISO EN 9001:2008) to produce high quality reference polymers, GPC/SEC columns and software for the characterization of polymers by their molecular weight and their structural characteristics. PSS employs the latest findings in polymer science for the synthesis and characterization of polymers, block copolymers and biopolymers. PSS operates a manufacturing facility equipped with a complete state-of-the-art characterization laboratory at the headquarters in Mainz, Germany, fully supporting customers working under stringent requirements i.e., GLP, DIN, ISO certifications.

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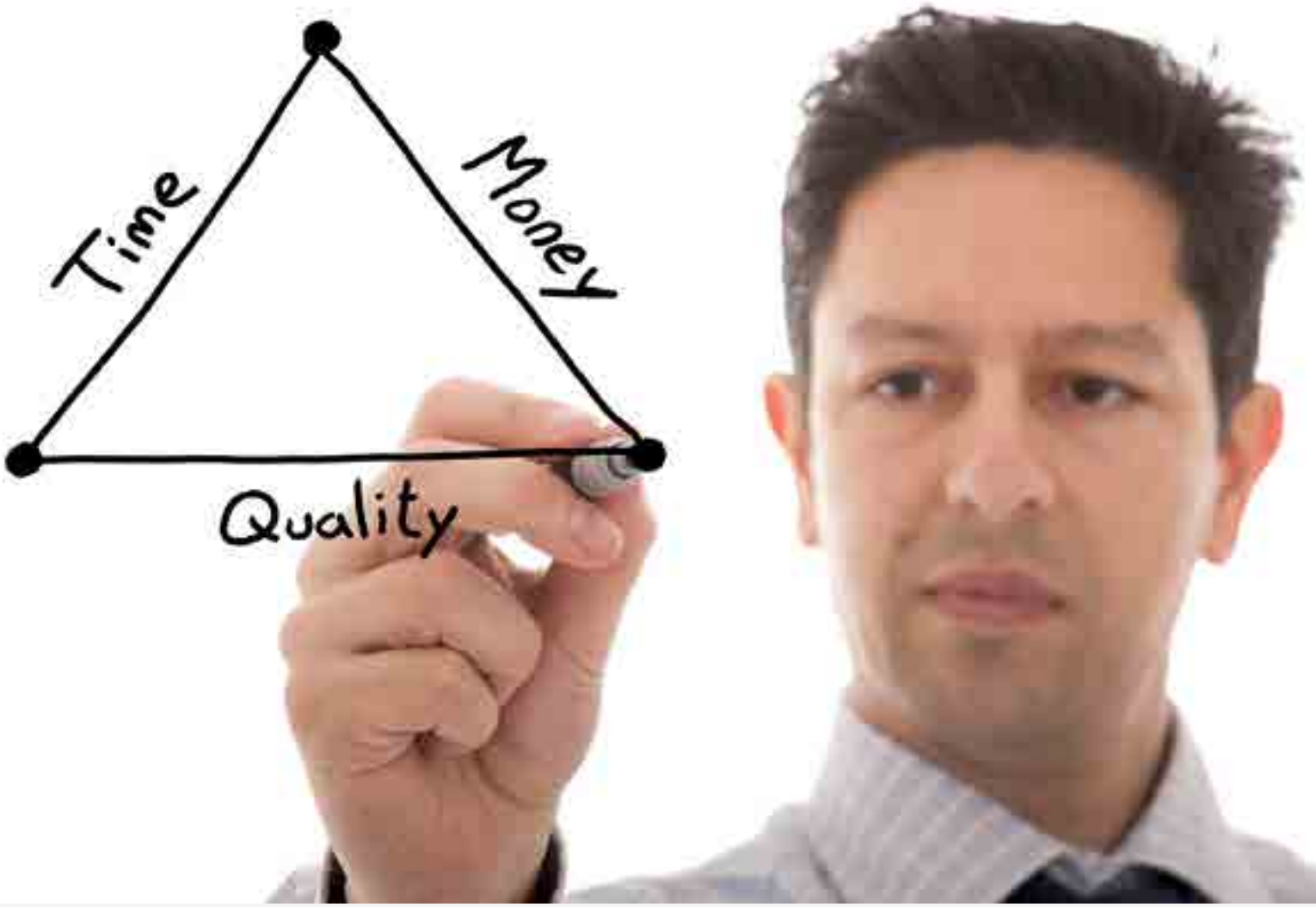


1| Polymer Testing/Macromolecular Contract Analysis

PSS provides analytical services covering all aspects of analysis, from academic research to routine quality control. At PSS analytical services division we address each sample with the highest level of care in adherence to our DIN EN ISO 9001 certification and standard methodologies.

PSS offers contract analysis and comprehensive characterization of (bio)polymers, proteins, resins, plastics and composites, including the determination of:

- Molar mass distribution and averages
- Co-monomer contents and distribution
- Co-polymer contents and blend composition
- Additives, filler materials
- Contaminants, catalyst residues, unreacted monomers and oligomers
- End groups and end group distribution
- Tacticity
- Branching
- Structure

We provide our services to a wide variety of customers, including industry, academic, commercial and government accounts in automotive, medical & pharmaceutical, food & beverage, polymers & plastics and many others.

Our team of experienced scientists and their extensive background in polymer characterization and synthesis are experts in problem-solving and product deformulation. They are able to ask the right questions at the right time and to help determine the most efficient way to achieve the desired results.

PSS uses a wide variety of methods, techniques and instruments including all kinds of hyphenated techniques. Technical details relating to specific equipment and methods can be found at **www.analyzepolymers.com.**



1.1. Quality Control

Our experts will work with you on developing meaningful methods, to identify quality criteria as well as the determination of relevant pass/fail criteria.
In addition, PSS provides special services for customers who desire to outsource their analysis. PSS can transfer existing methods and reserve exclusive instruments and column sets for the applications. Special contracts with reduced processing times are available. Outsourcing may include reporting in a customer-defined format and electronic files for customer laboratory information management systems (LIMS) for a seamless integration of our results into your environment.

Incoming Raw Material Verification

Characterization of incoming raw materials is a critical component of any good manufacturing process. A continuous monitoring program for the raw materials helps to save time and money. The PSS analytical services team can help to establish such programs and can reliably perform the required measurements – today and in the future.

Molar Mass Determination

In accordance with the requirements of each individual application, PSS employs various instrument setups, configurations and detectors to obtain molar mass averages and molar mass distributions.

Molar mass distributions

GPC/SEC is the method of choice for characterizing macromolecules by molar mass distribution. PSS offers all GPC/SEC techniques including detector hyphenation:

- Conventional GPC/SEC with RI, IR, UV, DAD/PDA, ELSD (and combinations)
- GPC/SEC-Light Scattering (MALLS/RALLS)
- GPC/SEC-Viscometry
- GPC/SEC-Light Scattering-Viscometry (Triple/Triple plus detection)
- GPC/SEC-ESI-MS

PSS provides GPC/SEC in a variety of solvents at temperatures up to 155° C. The analysis fee for the first sample includes calibration, validation and verification of the system according to the PSS quality conditions. Calibration with customer's choice of calibration standards is available.

Molar mass averages

In addition PSS offers methods to determine molar mass averages only. Batch static multi angle laser light scattering (MALLS) is the method of choice for determining the molar mass weight average, Mw. Precise data evaluation requires the knowledge of the sample refractive index increment, dn/dc.

PSS provides light scattering Mw determination in a variety of solvents, with or without dn/dc determination using dedicated dn/dc instrumentation at temperatures up to 80° C.

Other methods for molar mass average determination offered by PSS are Maldi-ToF, ^{1}H-NMR, vapour pressure osmometry.

Quantitative Analysis

Chromatography for the efficient separation of the components of a mixture combined with identification and quantification is one of the specialties of PSS. Depending on the application PSS utilizes various separation techniques and suitable detection methods for substance identification and quantification. In addition to the quantitative determination of low molecular weight molecules such as residual monomers, residual solvents, antioxidants, light stabilizers, plasticizers, lubricants, identification is available by fractionation combined with MALDI-ToF, ESI-MS or FTIR.

1.2. Stability Testing/Polymer Failure Analysis

Polymer characteristics and quality for an application depends on different sample and material related properties. The molar mass distribution, the composition, end groups and additives (amongst other properties) determine if the raw material is suitable for processing and the application of the material.
In case of a failure, PSS works with you to determine the cause and provides insight to successfully resolve the problem.

Molar Mass Determination

PSS provides GPC/SEC in a variety of solvents at temperatures up to 155° C.

The analysis fee for the first sample includes calibration, validation and verification of the system according to the PSS quality conditions. Calibration with customer's choice of calibration standards is available.

The basic GPC/SEC setup includes either refractive index (RI) detection or infrared (IR) detection (High Temperature GPC). This setup is sufficient for comparison with a control sample.

Depending on your requirements additional detectors can be added to the system to increase the information content , e.g. for the determination of absolute molar masses or the chemical composition distribution.

Sample Comparison and Degradation studies

Failure analysis of polymers can benefit from the comparison of the molar mass distribution for a "good product" compared to a "failed/bad product". A standard GPC/SEC process is usually the fastest and best approach for these results. This method is also applied for degradation studies including visual and numerical sample comparison.

Additive/Fillers Analysis

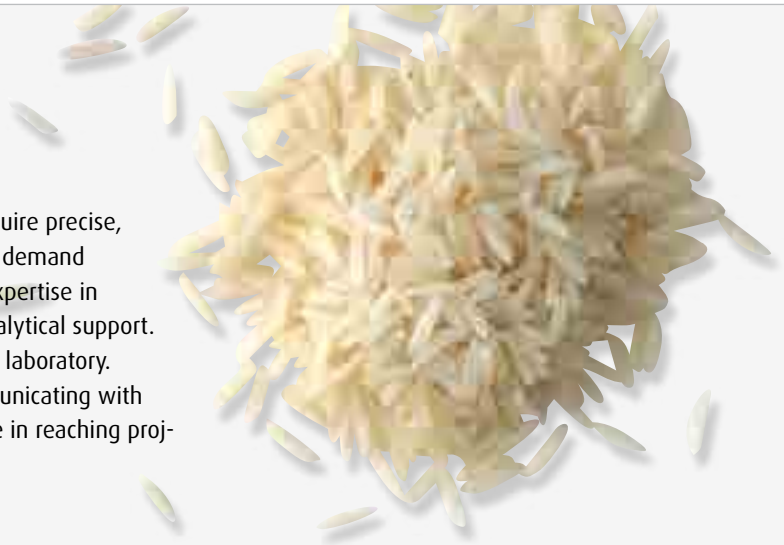
The properties of polymer products are influenced by the inclusion of appropriate additives. Quality control, failure testing, and specification testing involves the evaluation of the additives in fully formulated polymer systems. Additive analysis can verify that the intended additives are present in the desired concentration. In addition it is possible to monitor the amount of additive as a function of time and environmental exposure.

PSS additive analysis capabilities include:

- Comprehensive additive identification in solid polymer and plastic materials
- Additive leaching studies for food/pharmaceutical contact and food/pharmaceutical packaging projects
- Identification and measurement of trace impurities and contaminants

Some Examples of Polymer Additives Testing include:

- Antioxidants
- Antimicrobials
- Crosslinking agents
- Dispersing agents
- Dyes
- Fillers and Fibers
- Flame retardants
- Light stabilizers
- Lubricants and Waxes
- Plasticizers
- Slip agents
- Stabilizers



1.3. Polymer R&D Analysis

New, complex structured, and high-tech macromolecules require precise, reliable and accurate characterization. Realizing the growing demand for advanced macromolecular characterization and limited expertise in services for these applications, PSS offers state-of-the-art analytical support. Challenges of macromolecular analysis are faced daily at our laboratory. Since our experienced staff devotes time and effort in communicating with customers to identify their specific needs, a high success rate in reaching project objectives is achieved.

Product Deformulation/Deformulation Analysis

Also known as reverse engineering, deformulation is the separation, identification and quantification of ingredients in a formulation. Deformulation analysis uses a combination of analytical methods and conventional extraction methods to identify and quantify the components of a complex mixture.

This service involves an initial consultation with our analytical services staff to determine the most effective analytical methods to use. Please note that product deformulation of commercial products is provided for informational purposes only.
PSS recommends review of patents, state and federal laws before this information is used.

Substance Identification/Additive Analysis

Quantitative analysis of low molecular weight molecules such as residual monomer, solvent, antioxidants, light stabilizers, plasticizers, lubricants can be done using on-line techniques, also with a dedicated focus on the analysis of additives.

Many known additives are in stock at PSS sample testing department to be used as reference material for customer analysis. The PSS additive database supports fast and reliable information retrieval.

Structure/Branching Analysis

Branching of polymer chains strongly affects the physical polymer properties. Long chain branches increases polymer strength, toughness, and the glass transition temperature. PSS determines long-chain branching using GPC/SEC combined with viscometry and/or multi angle light scattering.

Polyethylene (PE) short chain branching is investigated using HT-GPC with IR detection.

Determination of Mark-Houwink parameters is used for structure analysis.

1.4. Analysis based on Regulations & Standards

REACH Polymer Status

Under the registration, evaluation and authorization of chemicals (REACH) Regulations (EG) no. 1907/2006 the producer, manufacturer or importer of chemical substances/formulations have to register their products (> 1 ton/year) at the chemical agency. In the context of REACH, Polymers are substances, defined under article 3, No.5, as "special" substances, based on their composition and structure. The preferred method to identify whether a substance falls under the definition of a polymer is GPC/SEC.

PSS provides GPC/SEC in a variety of solvents at temperatures up to 155° C.

For room temperature applications ESI-MS can be applied. On request PSS provides also the peak area calculation required by REACH.

Product Registration

PSS provides characterization data for regulatory submissions, stability or product release testing. Calculation of the percentage of a given molar mass (eg. < 500 g/mol) from the molecular weight distribution is usually requested for product approval in the USA and Canada. Additives and stabilizers can be separated from the polymer and a quantitative determination of these compounds is possible. The analysis report lists all relevant parameters of the measurement and documents the sample preparation.

Analysis based on International Standards/Monograph Testing

PSS provides ASTM, ISO and EN standard tests for the characterization of plastics and polymers.

Examples are

ASTM D3418/E1356
ASTM E1131
ASTM D2238 -92 (2004)
ASTM D4001 - 93 (2006)
ASTM D5227 -01 (2008)e1
ASTM D5296 -05
ASTM D5591 -98 (2004)
ASTM D6042 -09
ASTM D6953 -03
ASTM D7210 -06
DIN EN ISO 4288
DIN 53122-2
ISO 11357
ISO11358
Migration test EC 282-2008

Pharmacopeia Analysis

The demand for the analysis of raw materials according to pharmacopeia methods has increased dramatically. Analysis according to pharmacopeia methods is a complex operation requiring access to a variety of equipment. PSS performs GPC/SEC pharmacopeia methods according to the European Pharmacopoeia (EP), the United States Pharmacopeia (USP), the British Pharmacopoeia (BP), the Japanese Pharmacopoeia (JP) and others. PSS also utilizes customer specified and proprietary methods.

Examples for EP/USP analysis amongst many others are:

- Glycerol
- Gelatin
- Heparin/Enoxaparin Sodium
- Chondroitin Sulfate
- Hydroxyethyl starch (HES)
- Insulin
- Dextran

Analysis based on Customer Standards

PSS can transfer existing methods and reserve exclusive instruments and column sets for these applications. If you have confidentiality requirements, we routinely deal with these situations and will promptly process this after receipt. Special contracts with reduced processing times are available. Outsourcing may include reporting in a customer-defined format and electronic files for customer laboratory information management systems (LIMS).

2| Method Development

A robust method is the key to reliable, consistent, accurate and precise results. PSS is fully dedicated to the advancement of macromolecular liquid chromatography, by means of materials design, synthesis, manufacturing, consulting, service, and innovative research, applying the highest standard of expertise and reliability. PSS therefore offers services to help you to identify and optimize the best method for your analytical requirements.

2.1. Column Selection Service

PSS will facilitate column selection when clients are researching alternative GPC/SEC columns or look for columns for new products, which have not been subject of a PSS GPC/SEC application.

PSS will select the suitable stationary phase material and perform a GPC/SEC test to document the column performance with the customer samples (1-3). The test report also includes a solvent recommendation.

PSS will measure the sample charging a fee, if the test is successful. The fee will be credited to the purchase of a column set. **P/N 899-0012**

2.2. Method Development

PSS experts will work with you one-on-one to determine your goals and design the appropriate project to meet those goals.

Various aspects of methods development are covered:

- Evaluation and documentation of a column selection
- Establishing a GPC/SEC method (conventional, 2D, LAC under critical conditions, Polymer-HPLC,...) with optimized detection (light scattering, ELSD, viscometry, FTIR, ...)
- Trial testing to demonstrate method robustness and to validate the application

- Complex protocol development under GMP/GLP requirements/methodologies typical of the pharmaceutical industry (optional)
- Integration of other characterization methods (optional)

PSS will provide a project plan that may include several phases, depending on the project's progression.

2.3. Method Validation

After a successful method development, PSS has capabilities to validate analytical methods. A practical approach coupled with sound scientific expertise in the field of macromolecular characterization allow to determine and document

- Range (Accuracy, Linearity and Precision)
- Limit of detection
- Intermediate precision
- Robustness

and other parameters in accordance with national and international GPC/SEC standards and guidelines.

2.4. Method Transfer

After successful implementation of the method, PSS will assist you in transferring the analytical method into your laboratory. Our staff can deliver all instruments and components, install & validate the system, and train you how to perform the analysis.

2.5 Consultancy

PSS can offer consultancy services in the following areas of macromolecular science:

Synthesis:
- Polymerization and polymer synthesis
- Synthesis of speciality polymers
- Polymerization techniques

Characterization:
- Polymer analysis and characterization
- Scattering techniques
- Molar mass determination
- Mass spectrometry of polymers
- Processing and interpretation

3| Custom Synthesis/Customized GPC/SEC Solutions

3.1. Custom Synthesis/Polymers on demand

PSS employs various polymerization techniques to synthesize multiple kinds of specialty polymers, polymer particles and polymer networks:

- Homopolymers
- Copolymers (e.g. block copolymers, random copolymers, terpolymers)
- Branched polymers/copolymers (e.g. star polymers, comb polymers, graft copolymers, dendrimers, hyperbranched polymers)
- End-functionalized polymers and macromonomers
- Deuterated polymers/copolymers
- Polymer networks

PSS uses all types of polymerization techniques including controlled and living techniques:

- Controlled (living) ionic polymerization (anionic, cationic)
- Radical polymerization (ATRP, RAFT, conventional radical)
- Suspension polymerization
- Emulsion polymerization

We commonly perform synthesis ranging from small laboratory scale (1 g) to larger quantities (5 kg) or more.

A selection of specialty polymers is already available. Others are produced on request.

3.2. Custom Programming

With more than twenty years of experience in macromolecular characterization, PSS has set the standard for scientific software that is flexible, powerful and easy to use.

PSS offers with WinGPC Unity a software package for all methods in liquid chromatography, including GPC (SEC, GFC), LAC, Polymer HPLC, and 2D Chromatography.

Dedicated software modules and true scalability allow you to grow at your pace in any way you choose. Various versions are available to meet your needs, market-wide compatibility allows to capitalize on previous investments.

WinGPC was developed and continuously updated using customer input management. Based on the practical experience of our customers and the PSS experts a solution supporting the workflow in the lab has been established. Regularly users meetings and a close relationship with our users guarantees development of efficient software tools and functions allowing to save time and mouse clicks, which increases productivity and ease of use.

PSS regularly integrates new detectors, new methods or enhanced calculation routines into WinGPC enabeling you to keep pace with new developments and making your solution future-proof.

In addition our team of polymer scientists, software engineers and programmers also assists you when looking for customized solutions.

Custom programming may include:

- Adding dedicated evaluation tools into WinGPC Unity
- Adding calculation algorithms into WinGPC Unity
- Adding instrument control for new detectors and systems
- Adding import/export formats for sample lists, files, results
- Creating Custom Reports
- LIMS Integration

4| Instrument and Software Services/ Compliance Services*

GPC/SEC is not HPLC, although the analysis can be done using HPLC equipment. However, different requirements for solvents, instrument performance, column specifications, data treatment and results interpretation need dedicated solutions. PSS' sole commitment to elucidate the true nature of macromolecules makes us the ideal partner in the field of (bio) polymer characterization.

4.1. Instrument Configuration

PSS will help you configure the instrumentation and informatics solution required for the target polymer characterization systems, regardless of the complexity of the task.

PSS has the ability to either provide a fully-integrated turn-key GPC/SEC system or using elements existing in your lab. We will design an instrument configuration that optimizes use of your existing resources. Each installation and configuration is tailored to meet the unique requirements of our customer, from use in a single workstation to access across a networked, worldwide enterprise.

4.2. Support Contracts

Preventive Maintenance Contracts
PSS performs on-site preventive maintenance on client instruments to maximize uptime and to extend the instrument life-time. PSS uses predefined checklists of preventive maintenance procedures under true GPC/SEC conditions for consistent service from laboratory to laboratory.

The package includes:

- Timely alert if a maintenance is due.
- Careful system check and maintenance of all models
- GPC/SEC test runs including GPC/SEC column checks
- Software tests
- Comprehensive documentation **P/N 899-0010**

* only available in selected countries

Preferred Software Support
The PSS premium software support includes

- Telephone assistance from highly trained professionals for WinGPC Unity MCDS
- Enhanced e-mail, internet, and fax support
- Remote maintenance on customer PC's
- Guaranteed response time
- Free updates, patches and service releases
- 20% discount for all PSS trainings and on-site courses

P/N 899-0009

Relocation Services
Minimize the impact of moving, protect your investment, and resume operations quickly and efficiently. PSS relocation services includes cabling, wire testing, relocation, and startup capabilities. **P/N 899-0023**

4.3. Compliance Services IQ, OQ/PV

Make sure that your GPC/SEC instruments comply with GPC/SEC standards and have your system validated from GPC/SEC experts. PSS offers a complete compliance program including comprehensive documentation. A suite of services is available, to maintain the highest level of operation.

PSS compliance services take into account the various phases of an instrument's life cycle and include

Installation Qualification (IQ) with:

- Qualification and documentation of shipment completeness
- Installation by qualified professionals with GPC/SEC background
- Standards and procedures to document that hardware and software is installed correctly
- Comprehensive verification and validation tests for WinGPC Unity MCDS

Operational Qualification (OQ)/Performance Verification (PV) with:

- Verification and documentation of the system's ability to meet specified criteria
- Procedures and documentation that meet the requirements of GLP, ISO 9000, and other regulatory agencies
- Meaningful, relevant, and understandable GPC/SEC tests with PSS EasyValid
  (holistic GPC/SEC system suitability test)

Performance Qualification (PQ) with:

- Assistance and support through experienced analytical chemists
- Consulting

All Compliance Services are completely customized and organized in close cooperation to meet your individual requirements. Based on the your configuration PSS will recommend tests and criteria. **P/N 899-0021**

5| Education & Training

In accordance with our commitment to provide our customers with only the highest quality products and services, we offer the PSS education & training program. For more than 25 years PSS has provided dedicated method training courses, software training and on-site courses. PSS programs provide the tools and know-how to increase efficiency and effectiveness in daily routine for a wide variety of GPC/SEC users and applications.

All PSS courses are tailored to cover theoretical sessions and course practicals (exception: webinars). They are given by experienced polymer chemists with expertise in polymer characterization. In the practical sessions small workgroups (2-5 people) discuss with their own tutor special applications and questions.

5.1. GPC/SEC Basic Training (Webinars, Theory & Practice)

This training course provides theory, lectures and practical sessions for modern analysis of macromolecules using gel permeation chromatography (GPC), also known as size exclusion chromatography (SEC), and all related techniques.

After successful participation each attendee should be able to obtain reliable results, to qualify the condition of the analytical system and the separation columns, and to optimize the application conditions and the work flow in the lab.

Who should attend?

- Analysts and researchers who currently use GPC/SEC
- Researchers who plan to use GPC/SEC in a laboratory
- Scientists working in the field of characterizing macromolecules

Theory and Practice: **P/N 899-0022**
Webinar: **P/N 899-00web**

5.2. Viscometry/Light Scattering Hands-on Training

For clients interested in a hands-on training including live measurements with the instruments, PSS offers a 2-day viscometry/light scattering hands-on training. This training course covers all aspects for working with advanced detection methods and instruments for the determination of molar masses, sizes, and structures of macromolecules and biopolymers in solution.

Who should attend?

- All scientists working with techniques to determine the molar mass and the size of polymers in solution.
- Scientists interested in adding molar mass sensitive detection to their equipment.
- Users of light scattering and viscometry detectors (triple detectors) independent on the brand.

Visco/LS Hands-on: **P/N 899-0025**

5.3. Software Training

PSS software training courses are designed to give users of the Macromolecular Chromatography Data System (MCDS) PSS WinGPC Unity a strong introduction to make a targeted and efficient use in the lab. Each course offers lectures and practical sessions given by experienced polymer chemists with extensive knowledge about chromatography and WinGPC Unity.

Five different one-day training courses are available, each of them can be booked separately.

	P/N	Requirements
WinGPC Unity Basic training	899-0029	
WinGPC ReportDesigner^{plus}	899-0030	
WinGPC software modules viscometry and light scattering	899-0031	Participants should be familiar with the basic WinGPC features and functions. Previous attendance of the WinGPC Unity software training course (P/N 899-0029) is recommended, but not required.
WinGPC SystemPilot	899-0032	
WinGPC Compliance Pack	899-0033	

Who should attend

- Analysts and researchers who currently use WinGPC Unity
- Researchers who plan to use GPC/SEC in the laboratory
- IT professionals responsible for CSV (computer system validation) and users responsible for validation

5.4. Tailored on-site Courses

More and more companies are realizing the value of bringing tailored training on-site. PSS offers on-site courses for 1 or 2 days. The program of the course is completely customized and organized in close cooperation with the participants.

Potential subjects may be:

- Key concepts in polymer synthesis and liquid chromatography techniques (GPC/SEC/HPLC)
- Fundamentals of GPC/SEC, separation mechanism, objectives
- Experimental set-up and parameters
- Modern GPC/SEC column trends, column selection
- Best practice in GPC/SEC
- Method development
- Instrument qualification
- Calibration methods
- Detection systems
- How to be more successful and productive in GPC/SEC
- Novel approaches in copolymer analysis, multidetection and coupling with hyphenated techniques
- Tips&tricks for WinGPC (Unity) software
- Tips&tricks for applications
- Troubleshooting

on-site GPC: **P/N 899-0005 (1-4 persons)**
P/N 899-0014 (5-9 persons)

Program, dates and registration forms for all courses can be found at:

www.polymer.de/services/education-and-training

6| Macromolecules are everywhere!

And we know macromolecules!

25+ year's track record of thousands of samples of natural or synthetic polymers and biopolymers has earned PSS the claim for "authority" in the field of macromolecular analysis. PSS has tested virtually all available polymers from DNA, enzymes, gelatins, starches, polysaccharides, peptides, proteins, lignins, polyolefins, polyesters, polyurethanes, rubbers, nylons, methacrylates and acrylates, cationic and anionic polymers, polysiloxanes, resins and many others.

Unlike others the PSS' focus is exclusively on macromolecules.

PSS employs various separation techniques from

- GPC/SEC/GFC
- Polymer-HPLC, Liquid adsorption chromatography
- Liquid adsorption chromatography under critical conditions
- 2-dimensional chromatography including HT-GPC

and comprenehsive detection, e.g.

- Light scattering, viscometry, Triple plus detection
- FTIR
- MALDI-ToF, ESI-MS
- NMR

New methods and detection techniques are integrated continuously into our portfolio.

Technical details and a comprehensive description of all the methods and detectors used can be found on our website:

www.analyzepolymers.com

Supplies and Services for Comprehensive Characterization of Natural and Synthetic Macromolecules

Reference Polymer Standards

- GPC/SEC Standards and Kits
- Certified Reference Materials
- MALDI Kits
- Viscosity & Light Scattering Validation Kits
- ReadyCal Kits
- Deuterated Polymers
- Tailor made Polymers and Copolymers

Software

WinGPC UNITY MACROMOLECULAR CHROMATOGRAPHY DATA SYSTEM

- Light Scattering Module for LALLS, RALLS, TALLS, MALLS
- Viscosity Module
- Copolymer Module
- End-group Analysis Module
- 2-dimensional Chromatography Module
- Heparin Module
- LAN/Server Solutions
- Compliance Pack

PoroCheck SOFTWARE FOR PORESIZE ANALYSIS AND INVERSE GPC/SEC

Analytical services

- Molar Mass Determination
- Branching/Structure Information
- Method Developement and Transfer
- Complete Product Deformulation
- Consulting

GPC/SEC Columns

- For all Organic Eluents
- For all Aqueous Eluents
- For High and Low Molecular Weight Synthetic and Bio-Polymers
- For Micro GPC/SEC up to Preparative Jobs
- HighSpeed Columns for fast Analysis

GPC/SEC Instruments

- Complete Systems and Components
- Light Scattering Detectors
- Viscosity Detectors
- dn/dc Instrumentation

GPC/SEC Schools and Support

- Full Services from Installation to Validation, Operation, and Repair
- GPC/SEC and Software Training Schools
- GPC/SEC In-house Training
- User Meetings
- NetCommunity with Application and Publication Downloads

your local distributor

www.polymer.de