

Innovative Sample Preparation Tools for Proteomics and Analytical Laboratories

Pressure BioSciences, Inc. 14 Norfolk Ave., South Easton, MA 02375

NASDAQ:PBIO

PULSE Tubes: Disposable Sample Containers for Tissue Lysis

Tissue lysis by pressure cycling technology (PCT) process offers efficient hands-free sample preparation methods while protecting samples from cross-contamination and users – from potential exposure to a hazardous sample material. High pressure treatment not only facilitates sample lysis and extraction, it facilitates concurrent pathogen inactivation, when processing of extremely hazardous samples is required.

PULSE Tubes are specialized sample containers designed for processing tissue samples and cell suspensions in the Barocycler instruments.



PULSE Tube FT-500

PULSE Tube FT500-ND

PCT MicroTubes and MicroCaps



Inert fluoropolymer sample containers offer low analyte binding and wider range of operating temperatures ranging from -200 °C to +250 °C. Ergonomic tube size is fixed, while three versions of the caps provide a choice for sample volume and an optional gel cutting functionality.

PCT MicroTube Adapter Kit and The Workstation



PCT MicroTube Adapter Kit allows to place up to 48 sample containers into the pressure chamber of the Barocycler NEP 3229. The MicroTube cartridges keep the tubes tightly closed during pressure cycling and permit derivatization reactions at the temperatures above the boiling point of the solvent. The Kit contains convenient Workstation trays, capping/decapping tool and the MicroTube rack system for compatibility with the micro-titer plate liquid handling equipment.

Pressure BioSciences Inc. (PBI) focuses on development of specialized products for biological sample preparation that utilize alternating ultra-high hydrostatic pressure – pressure cycling technology (PCT). PCT is a fundamental thermodynamic process which destabilizes molecular interactions by rapidly and repeatedly raising and lowering pressure in the reaction vessel from atmospheric to levels of up to 45,000 psi. PCT offers the ability to solve difficult and complex sample preparation problems that are bottlenecks – even barriers – to important new discoveries in genomics, proteomics, lipidomics, and drug metabolism studies. Pressure cycling equipment and auxiliary tools such as the Shredder homogenizers have been shown to facilitate more quantitative extraction and more efficient digestion of hydrophobic membrane proteins and rapid enzymatic removal of N-linked glycans. Moreover, the ability of pressure cycling to differentiate between cells or subcellular structures of different composition and structural integrity facilitated the phenomenon of “differential lysis”, a process used for step-wise extraction of analytes from heterogeneous tissue samples or isolate intact and functional organelles, such as mitochondria. Here we present an overview of PBI sample preparation products.

The PCT Shredder and The SHREDDER SG3 – Gentle Mechanical Homogenizers

Low energy tissue homogenization results in extraction of high quality analytes without cavitation and shearing of long biological macromolecules. Several versions of disposable containers are available for optimum processing of various sample types.



Pressure cycling Technology (PCT) Sample Preparation Systems

Pneumatic system
Pressure range: 5,000 – 35,000 psi
Extended range: 5,000 – 45,000 psi
Capacity per load: 1 - 12 samples
Sample containers:
PULSE Tubes FT-500, FT-500 ND, FT500-PSR, PCT MicroTubes
Optional temperature control (-10 to 65°C)



Barocycler™ NEP 2320



Barocycler™ NEP3229

Hydraulic system
Pressure range: 5,000 – 35,000 psi
Capacity per load: 1 - 48 samples
Sample containers:
PULSE Tubes FT-500, FT-500 ND, FT500-PSR, PCT MicroTubes
Optional temperature control (-10 to 65°C)



APPLICATIONS:

Cell and tissue lysis	Extraction of small molecules
Extraction of proteins	Accelerated protein digestion
Extraction of nucleic acids	Pathogen inactivation
Extraction of lipids	Enzymatic protein deglycosylation
Subcellular fractionation	Isolation of functional organelles

PCT Sample Preparation Systems offer specific advantages for tissue and cell lysis and quantitative recovery of hydrophobic molecules, including integral membrane proteins. These systems also accelerate enzymatic proteolysis and deglycosylation and help improve protein sequence coverage in proteomic analysis.

Pressure BioSciences Products are Suitable for Multiple Steps of a Proteomic Workflow.



Barocycler™ HUB440 Pressure Generator – State-of-the-Art High Pressure Equipment for a Wide Range of Laboratory Applications

The Barocycler HUB440 is capable of creating and controlling hydrostatic pressure from 35 bar (~500 psi) up to 4,000 bar (~60,000 psi). The Barocycler HUB440 is the first portable, ready to use pressure generator for the laboratory bench capable of real-time pressure control.



FEATURES:

Maximum Operating Pressure : 60,000 psi (4,000 bar)
Minimum Operating Pressure 500 psi (35 bar)
Intensifier Displacement : 0.22 in³ (3.6 mL)
Compact and Portable (17" X 12" X 9", 55 lbs)
Built for Expansion
Manual or Computer Control with optional Data Acquisition and Control Module
Pressure Jump Option (full pressure on/off in less than 2 milliseconds)
Air Pressure and 24VDC power source required (suitable for mobile field use). AC adapter is supplied.

APPLICATIONS:

UHPLC solvent delivery	Pathogen inactivation
UHPLC component testing	Spore germination studies
UHPLC column packing	EPR/NMR spectroscopy
Supercritical chromatography	Cell/tissue lysis
Enzymology	Protein conformation studies
Chemical reaction kinetics	Thermodynamic experiments
Protein aggregation studies	Compressibility measurements
High pressure food science	Chemical synthesis
	Deep sea biology
	Vaccine development

Specialized Reagent Kits

ProteoSolve Line of proteomic kits is optimized to provide synergistic effect with PCT:

ProteoSolve-LRS – detergent-free protein isolation from lipid-rich samples
ProteoSolve-SB – detergent-free extraction of proteins, lipids, DNA and RNA
ProteoSolve CE Native – non-denaturing protein extraction from nematodes
ProteoSolve CE Stringent – denaturing protein extraction from nematodes
ProteoSolve TD-1 – non-denaturing extraction and stabilization of membrane
ProteoSolve TD-2 – proteins

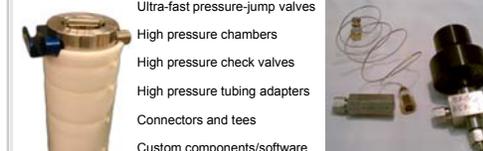


For information on specific kits and their applications please visit
www.pressurebiosciences.com

Tissue-specific Mitochondrial Isolation Kits

Recently added to the PBI family of products, these unique kits combine the power of gentle mechanical homogenization by the Shredder devices and cell lysis by PCT to allow hands-free on-demand isolation of intact, functional mitochondria from a variety of animal tissues.

Specialized High Pressure Components For All Your Laboratory Needs



Ultra-fast pressure-jump valves
High pressure chambers
High pressure check valves
High pressure tubing adapters
Connectors and tees
Custom components/software

Application Examples Presented at The 59th ASMS Conference

Jmeian Y., Beil E., Janecki D., Pomerantz S.C., Nemeth J.F., Centocor R&D, a division of J&PRD LLC, Radnor, PA
The Evaluation of Pressure-Assisted Enzymatic Digestion for the Optimal Digestion of Monoclonal Antibodies. MP11 - LC-MS: Sample Preparation - Peptides, poster number: 201, Monday.

McFarland M.A., Andrzejewski D., Callahan J.H., Musser S.M., FDA-CFSAN, College Park, MD

Does LC Separation of Intact Proteins Hinder Identification of Bacterial Markers? MP33 - Intact Proteins: Sequence Analysis, poster number: 564, Monday.

Hyung S.-W., López-Ferrer D., Orton D.J., Zink E., Weitz K.K., Zhao R., Moore R.J., Hixson K.K., Ting E.Y., Lazarev A.V., Smith R.D.
*Pacific Northwest National Laboratory, Richland, WA; *Pressure BioSciences, Inc, South Easton, MA

Development of a 20 kpsi Enzymatic Digester for High Throughput Proteomic Analysis and Its Application to Membrane Proteomics. THP11 - Drug Metabolism: High Throughput/Robotics, poster number: 211, Thursday.

Stansberry L.C., Payne A., Skinner J., Schultz L., Heinrichs J., Durr E., Merck and Co., West Point, PA
Identification and Validation of Vaccine Candidate Proteins by 2-Dimensional Mass Spectrometry Analysis of Group A Streptococcus. THP35 - Protein Therapeutics: Quantitative Analysis, poster number: 634, Thursday.