8

Protein technologies

8.1 Expression www.qiagen.com/PG/proteinexpression

Protein expression selection guide

Expression vectors

UA cloning

In vitro translation of recombinant proteins

■ Manual solutions □ Automated solutions ▣ Automatable solutions

■ Manual solutions □ Automated solutions ▣ Automatable solutions

Manual solutions Automated solutions Automatable solutions

■ Manual solutions □ Automated solutions ▣ Automatable solutions

8.4 Assay www.qiagen.com/PG/proteinassay

Assays with 6xHis-tagged proteins

Magnetocapture assays	*Ni-NTA Magnetic Agarose Beads*	*269*
Plate-based assays	Ni-NTA HisSorb Strips	307
	Ni-NTA HisSorb Plates	307
System for expression and detection of proteins tagged with both 6xHis and Tag·100 epitopes	DoubleTag Assay System	308

8.5 Cell separation www.qiagen.com/PG/cellsep

Magnetic particle-based purification/separation

Magnetic cell separation and magnetocapture, immunoassays, and binding of immunologlobulins	BioMag Secondary Antibody Suspensions	309
DNA probe assays, mRNA isolation, and separation of biotinylated compounds in solution	BioMag Streptavidin Suspensions	311
High affinity binding of immunoglobulins, removal of Fc fragments, and immunoassays	BioMag Protein A and Protein G Suspensions	312
Separation of magnetic particles	Magnets	312

8.6 Multiplex bead-based protein assays www.qiagen.com/PG/liquichip

Instrumentation

Running and analysis of multiplex protein assays	LiquiChip 200 Workstation	313

Software

Software for analysis of multiplex bead-based protein assays	LiquiChip Analyzer Software	314

Immobilization of capture molecules

Covalent immobilization on pre-activated beads	LiquiChip Activated Beads	315
Ni-NTA-mediated immobilization of 6xHis-tagged proteins	LiquiChip Ni-NTA Beads	316
Antibody-mediated immobilization of 6xHis-tagged proteins	LiquiChip Penta·His Beads	317
Covalent immobilization via amino groups	LiquiChip Carboxy Beads	318

Manual solutions Automated solutions Automatable solutions

8.7 New Protein crystallization www.qiagen.com/PG/proteincrystal

■ Manual solutions □ Automated solutions ▣ Automatable solutions

8.8 New MALDI-MS sample preparation www.qiagen.com/PG/MALDIprep

Protein Expression: Vector Options

Vector	In-frame cloning necessary	6xHis colony blots for expression screening	All three reading frames provided	Special feature	Product
N-terminal 6xHis tag					
pQE-9*	5' only	■		Very short MCS	N-Terminus pQE Vector Set (page 257)
pQE-30 series*	5' only	■	■		N-Terminus pQE Vector Set (page 257) QIA*express* Type IV Kit (page 257)
pQE-40*	5' only			DHFR fusion	N-Terminus pQE Vector Set (page 257)
pQE-80L series*	5' only	■	■	*cis*-repressed	*cis*-Repressed pQE Vector Set (page 259)
pQE30 UA*	5' only	■		Direct cloning of PCR products	pQE-30 UA Vector (page 261)
pQE-100 DoubleTag*	5' and 3'	■		Encodes Tag·100 epitope at the C-terminus	pQE-100 DoubleTag Vector (page 308)
TAGZyme pQE-1 and -2	5' only	■		For efficient His-tag removal using the TAGZyme System	TAGZyme pQE Vector Set (page 282)
pQE-30 Xa*	5' only	■		Inserts Factor Xa recognition site	pQE-30 Xa Vector (page 284)
C-terminal 6xHis tag					
pQE-16	5' and 3'			DHFR fusion	C-terminus pQE Vector Set (page 258)
pQE-60/pQE-70	5' and 3'	■		Endogenous ATG	C-terminus pQE Vector Set (page 258) QIA*express* Type ATG Kit (page 258)
pQE-TriSystem	5' and 3'	■		For parallel *E. coli*, mammalian, and baculovirus-mediated expression	pQE-TriSystem Vector (page 260)
C-terminal 6xHis tag and C-terminal *Strep*-tag					
pQE-TriSystem His·*Strep* 1	5' and 3'	■		For parallel *E. coli*, mammalian,and baculovirus-mediated expression	His·*Strep* pQE-TriSystem Vector Set (page 279)
C-terminal 6xHis tag and N-terminal *Strep*-tag					
pQE-TriSystem His·*Strep* 2	5' and 3'	■		For parallel *E. coli*, mammalian, and baculovirus-mediated expression	His·*Strep* pQE-TriSystem Vector Set (page 279)
C-terminal *Strep*-tag					
pQE-TriSystem *Strep* vector	5' and 3'	■		For parallel *E. coli*, mammalian, and baculovirus-mediated expression	pQE-TriSystem *Strep* Vector (page 279)

* Encodes RGS·His epitope.

N-Terminus pQE Vector Set

For expression of N-terminally 6xHis-tagged proteins

- pQE-30 series vectors providing the MCS in all three reading frames for fast cloning
- pQE-40 vector for expression of poorly expressed proteins or short peptides as DHFR fusions

QIA*express*® Type IV Kit

For expression and one-step purification of N-terminally 6xHis-tagged proteins

- Vectors covering all three reading frames
- Complete kit for expression and purification of 6xHis-tagged proteins
- High-level expression of N-terminally 6xHis-tagged proteins; up to 50% of total cellular protein
- Versatile, complete 6xHis system allows one-step purification, sensitive detection, and improved assay procedures

Product description

Vectors in the N-Terminus pQE Vector Set and QIA*express* Type IV Kit are used for expression of recombinant proteins with a 6xHis tag at their N-terminus in *E. coli* cells. Once a protein-encoding DNA insert has been incorporated into the vector, it is transformed into *E. coli* cells and protein expression is induced by the addition of IPTG to the growth medium. After cell lysis, 6xHis-tagged proteins are purified by Ni-NTA affinity chromatography under native or denaturing conditions.

Applications

The pQE vectors in these products provide high-level expression of protein in *E. coli*.

Product	Contents	Cat. no.
N-Terminus pQE Vector Set	25 µg each: pQE-9, pQE-30, pQE-31, pQE-32, pQE-40	32915
QIA*express* Type IV Kit	5 µg each: pQE-30, pQE-31, pQE-32 (N-terminal 6xHis); 10 ml Ni-NTA Agarose	32149

For further information: www.qiagen.com/PG/proteinexpression

C-Terminus pQE Vector Set

For expression of C-terminally 6xHis-tagged proteins

- C-terminal 6xHis tag ensuring that only full-length protein is purified
- pQE-16 vector for expression of poorly expressed proteins or short peptides as DHFR fusions

QIA*express* Type ATG Kit

For expression of C-terminally 6xHis-tagged proteins with endogenous N-termini

- Complete kit for expression and purification of 6xHis-tagged proteins
- High-level expression of C-terminally 6xHis-tagged proteins; up to 50% of total cellular protein
- Tightly regulated expression leading to enhanced stability of cytotoxic constructs
- Versatile, complete 6xHis system allows one-step purification, sensitive detection, and improved assay procedures

Product description

Vectors in the C-Terminus pQE Vector Set and QIA*express* Type ATG Kit are used for expression of recombinant proteins with a 6xHis tag at their C-terminus in *E. coli* cells. Once a protein-encoding DNA insert has been incorporated into the vector, it is transformed into *E. coli* cells and protein expression is induced by the addition of IPTG to the growth medium. After cell lysis, 6xHis-tagged proteins are purified by Ni-NTA affinity chromatography under native or denaturing conditions.

Applications

The pQE vectors in these products provide high-level expression of protein in *E. coli*.

Product	Contents	Cat. no.
C-Terminus pQE Vector Set	25 µg each: pQE-16, pQE-60, pQE-70	32903
QIA*express* Type ATG Kit	5 µg each: pQE-60, pQE-70 (C-terminal 6xHis); 10 ml Ni-NTA Agarose	32169

For further information: www.qiagen.com/PG/proteinexpression

cis-Repressed pQE Vector Set

For *cis*-repressed expression of N-terminally 6xHis-tagged proteins

- Tightly regulated expression leading to enhanced stability of cytotoxic constructs
- No requirement for second plasmid encoding repressor in *trans*

Product description

The vectors in the *cis*-Repressed pQE Vector Set are similar to those in the N-Terminus Vector Set but additionally express the *lacI*^{q} gene product that represses protein expression prior to IPTG induction. This eliminates the need to include this gene on another plasmid. Use of these vectors is recommended when expressing gene products toxic to *E. coli*. Once a protein-encoding DNA insert has been incorporated into the vector, it is transformed into *E. coli* cells and protein expression is induced by the addition of IPTG to the growth medium. After cell lysis, 6xHis-tagged proteins are purified by Ni-NTA affinity chromatography under native or denaturing conditions.

Applications

The pQE vectors in this product provide high-level expression of protein in *E. coli* and, by adding the small 6xHis affinity tag to protein expression constructs, enable:

- Purification of functional proteins under native conditions
- Purification under denaturing conditions for antibody production
- Efficient detection using Anti·His antibodies and conjugates (page 300)

Product	Contents	Cat. no.
cis-Repressed pQE Vector Set	25 µg each: pQE-80L, pQE-81L, pQE-82L	32923

For further information: www.qiagen.com/PG/proteinexpression

pQE-TriSystem Vector

For parallel expression of C-terminally 6xHis-tagged proteins in *E. coli*, mammalian cells, and baculovirus-infected insect cells using a single construct

- No need for time-consuming subcloning procedures
- Obtain post-translational modifications by expression in insect or mammalian cells
- One construct provides efficient expression in three expression systems

Product description

The pQE-TriSystem Vector is used for expression of recombinant proteins with a 6xHis tag at their C-terminus in three different expression systems. In *E. coli* cells expression is directed by a T5 promoter. In insect and mammalian cells, transient expression is directed by p10 and CAG promoters respectively. After cell lysis, 6xHis-tagged proteins are purified by Ni-NTA affinity chromatography under native or denaturing conditions.

Applications

The pQE-TriSystem Vector provides high-level expression of proteins in *E. coli*, insect, and mammalian cells and by adding the small 6xHis affinity tag to protein expression constructs enables:

- Purification of functional proteins under native conditions
- Purification under denaturing conditions for antibody production
- Efficient detection using Anti·His antibodies and conjugates (page 300)

Product	Contents	Cat. no.
pQE-TriSystem Vector	25 µg pQE-TriSystem Vector DNA	33903

For further information: www.qiagen.com/PG/proteinexpression

QIA*express* UA Cloning Kit

For fast and efficient PCR cloning of N-terminally 6xHis-tagged–protein expression constructs

- No need for restriction digestion of the vector or insert, primers with built-in restriction sites, or specifically designed adapters
- Optimized Ligation Master Mix

Product description

The prelinearized pQE-30 UA vector DNA in the QIA*express* UA Cloning Kit enables direct insertion of PCR products with A-overhangs that encode recombinant proteins. Such PCR products are generated using *Taq* or other non-proofreading DNA polymerases. Once a protein-encoding PCR product has been incorporated into the vector, it is transformed into *E. coli* cells and protein expression is induced by the addition of IPTG to the growth medium. Expressed proteins, which carry a 6xHis tag at their N-terminus, are purified by Ni-NTA affinity chromatography under native or denaturing conditions.

Applications

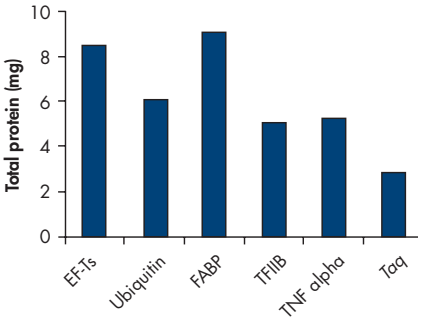
pQE vectors provide high-level expression of protein in *E. coli* and, by adding the small 6xHis affinity tag to protein expression constructs, enable:

- Purification of functional proteins under native conditions
- Purification under denaturing conditions for antibody production
- Efficient detection using Anti·His antibodies and conjugates (see page 300)

Product	Contents	Cat. no.
QIA*express* UA Cloning Kit (20)	For 20 reactions: 2x Ligation Master Mix (100 µl), 1 µg pQE-30 UA Vector DNA (50 ng/µl), distilled water (1.7 ml)	32179

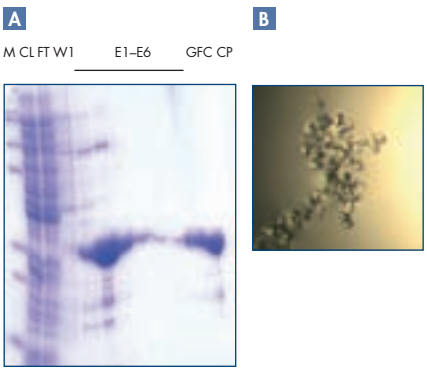
For further information: www.qiagen.com/PG/proteinexpression

High Protein Yields from Wide Range of Proteins



The indicated proteins were expressed in 2 x 5 ml reactions using the EasyXpress Protein Synthesis Mega Kit. Yields were determined by Bradford analysis (*Taq* DNA polymerase and TNF alpha) or by incorporation of ^{14}C-labeled leucine.

Large-Scale Synthesis for Protein Crystallization



A The N-terminal GTP-binding domain (NG) of FtsY, the *E. coli* homolog of signal recognition particle receptor α, was synthesized in a 10 ml EasyXpress Protein Synthesis Mega Kit reaction. His-tagged FtsY-NG was purified using Ni-NTA Superflow and gel filtration. **M**: markers; **CL**: crude lysate; **FT**: flow-through; **W1**: wash fraction; **E**: elution fractions; **GFC**: gel-filtration column pool; **CP**: concentrated protein. 4.4 mg of highly pure concentrated protein was obtained for crystallization. **B** FtsY-NG was crystallized in the absence of GTP using the EasyXtal Classics Screening Suite by hanging-drop vapor diffusion method.

EasyXpress™ Protein Synthesis System

For fast, efficient in vitro synthesis of recombinant proteins

EasyXpress Linear Template Kit Plus and Vector pIX3.0

For accelerated screening of protein expression templates and conditions

EasyXpress Protein Synthesis Kits

For in vitro synthesis of recombinant proteins in high yields

- Fast procedure — go from gene to protein in a single day
- High yields — up to 600 µg protein per ml reaction volume in just one hour
- Significant time and cost-savings — no cloning, transformation, fermentation, or specialized equipment required
- Simple and flexible addition of affinity tag sequences to expression templates

Product description

Using the EasyXpress Linear Template Kit Plus is the fastest and easiest way to generate PCR product expression templates for the EasyXpress Protein Synthesis Kit. The kit contains enough reagents for 20 two-step PCRs, with each reaction yielding enough expression template for up to 4 in vitro translation reactions.

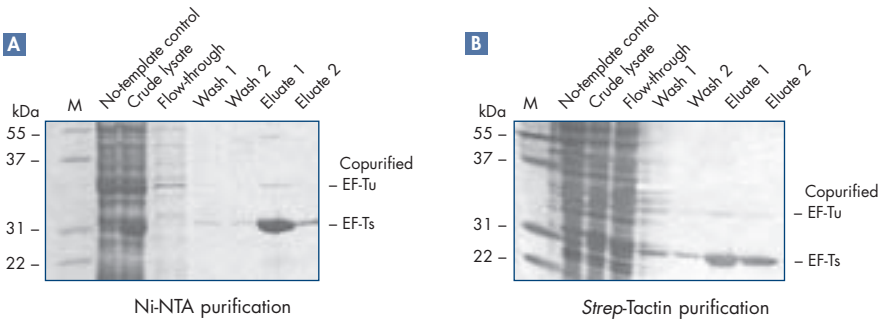
EasyXpress Protein Synthesis Mini and Maxi Kits use highly productive *E. coli* lysates, which contain all transcriptional and translational machinery components required for efficient protein synthesis and are pre-aliquoted for convenience and ease-of-handling.

For large-scale synthesis, the EasyXpress Protein Synthesis Mega Kit uses a plasmid expression template in a two-stage reaction to produce up to 5 mg recombinant protein from 2 x 5 ml reactions.

Applications

Proteins produced using the EasyXpress Protein Synthesis system are suitable for use in a wide variety of downstream applications including activity assays, protein–protein interaction studies, and structural and mutational analyses.

Efficient Synthesis and Purification of Functionally Active Proteins

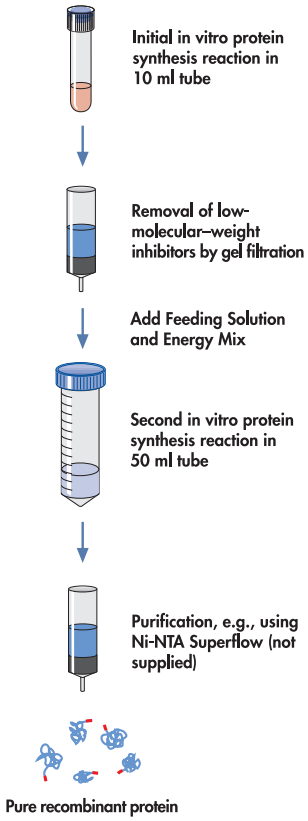


E. coli elongation factor-Ts with a C-terminal A 6xHis-tag or B *Strep*-tag was purified under native conditions from 50 µl EasyXpress Protein Synthesis Mini Kit in vitro translation reactions. Ni-NTA Magnetic Agarose Bead or *Strep*-Tactin® Magnetic Bead suspension (150 µl) was added to the crude lysate to bind protein. The beads were washed with 500 µl wash buffer to remove contaminants and pure 6xHis- or *Strep*-tagged protein was eluted in two 50 µl aliquots of elution buffer. Protein from each fraction was separated by SDS-PAGE and visualized by A Coomassie® or B silver staining. In both cases, EF-Ts is eluted from Ni-NTA or *Strep*-Tactin beads as a complex with endogenous elongation factor EF-Tu, demonstrating the functional activity of His- and *Strep*-tagged EF-Ts synthesized in vitro using EasyXpress *E. coli* extract. **M**: markers.

Product	Contents	Cat. no.
EasyXpress Linear Template Kit Plus (20)	For 20 two-step PCRs: ProofStart DNA Polymerase, buffer, RNase-free water, Q-Solution, XE-Solution, positive-control DNA, and optimized PCR primers	32723
EasyXpress pIX3.0 Vector	For rapid cloning of PCR products and protein expression in scaled-up in vitro translation reactions or in vivo systems: 25 µg vector DNA	32733
EasyXpress Protein Synthesis Mini Kit	For 20 x 50 µl reactions: *E. coli* extract, reaction buffer, RNase-free water, and positive-control DNA	32502
EasyXpress Protein Synthesis Maxi Kit	For reactions up to 4000 µl: 4 x 350 µl *E. coli* extract, reaction buffer, RNase-free water, and positive-control DNA	32506
EasyXpress Protein Synthesis Mega Kit	For 2 x 5 ml reactions: *E. coli* extract, reaction buffers without methionine, methionine, RNase-free water, gel-filtration columns, and reaction flasks	32516

For further information: www.qiagen.com/PG/proteinexpression

EasyXpress Large-Scale Procedure



EasyXpress NMR Protein Synthesis Kits

For large-scale in vitro synthesis of protein for NMR structural studies

- High yields of high-quality protein — one kit delivers enough protein for a comprehensive structural characterization
- Fast procedures — up to 5 mg purified protein in just 4 hours, compared to weeks using conventional methods
- Easy incorporation of selected isotopically labeled amino acids — facilitating structural analyses using NMR

Product description

EasyXpress NMR Protein Synthesis Kits provide *E. coli* extract, reaction buffers, an amino acid mix, individual amino acids,* RNase-free water, gel-filtration columns, and reaction flasks for large-scale production of isotopically labeled recombinant proteins for structural analysis using NMR.

Applications

Large-scale in vitro translation reactions provide unique possibilities for rapid production of large amounts of recombinant proteins suitable for a range of downstream applications, including:

- Structural analysis using NMR

Product	Contents	Cat. no.
EasyXpress NMR Protein Synthesis Kit	For 2 x 5 ml reactions: *E. coli* extract, reaction buffers, amino acid mix w/o Arg, Lys, Ser, Thr, Val (supplied as individual amino acids), RNase-free water, gel-filtration columns, and reaction flasks	32526
EasyXpress NMR Protein Synthesis Kit –X*	For 2 x 5 ml reactions: *E. coli* extract, reaction buffers, amino acid mix w/o X (supplied as an individual amino acid), RNase-free water, gel-filtration columns, and reaction flasks	Varies

* Kits available for substitution of Ala, Cys, Asp, Glu, Phe, Gly, His, Ile, Leu, Met, Asn, Pro, Gln, Trp, and Tyr. Delivery may take up to six weeks, please inquire.

For further information: www.qiagen.com/PG/proteinexpression

EasyXpress Biotin Kits

For efficient site-directed or random biotin labeling of recombinant proteins

- Efficient biotin incorporation — guaranteeing efficient detection or immobilization
- Labeling without radioactivity — no problems with dangerous waste
- Biotinylation at any position with a 1:1 stoichiometry — labeling away from interaction sites (site-directed kit)
- Lysate free of endogenous biotinylated proteins — enabling direct immobilization of biotinylated proteins (site-directed kit)

Product description

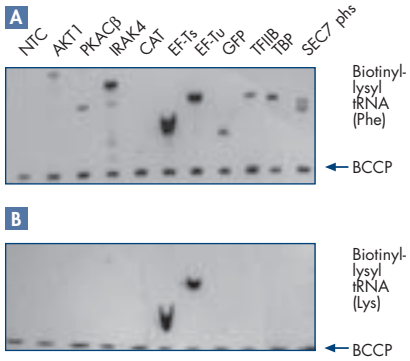
EasyXpress Biotin Kits provide *E. coli* extracts, synthetic biotinyl-lysyl tRNA, reagents, and buffers for production of biotin-labeled recombinant proteins. The EasyXpress Random Biotin Kit enables efficient random incorporation of biotin at Phe codons. The EasyXpress Site-Directed Biotin Kit enables production of recombinant proteins that contain a biotinylated residue at a selected position in their amino acid sequence.

Applications

EasyXpress Biotin Kits can be used for a large number of applications, including:

- Screening expression constructs using a universally applicable, non-radioactive detection system
- Immobilizing or detecting components of protein–protein interaction assays using a site remote from interaction surfaces

Efficient Incorporation of Biotin in Synthesized Proteins

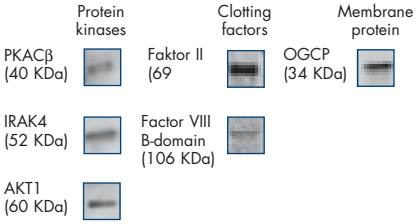


A Synthesis of biotinylated recombinant proteins using the EasyXpress Random Biotin Kit, which inserts biotinylated lysine residues at phenylalanine UUC codons. **B** Parallel synthesis of biotinylated proteins using a commercially available biotinylated tRNA which inserts biotinylated lysine residues at lysine AAA codons. It should be noted that in **B** proteins were efficiently expressed, but efficient biotin incorporation was only observed in the case of EF-Tu and EF-Ts. **BCCP**: endogenous *E. coli* biotin carboxyl carrier protein; **NTC**: no template control; **AKT1**: human RAC-alpha serine/threonine kinase; **PKAC**: human cAMP-dependent protein kinase, beta catalytic subunit; **IRAK4**: human interleukin-1 receptor associated kinase 4; **CAT**: chloramphenicol acetyltransferase; **EF-Ts**: elongation factor Ts; **EF-Tu**: elongation factor Tu; **GFP**: green fluorescent protein; **TFIIB**: human Transcription Factor IIB; **TBP**: human TATA-box binding protein; **SEC7phs**: human cytohesin-1 SEC7phs domain.

Product	Contents	Cat. no.
EasyXpress Site-Specific Biotin Kit	For 5 x 25 µl reactions: *E. coli* extract, reaction buffer, RNase-free water, biotinyl-lysyl tRNA (amber), and positive-control DNA	32602
EasyXpress Random Biotin Kit	For 20 x 50 µl reactions: *E. coli* extract, reaction buffers, RNase-free water, biotinyl-lysyl tRNA (Phe), and positive-control DNA	32612

For further information: www.qiagen.com/PG/proteinexpression

Efficient Synthesis of a Wide Range of Proteins



Proteins successfully expressed using the EasyXpress Insect Kit. 6xHis-tagged protein kinases were visualized using the Penta·His HRP Conjugate. Clotting factors and OGCP were synthesized using ^{14}C-labeled amino acids and visualized with a PhosphorImager®.

New EasyXpress Insect Kit II

For efficient expression of posttranslationally modified recombinant proteins

- Posttranslationally modified recombinant proteins — fully active and correctly folded mammalian proteins
- Proven procedure — efficient synthesis of a wide range of eukaryotic proteins, such as clotting factors, protein kinases, and membrane proteins
- Efficient protein synthesis — increased yields and extent of modification

Product description

The kit contains *Spodoptera frugiperda* insect cell extract, in vitro transcription reaction components, and reaction buffers for production of posttranslationally modified eukaryotic proteins.

Applications

By enabling efficient production of posttranslationally modified recombinant proteins, the EasyXpress Insect Kit II can be used for a number of applications, including:

- Investigations into the effect of posttranslational modifications on eukaryotic protein structure and function
- Generating eukaryotic proteins with native structure and activity for functional and interaction studies

Product	Contents	Cat. no.
EasyXpress Insect Kit II	For 20 x 50 µl reactions: *Spodoptera frugiperda* insect cell extract, in vitro transcription reaction components, reaction buffers, RNase-free water, and positive-control DNA	32562
EasyXpress pIX4.0 Vector	25 µg vector DNA for efficient synthesis of proteins using the EasyXpress Insect Kit II	32713

For further information: www.qiagen.com/PG/proteinexpression

pQE Sequencing-Primer Set

For sequencing inserts cloned into pQE Vectors

- Fast and efficient sequencing
- Sequence any pQE vector (except pQE-TriSystem)

Product description

The primers in the pQE Sequencing-Primer Set can be used to sequence inserts in any pQE vector (except pQE TriSystem vectors). Primers are added to a PCR sequencing reaction containing the vector to be sequenced, dNTPs, a DNA polymerase, and fluorescently labeled chain-terminating nucleotide analogs (dye terminators). The reaction generates a "ladder" of DNA fragments which can be separated and read using a capillary sequencer.

E. coli Host Strains

For regulated high-level expression with pQE Vectors

- Cells contain pREP4 plasmid encoding lac repressor in *trans*, ensuring tightly regulated expression

Product description

Cells in the two *E. coli* Host Strains M15[pREP4] and SG13009[pREP4] carry the repressor plasmid pREP4 which constitutively expresses *lac* repressor at high levels, enabling *trans* repression of protein expression prior to IPTG induction. The pREP4 plasmid is maintained by kanamycin selection.

Product	Contents	Cat. no.
pQE Sequencing-Primer Set	0.1 A_{260} unit each: Primer - Promoter Region, Primer - Type III/IV, Primer - Reverse Sequencing (3.0, 2.8, 3.1 µg, respectively; lyophilized)	34051
E. coli Host Strains	One stab culture each: *E. coli* M15[pREP4], SG13009[pREP4]	34210

For further information: www.qiagen.com/PG/proteinexpression

Protein Purification: Formats

	Ni-NTA Agarose	Ni-NTA Superflow	Ni-NTA Spin Columns	Ni-NTA Magnetic Agarose Beads
Binding capacity:	5–20 mg/ml (300–1000 nmol @~20 kDa)	5–20 mg/ml (300–1000 nmol @~20 kDa)	150 µg per spin column	0.25–1 mg/ml suspension (5%)
Support:	Sepharose® CL-6B	Superflow	Macroporous silica	Magnetic agarose beads
Bead diameter:	45–165 µm	60–160 µm	16–24 µm	20–70 µm
Exclusion limit (MW):	>>4 x 10^7	4 x 10^6	n.d.	n.d.
Max. linear flow rate:	75–150 cm/h	3000 cm/h		
Max. pressure:	2.8 psi (0.2 bar)	140 psi (10 bar)	n.d.	n.a.
pH stability (2 h):	2–14	2–14	2–8.5	3–14
pH stability (>2 h):	3–12	3–12	3–7.5	4–12
Form:	50% resin suspension in 30% ethanol, precharged with Ni^{2+}	50% resin suspension in 30% ethanol, precharged with Ni^{2+}	Dry matrix packed in spin columns, precharged with Ni^{2+}	5% suspension in 30% ethanol precharged with Ni^{2+}
Storage:	Room temperature (15–25°C) or 4°C (do not freeze!)	Room temperature (15–25°C) or 4°C (do not freeze!)	Room temperature (15–25°C) or 4°C (do not freeze!)	Room temperature (15–25°C) or 4°C (do not freeze!)

Protein Purification: Yields and Applications

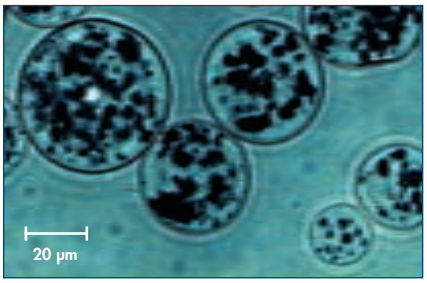
	Yield	Special applications	Protocol	Product	Page
Micro-scale	1–30 µg	Purification from dilute lysates Small elution volumes	Manual	Ni-NTA Magnetic Agarose Beads	269
		High-throughput (96-well)	Automated	Ni-NTA Magnetic Agarose Beads	269
Medium-scale	15–150 µg	Low-throughput screening	Manual or automated on QIAcube	Ni-NTA Spin Columns	271
	up to 200 µg	Economical and rapid purification	Automated	BioSprint 15 Ni-NTA Kit	275
	15–600 µg	High-throughput screening (96-well)	Automated	Ni-NTA Superflow 96 BioRobot Kit	276
	up to 4 mg	High-throughput screening (96-well)	Adapted automated protocol	Ni-NTA Superflow 96 BioRobot Kit	276
Large-scale	100 µg – 100 mg	Batch and column purification	Manual	Ni-NTA Agarose	272
	up to 30 mg	Column purification	Manual or automated	Ni-NTA Superflow Columns	276
	5 mg – production scale	Batch and column purification	Manual	Ni-NTA Superflow	272
		FPLC®	Automated	Ni-NTA Superflow	272

Automatable

Ni-NTA Magnetic Agarose Beads

For high-throughput, micro-scale purification of 6xHis-tagged proteins

- Directed presentation of 6xHis-tagged biomolecules for enhanced signal-to-noise ratio and reproducibility
- Wide range of binding capacities by simply varying the amount of beads used per well
- Effective screening and concentration procedures, even with crude cell lysates
- Ideal for study of biomolecular interactions
- Option of full automation on the BioRobot® Protein – Expression Screening (page 370) or BioRobot 8000 (page 371)



Micrograph of Ni-NTA Magnetic Agarose Beads showing magnetic particles inside the beads.

Product description

Ni-NTA Magnetic Agarose Beads are magnetic particles coated with Ni-NTA Agarose affinity purification matrix. They are used for immobilizing and purifying recombinant proteins carrying a 6xHis tag. Histidine residues in the 6xHis tag bind to the vacant positions in the coordination sphere of the immobilized nickel ions with high specificity and affinity. Once proteins are bound, the beads can be precipitated using a magnet, washed, and proteins eluted in small volumes of buffer under native or denaturing conditions.

Applications

Ni-NTA Magnetic Agarose Beads provide reliable, one-step purification of 6xHis-tagged proteins suitable for applications including:

- Structural and functional investigations
- Assays involving protein–protein and protein–DNA interactions

Ni-NTA Magnetic Agarose Beads can also be used to bind 6xHis-tagged proteins as immobilized affinity ligands to:

- Study molecular interactions with nucleic acids and binding proteins
- Purify antibodies
- Isolate nontagged, interacting subunits or nucleic acids
- Investigate ligand–receptor interactions

Automatable

Product	Contents	Cat. no.
Ni-NTA Magnetic Agarose Beads (2 x 1 ml)	2 x 1 ml nickel-charged magnetic agarose beads (5% suspension)	36111
Ni-NTA Magnetic Agarose Beads (6 x 1 ml)	6 x 1 ml nickel-charged magnetic agarose beads (5% suspension)	36113
12-Tube Magnet	Magnet for separating magnetic particles in 12 x 1.5 ml or 2 ml tubes	36912
96-Well Magnet Type A	Magnet for separating magnetic beads in wells of 96-well plates, 2 x 96-Well Microplates FB	36915

Please inquire for availability and pricing of bulk quantities.

For further information: www.qiagen.com/PG/proteinpurification

Automatable on QIAcube

Ni-NTA Spin Kit and Ni-NTA Spin Columns

For fast, small-scale purification of 6xHis-tagged proteins

- Up to 150 µg 6xHis-tagged protein in 15 minutes
- Purification under native and denaturing conditions
- Up to 95% homogeneity in one step
- Ready-to-use spin columns for rapid parallel processing of multiple samples

Product description

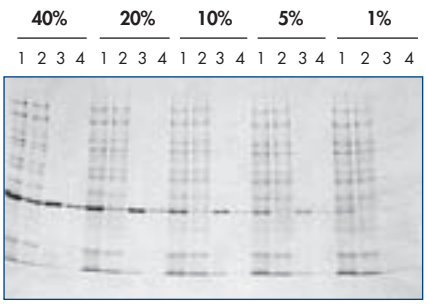
Ni-NTA Spin Columns contain a Ni-NTA silica matrix for purifying recombinant proteins carrying a 6xHis tag from *E. coli* cell lysates. Histidine residues in the 6xHis tag bind to the vacant positions in the coordination sphere of the immobilized nickel ions with high specificity and affinity. Purification can be fully automated on the QIAcube (see page 363).

Applications

Ni-NTA Spin Columns provide fast, reliable, one-step purification of 6xHis-tagged proteins suitable for any application, including:

- Structural and functional investigations
- Crystallization for determination of three-dimensional structure
- Assays involving protein–protein and protein–DNA interactions
- Immunization to produce antibodies

Purification at Different Expression Levels



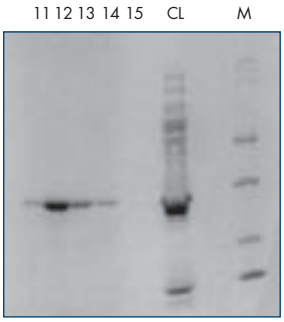
The 6xHis-tagged mouse DHFR protein was expressed at the indicated levels in *E. coli*, purified from 3 ml cultures using the Ni-NTA Spin Kit under denaturing conditions, and eluted in buffer at pH 5.9. Fractions were visualized by Coomassie staining after SDS-PAGE. 5 µl (of each 200 µl eluate) was loaded. **1**: cell lysate; **2**: flow-through **3**: first eluate; **4**: second eluate.

Product	Contents	Cat. no.
Ni-NTA Spin Columns (50)	50 Ni-NTA Spin Columns, Collection Tubes	31014
Ni-NTA Spin Kit (50)	50 Ni-NTA Spin Columns, Reagents, Collection Tubes, 1µg Expression Plasmid	31314

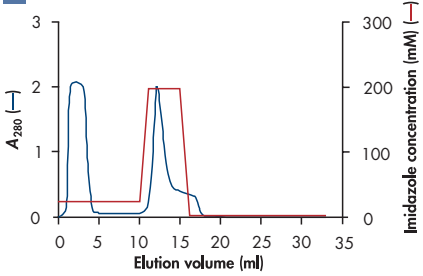
For further information: www.qiagen.com/PG/proteinpurification

FPLC Purification with Ni-NTA Superflow*

A



B



Elution with a step gradient using Ni-NTA Superflow. 6xHis-tagged chloramphenicol acetyltransferase was purified under native conditions on a 1 ml Ni-NTA Superflow column connected to an FPLC system at a flow rate of 1 ml/min. After applying the sample, the column was washed with 10 ml wash buffer (containing 20 mM imidazole) and eluted with 5 ml elution buffer (containing 200 mM imidazole). 1 ml fractions were collected and analyzed.
A SDS-PAGE gel of eluate fractions. **11–15**: eluate fractions; **CL**: cleared lysate; **M**: markers.
B Elution and gradient profile. Note: Imidazole contributes to A_{280}.

* Step gradients are recommended over linear gradients for better resolution and sharper elution peaks on Ni-NTA resins.

Ni-NTA Agarose and Ni-NTA Superflow

For purification of 6xHis-tagged proteins by gravity-flow chromatography and FPLC

- Purification using gravity-flow (Ni-NTA Agarose) or FPLC (Ni-NTA Superflow)
- One-step purification from crude lysate to >95% pure protein
- High binding affinity and high capacity
- Choice of purification under native or denaturing conditions
- Precharged, ready-to-use matrices for any scale of purification
- Automated purification and assay protocols

Product description

Ni-NTA Agarose and Superflow are affinity chromatography matrices for purifying recombinant proteins carrying a 6xHis tag. Histidine residues in the 6xHis tag bind to the vacant positions in the coordination sphere of the immobilized nickel ions with high specificity and affinity. Cleared cell lysates are loaded onto the matrices. 6xHis-tagged proteins are bound, and other proteins pass through the matrix. After washing, 6xHis-tagged proteins are eluted in buffer under native or denaturing conditions.

Applications

Ni-NTA matrices provide reliable, one-step purification of 6xHis-tagged proteins suitable for any application, including:

- Structural and functional investigations
- Crystallization for determination of three-dimensional structure
- Assays involving protein–protein and protein–DNA interactions
- Immunization to produce antibodies

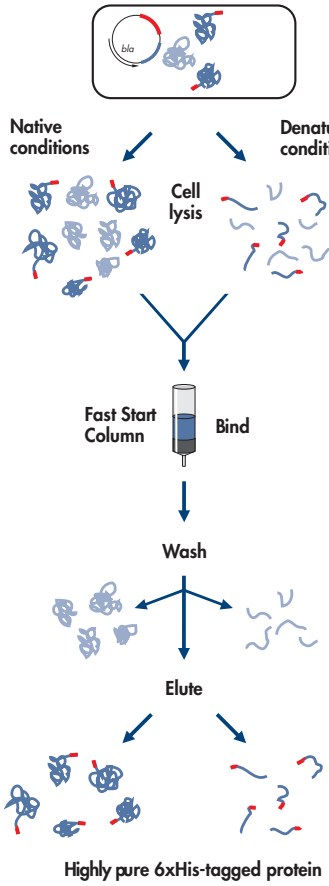
Ni-NTA matrices can also be used to bind 6xHis-tagged proteins as immobilized affinity ligands to:

- Study molecular interactions with nucleic acids and binding proteins
- Purify antibodies
- Isolate nontagged, interacting subunits or nucleic acids
- Investigate ligand–receptor interactions

Product	Contents	Cat. no.
Ni-NTA Agarose (25 ml)	25 ml nickel-charged resin (max. pressure: 2.8 psi)	30210
Ni-NTA Agarose (100 ml)	100 ml nickel-charged resin (max. pressure: 2.8 psi)	30230
Ni-NTA Agarose (500 ml)	500 ml nickel-charged resin (max. pressure: 2.8 psi)	30250
Ni-NTA Superflow (25 ml) (max. pressure: 140 psi)	25 ml nickel-charged resin	30410
Ni-NTA Superflow (100 ml)	100 ml nickel-charged resin (max. pressure: 140 psi)	30430
Ni-NTA Superflow (500 ml)	500 ml nickel-charged resin (max. pressure: 140 psi)	30450

For further information: www.qiagen.com/PG/proteinpurification

Fast and Easy Protein Purification



Ni-NTA Fast Start Kit

For purification and detection of recombinant 6xHis-tagged proteins from *E. coli* lysates

- Ideal for researchers new to protein science
- Everything required for efficient purification in one kit
- Easy-to-follow protocols and straightforward processing
- Up to 10 mg protein per column in as little as 90 minutes

Product description

The Ni-NTA Fast Start Kit provides everything required for fast, efficient purification of 6xHis-tagged proteins from cleared *E. coli* lysates, including prefilled Ni-NTA columns. Buffers supplied in the kit enable proteins to be purified either under native or denaturing conditions. The kit also contains an Anti·His antibody for detection of expressed 6xHis-tagged proteins.

Applications

The Ni-NTA Fast Start Kit provides reliable, one-step purification of 6xHis-tagged proteins suitable for any application, including:

- Functional studies
- Immunization to produce antibodies
- Assays involving protein–protein and protein–DNA interactions
- Structural investigations

Product	Contents	Cat. no.
Ni-NTA Fast Start Kit (6)	For purification and detection of six 6xHis-tagged protein preps: 6 x Fast Start Columns, Penta·His Antibody, Buffers and Reagents	30600

For further information: www.qiagen.com/PG/proteinpurification

Automated

BioSprint 15 Ni-NTA Kit

For rapid and economical automated purification of 6xHis-tagged recombinant proteins

- Rapid processing of 1–15 samples per run
- Purification of high-purity protein, ready to use in downstream applications
- Automated procedure saves time and effort

Product description

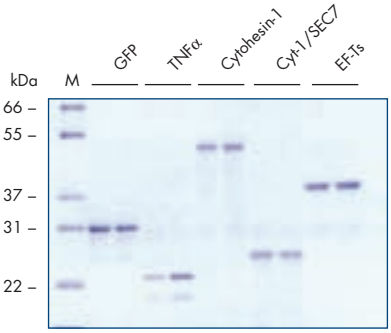
The BioSprint 15 Ni-NTA Kit provides all reagents and plasticware necessary for rapid, automated purification of 6xHis-tagged proteins from prokaryotic or eukaryotic cell lysates using magnetic-bead technology. This kit can be combined with the BioSprint 15 Strep-Tactin Kit (page 281) to isolate extremely high purity His·*Strep*-tagged proteins (proteins that carry both a 6xHis and *Strep*-tag) in a two-step procedure.

Applications

The BioSprint 15 Ni-NTA Kit provides reliable, automated purification of 6xHis-tagged proteins for use in a range of downstream applications, including:

- Structural and functional investigations
- Activity-based assays
- Protein–protein and protein–nucleic acid interaction assays
- Immunization to produce antibodies

High-Purity Proteins from In Vitro Translation Reactions



The indicated proteins were expressed as 6xHis-tagged constructs in duplicate 50 µl EasyXpress protein synthesis reactions. Reactions were processed using the BioSprint 15 Ni-NTA Kit and eluates were analyzed by SDS-PAGE. **M**: markers. Constructs for cytohesin-1 and the SEC7 domain of cytohesin-1 were kindly provided by Michael Blind, NascaCell IP GmbH, Munich.

Product	Contents	Cat. no.
BioSprint 15 Ni-NTA Kit (120)	For 120 preps: Ni-NTA Magnetic Agarose Beads, 5 Rod Covers, and 5 Tube Strips	948015

For further information: www.qiagen.com/PG/proteinpurification

Ni-NTA Superflow 96 BioRobot Kit

For automated, medium-scale purification of 6xHis-tagged proteins

- Fully automated purification of up to 4 mg protein per well
- High-purity protein free from cross-contamination
- Purification under native or denaturing conditions

Product description

In Ni-NTA Superflow 96 BioRobot Kits, *E. coli* cell lysates containing 6xHis-tagged proteins are pipetted into the wells of a TurboFilter® plate. Lysates are cleared by drawing them through the TurboFilter plate under vacuum. The lysates are channeled onto 96 mini chromatography columns, which are created by pipetting Ni-NTA Superflow into a QIAfilter 96-well plate. Histidine residues in the 6xHis tag bind to the vacant positions in the coordination sphere of the immobilized nickel ions with high specificity and affinity. 6xHis-tagged proteins are bound, and other proteins pass through the matrix. After washing, 6xHis-tagged proteins are eluted in buffer under native or denaturing conditions.

Ni-NTA Superflow Columns

For gravity-flow or automated large-scale purification of 6xHis-tagged proteins

- Up to 30 mg highly pure 6xHis-tagged protein per column
- Automated parallel processing of up to 24 samples on BioRobot 3000 workstations (no longer available)
- Cross-contamination-free processing with high column-to-column reproducibility
- Ready-to-run automated protocols or manual purification under native or denaturing conditions

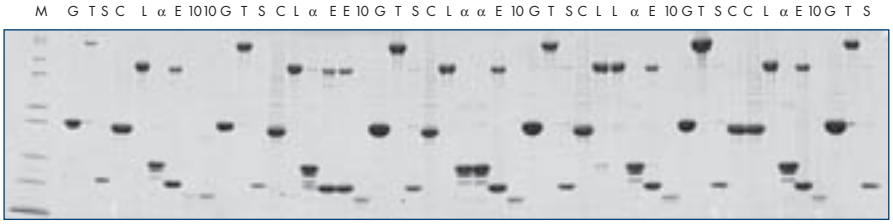
Product description

Ni-NTA Superflow Columns contain Ni-NTA Superflow for purification of up to 30 mg 6xHis-tagged proteins from cleared lysates using gravity flow or a vacuum-driven automated procedure.

Applications

Ni-NTA 96 BioRobot Kits and Superflow Columns provide reliable, automated, one-step purification of 6xHis-tagged proteins suitable for any application, including structural and functional investigations, crystallization for determination of three-dimensional structure, assays involving protein–protein and protein–DNA interactions, and immunization to produce antibodies.

Milligram Amounts of Pure 6xHis-Tagged Protein per Well



Vector constructs for the expression of 6xHis-tagged proteins were transformed into *E. coli*, plated on selective medium, and colonies were picked for inoculating 25 ml cultures. Expression of 6xHis-tagged proteins was induced with IPTG for 2–4 hours. Cells were pelleted in 24-well blocks and processed on the BioRobot 3000 using 200 µl Ni-NTA Superflow resin per well. 5 µl (0.9%) of the first elution fraction was loaded for SDS-PAGE and proteins were visualized by Coomassie staining. **G**: Green Fluorescent Protein (29 kDa); **T**: T7 RNA Polymerase (100 kDa); **S**: *E. coli* GroES (12 kDa). Some endogenous GroEL is copurified; **C**: *E. coli* chloramphenicol acetyltransferase (28 kDa); **L**: *E. coli* GroEL (60 kDa); **α**: human tumor necrosis factor α (18 kDa); **E**: *E. coli* GroES purified as a complex with co-overexpressed nontagged GroEL (12 and 60 kDa); **10**: *Saccharomyces cerevisiae* Cpn-10 (10 kDa). **M**: markers.

Product	Contents	Cat. no.
Ni-NTA Superflow 96 BioRobot Kit (24)*	For 24 x 96 6xHis-tagged protein preps: 24 QIAfilter 96 Plates, 24 TurboFilter 96 Plates, 3 x 100 ml Ni-NTA Superflow†	969263
Ni-NTA Superflow 96 BioRobot Kit (4)*	For 4 x 96 6xHis-tagged protein preps: 4 QIAfilter 96 Plates, 4 TurboFilter 96 Plates, 1 x 100 ml Ni-NTA Superflow	969261
Ni-NTA Superflow Columns (12 x 1.5 ml)	For 12 6xHis-tagged protein preps: 12 polypropylene columns containing 1.5 ml Ni-NTA Superflow	30622
Ni-NTA Superflow Columns (144 x 1.5 ml)	For 144 6xHis-tagged protein preps: 12 x 12 polypropylene columns containing 1.5 ml Ni-NTA Superflow	30624

* For use with BioRobot 3000, 8000, or 9600 workstations or the BioRobot Protein – Expression Screening (pages 370 and 371)

† For 24 x 96 preps using the optional high-yield protocol, an additional 200 ml Ni-NTA Superflow (page 272) is required.

For further information: www.qiagen.com/PG/proteinpurification

NTA Agarose and NTA Superflow

For efficient immobilized-metal affinity chromatography (IMAC) using gravity-flow or FPLC

- Purification using gravity-flow (NTA Agarose) or FPLC (NTA Superflow)
- High binding affinity and high capacity
- Choice of purification under native or denaturing conditions
- Fine-tuning of purification strategies through flexible choice of metal ion (e.g., Ni^{2+}, Cu^{2+}, Zn^{2+}, or Co^{2+})

Product description

NTA Agarose and Superflow are affinity chromatography matrices that carry immobilized tetradentate nitrilotriacetic acid groups. The matrices can be charged with metal ions to enable purification of metal-binding proteins, or can be used to remove metal ions from protein preparations.

Applications

NTA Agarose and Superflow can be used for a range of applications including:

- Purification of metal-binding proteins
- Gentle removal of metals from protein preparations
- Purification of proteins containing a large proportion of acidic residues

Product	Contents	Cat. no.
NTA Agarose (25 ml)	25 ml uncharged resin (max. pressure 2.8 psi)	30310
NTA Superflow (25 ml)	25 ml uncharged resin (max. pressure 140 psi)	30510

For further information: www.qiagen.com/PG/proteinpurification

Two-Step Affinity Purification System

For expression, purification, and detection of ultrapure His·*Strep*-tagged proteins

His·*Strep* pQE-TriSystem Vector Set and pQE-TriSystem *Strep* Vector

For convenient expression of His·*Strep*-tagged or *Strep*-tagged proteins in three different systems using a single construct

Strep-Tactin Magnetic Beads

For efficient micro-scale purification of *Strep*-tagged proteins

Strep-Tactin Superflow

For efficient medium- and large-scale purification of *Strep*-tagged proteins

Strep-tag® Antibody

For highly sensitive and specific detection of *Strep*-tagged proteins

- Ultrapure protein from two affinity purifications — >98% pure full-length protein for crystallization and functional studies
- Two small tags — minimal interference with protein structure or function
- A convenient, standardized procedure — ready-to-use reagents, detailed protocols, and no need for optimization
- A complete system for expression, purification, and detection — expression vectors, purification matrices, and antibodies to detect either tag

Product description

The Two-Step Affinity Purification System delivers ultrapure recombinant proteins. Protein-encoding constructs are cloned into vectors based on pQE-TriSystem and expressed in *E. coli*, insect, or mammalian cells. Expressed proteins carry two affinity tags — a 6xHis tag and *Strep*-tag — and are purified in two consecutive affinity chromatography steps using a Ni-NTA and *Strep*-Tactin matrix. Purification can also be fully automated on the BioRobot® Protein — Expression Screening (see page 370).

Applications

The Two-Step Affinity Purification system is highly suited for applications where high purity is at a premium or is difficult to achieve. The standardized purification procedure increases throughput by eliminating the need for protein-specific purification protocol development and optimization. The ultrahigh purity and convenience provided by the Two-Step Affinity Purification system make it the method of choice for structural and functional analyses of proteins, and for expression in eukaryotic systems.

Product	Contents	Cat. no.
His·*Strep* pQE-TriSystem Vector Set	pQE-TriSystem His·*Strep* 1 and pQE-TriSystem His·*Strep* 2 vectors, 25 µg each	32942
pQE-TriSystem *Strep* Vector	pQE-TriSystem *Strep* Vector, 25 µg	33913
Strep-Tactin Magnetic Beads (2 x 1 ml)	2 x 1 ml *Strep*-Tactin-charged magnetic agarose beads (10% suspension)	36311
Strep-Tactin Magnetic Beads (20 x 1 ml)	20 x 1 ml *Strep*-Tactin-charged magnetic agarose beads (10% suspension)	36315
Strep-Tactin Superflow (2 ml)	2 ml *Strep*-Tactin-charged Superflow (max. pressure: 140 psi)	30001
Strep-Tactin Superflow (10 ml)	10 ml *Strep*-Tactin-charged Superflow (max. pressure: 140 psi)	30003
Strep-tag Antibody (100 µg)	Mouse monoclonal antibody that recognizes the *Strep*-tag II epitope; lyophilized, for 1000 ml working solution	34850

For further information: www.qiagen.com/PG/proteinpurification

BioSprint 15 *Strep*-Tactin Kit

For rapid and economical automated purification of *Strep*-tagged recombinant proteins

- Rapid processing of 1–15 samples per run
- Purification of high-purity protein, ready to use in downstream applications
- Automated procedure saves time and effort

Product description

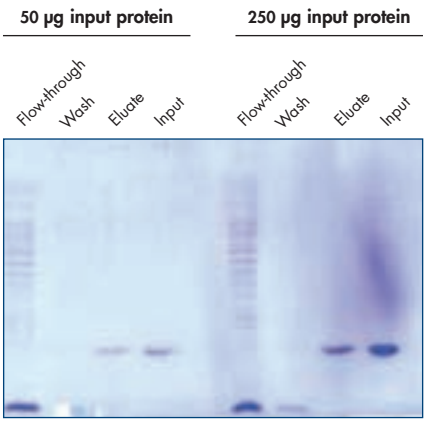
The BioSprint 15 *Strep*-Tactin Kit provides all reagents and plasticware necessary for rapid, automated purification of *Strep*-tagged proteins from crude or clear cell lysates using magnetic-bead technology. This kit can be combined with the BioSprint 15 Ni-NTA Kit (page 275) to isolate extremely high purity His·*Strep*-tagged proteins (proteins that carry both a 6xHis and *Strep*-tag) in a two-step procedure.

Applications

The BioSprint 15 *Strep*-Tactin Kit provides reliable, automated purification of *Strep*-tagged proteins for use in a range of downstream applications, including:

- Structural and functional investigations
- Activity-based assays
- Protein–protein and protein–nucleic acid interaction assays
- Immunization to produce antibodies

High Recovery of High-Purity *Strep*-tagged Protein



The indicated amount of input *Strep*-tagged thioredoxin was added to 500 µl cleared *E. coli* cell lysate and processed using the BioSprint 15 *Strep*-Tactin Kit.

Product	Contents	Cat. no.
BioSprint 15 *Strep*-Tactin Kit (120)	For 120 preps: *Strep*-Tactin Magnetic Agarose Beads, 5 Rod Covers, and 5 Tube Strips	948315

For further information: www.qiagen.com/PG/proteinpurification

Automated

TAGZyme System

For expression of 6xHis-tagged recombinant proteins with subsequent tag removal and purification

TAGZyme pQE Vector Set

For expression of proteins optimized for His-tag removal using TAGZyme enzymes

TAGZyme Kit

For the removal of 6xHis tags from proteins expressed using TAGZyme pQE vectors

TAGZyme DAPase™ Enzyme

For the removal of 6xHis tags from proteins expressed using TAGZyme pQE vectors

TAGZyme Qcyclase™/pGAPase™ Enzymes

For use in combination with TAGZyme DAPase Enzyme for the removal of 6xHis tags from proteins expressed using TAGZyme pQE vectors

- High specificity — exoproteolytic digest means no nonspecific cleavage takes place within the body of the protein
- A complete solution for tag removal — optimized vectors, enzymes, and resin
- Efficient tag removal — >95% in just 30 minutes at 37°C
- High-purity end products — TAGZyme enzymes, residual uncleaved protein, and tag fragments are completely removed by subtractive Ni-NTA chromatography
- Recombinant enzymes available in GMP-grade quality — important for the manufacture of therapeutics

Product description

The TAGZyme System is used to generate recombinant proteins free of affinity tags. Protein-encoding constructs are cloned into vectors based on pQE-TriSystem and expressed in *E. coli*, insect, or mammalian cells. Expressed proteins carry specially designed 6xHis tags that serve as substrates for the exoprotease DAPase and Qcyclase and pGAPase enzymes. These enzymes efficiently remove the affinity tag from target proteins and are themselves removed from digests by subtractive Ni-NTA affinity chromatography, leaving pure, recombinant proteins free of vector-encoded amino acids.

Applications

The TAGZyme system offers an absence of nonspecific cleavage, the use of recombinant reagents, and the complete removal of all contaminants, making it the method of choice for the production of His-tag–free proteins for applications including:

- Production of therapeutic proteins
- Protein structure determination by NMR or X-ray crystallography

Product	Contents	Cat. no.
TAGZyme pQE Vector Set	TAGZyme pQE-1 and pQE-2 Vector DNA, 25 µg each	32932
TAGZyme Kit	For processing of approximately 10 mg tagged protein: 0.5 units DAPase Enzyme, 30 units Qcyclase Enzyme, 10 units pGAPase Enzyme, 20 mM Cysteamine·HCl (1 ml), Ni-NTA Agarose (10 ml), 20 Disposable Columns	34300
TAGZyme DAPase Enzyme (2.5 U)	For processing of approximately 50 mg tagged protein: 2.5 units DAPase Enzyme, 20 mM Cysteamine·HCl (1 ml)	34362
TAGZyme DAPase Enzyme (50 U)*	For processing of approximately 1 g tagged protein: 50 units DAPase Enzyme, 20 mM Cysteamine·HCl (25 ml)	34366
TAGZyme Qcyclase/ pGAPase Enzymes (150 U/50 U)†	For processing of approximately 50 mg tagged protein: 150 units Qcyclase Enzyme, 50 units pGAPase Enzyme	34342

* Delivery of bulk quantities of enzymes may take up to 6 weeks; please inquire.

† Available in bulk quantities; please inquire.

For further information: www.qiagen.com/PG/proteinpurification

Factor Xa Protease System

For expression of 6xHis-tagged recombinant proteins with subsequent tag removal and purification

pQE-30 Xa Vector

For expression of 6xHis-tagged proteins containing a Factor Xa Protease recognition site

Factor Xa Protease and Xa Removal Resin

For cleavage of 6xHis tags at a Factor Xa Protease recognition site and efficient protease removal

- Easy cloning of a construct containing a Factor Xa Protease recognition site
- Efficient 6xHis tag cleavage (>90%) and high-purity target proteins

Product description

Protein-encoding constructs are cloned into the pQE-30 Xa vectors and expressed in *E. coli* cells. Expressed proteins carry a 6xHis tag at their N-terminus followed by a cleavage recognition motif for Factor Xa Protease. Factor Xa Protease cleaves the protein at this recognition site, leaving the protein free of the vector-encoded affinity tag. Factor Xa Protease is removed from digests using Xa Removal Resin, leaving recombinant proteins free of their 6xHis tag.

Applications

Proteins processed using the Factor Xa Protease system are well suited for applications where the removal of a protein's His tag may be preferred, including protein crystallography and structure determination studies using NMR.

Product	Contents	Cat. no.
pQE-30 Xa Vector	25 µg pQE-30 Xa Vector DNA	33203
Factor Xa Protease*	400 units Factor Xa Protease (2 units/µl)	33223
Xa Removal Resin	2 x 2.5 ml Xa Removal Resin, 3 x 1.9 ml 1 M Tris·Cl, pH 8.0	33213

* Not available in all countries.

For further information: www.qiagen.com/PG/proteinpurification

The Range of Qproteome Kits and their Properties

Qproteome kit	Protein categories	Sample size	Fractions isolated
Bacterial Protein Prep Kit (page 286)	Soluble bacterial proteins	25 ml bacterial culture per ml lysis buffer	Soluble bacterial proteins
Mammalian Protein Prep Kit (page 286)	Total mammalian proteins	5–10 x 10^6 cells per ml lysis buffer	Total mammalian proteins
Soluble Protein Separation Kit (page 287)	Whole proteome	10^6–10^7 cells or 500 µl protein sample (total protein 0.5–4 mg)	0.5–4 mg protein in 6 fractions separated according to protein solubility
Cell Compartment Kit (page 288)	Organelle-/cell compartment-specific	5 x 10^6 cells	0.5–1 mg protein divided between cytosolic, membrane, nuclear, and cytoskeletal protein fractions
Nuclear Subfractionation Kit (page 289)	Nuclear and nucleic acid binding proteins	5 x 10^6 – 1 x 10^7 cells	1.5–2.5 mg total protein divided between cytosolic proteins, "insoluble" nuclear proteins (e.g., histones), and 3 nucleic-acid–binding protein subfractions (50–100 µg each)
Nuclear Protein Kit (page 289)	Nuclear and nucleic acid binding proteins	5 x 10^6 – 1 x 10^7 cells	1.5–2.5 mg total protein divided between cytosolic proteins, "insoluble" nuclear proteins (e.g., histones), and nucleic-acid–binding protein fractions
Mitochondria Isolation Kit (page 290)	Intact, active mitochondria	5 x 10^6 cells	Intact active mitochondria (20–80 µg protein)
Plasma Membrane Protein Kits (page 291)	Plasma membrane proteins	1 x 10^7 cells	30–100 µg plasma membrane proteins
FFPE Tissue Kit (page 292)	Proteins from formalin-fixed paraffin-embedded (FFPE) tissue sections	2–3 10–15 µm sections, each 100 mm^2 in size	25–80 µg total protein, suitable for SDS-PAGE and western blotting
Total Glycoprotein Kit (page 293) Mannose Glycoprotein Kit (page 293) Sialic Glycoprotein Kit (page 293) O-Glycan Glycoprotein Kit (page 293)	Glycosylated proteins	10^7 cells or 50 µl serum	Separate enriched fractions containing 20–150 µg glycoproteins carrying lectin-specific glycan moieties
Albumin/IgG Depletion Kit (page 295)	Serum and plasma proteins	25 µl human serum or plasma	0.5–0.8 mg albumin and IgG-free serum or plasma protein sample
Murine Albumin Depletion Kit (page 295)	Serum and plasma proteins	25 µl mouse or rat serum or plasma	Up to 0.2–0.3 mg (mouse) or (0.5–0.7 mg rat) albumin-free serum or plasma protein sample
Phosphoprotein Purification Kit (page 296)	Phosphorylated proteins	1 x 10^7 cells	Unphosphorylated proteins and phosphorylated proteins (typically 10% total protein)
AllPrep RNA/Protein Kit (page 163)	Total mammalian proteins	Small cultured cell samples	Total mammalian proteins and total RNA

Qproteome Protein Prep Kits

For preparation of bacterial and mammalian proteins for proteomics and other procedures

- Gentle but effective cell lysis — high yields of active proteins
- Simple procedure — no specialized equipment required
- Highly reproducible procedure — consistent results time after time

Product description

Qproteome Protein Prep Kits contain a lysis buffer for preparation of soluble proteins from bacterial cultures or total proteins from mammalian cells for use in proteomics and other procedures.

The Qproteome Mammalian Protein Prep Kit provides gentle but efficient detergent-based lysis of mammalian cells to deliver a soluble protein fraction suitable for any downstream application.

Applications

The Qproteome Protein Prep Kits are used for preparation of soluble bacterial proteins or total mammalian proteins suitable for a variety of downstream applications, including:

- Proteomics procedures (e.g., 2D-PAGE, mass spectrometry)
- Purification for structural and functional characterization

Product	Contents	Cat. no.
Qproteome Bacterial Protein Prep Kit	For soluble protein preparations from up to 4.5 liters of bacterial cell culture: Lysis Buffer, Lysozyme, Benzonase Nuclease	37900
Qproteome Mammalian Protein Prep Kit	For approximately 100 protein preparations from cultured mammalian cells: Buffer, Reagents, Protease Inhibitor Solution, Benzonase Nuclease	37901

For further information: www.qiagen.com/PG/proteinpurification

Qproteome Soluble Protein Separation Kit

For crude fractionation of soluble proteins before further separation

- Highly reproducible fractionation of any cell lysate
- Simple procedure with just addition of fractionation buffer and centrifugation
- Fractions containing active proteins, ready to use in downstream applications

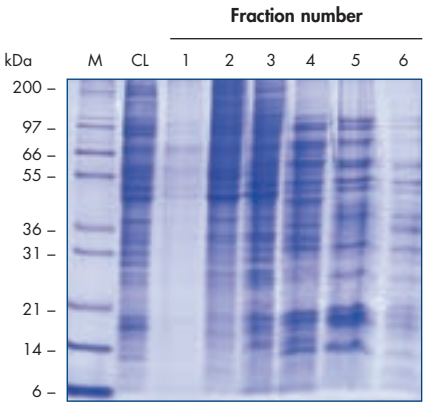
Product description

The kit contains buffers and reagents for the preparation of 6 separate protein fractions from cleared cell lysates.

Applications

The Soluble Protein Separation Kit is a general-use kit designed for fast and easy fractionation of complex protein samples. It can be used in the initial stages of a proteomics study to quickly and efficiently separate a target protein from the bulk of cellular proteins, reducing the complexity of the surrounding matrix and facilitating its analysis using methods such as 2D-PAGE or mass spectrometry.

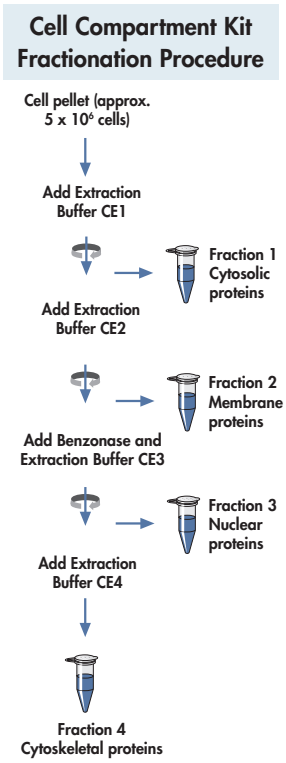
Efficient Fractionation of a Cell Lysate



Fractionation of an NIH-3T3 cell lysate sample using the Soluble Protein Separation Kit.
CL: cleared lysate; **M**: markers.

Product	Contents	Cat. no.
Qproteome Soluble Protein Separation Kit	For 10 soluble protein fractionations: Fractionation Buffer, Precipitation Reagents, Protease Inhibitor Solution, Benzonase® Nuclease	37512

For further information: www.qiagen.com/PG/proteinpurification



Qproteome Cell Compartment Kit

For fractionation of proteins according to cellular location

- Efficient and reproducible separation of proteins that are found in the cytosol, membranes, nucleus, or cytoskeleton
- Monitoring of the localization of proteins under different cellular growth conditions
- Enrichment of a particular subset of proteins from a cell compartment prior to further purification or analysis

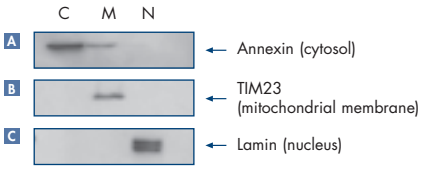
Product description

The kit contains 4 Extraction Buffers which enable the sequential isolation of proteins associated with the cytosol, membranes, nucleus, and cytoskeleton from cell lysates.

Applications

Subcellular fractionation of proteins can be used for enrichment of low-abundance species; definition of the subcellular localization of enzymes, regulatory, and structural proteins; and monitoring of compartmental redistribution of biomolecules under basal and stimulated conditions.

Specific Separation of Marker Proteins



Western blots of fractionated NIH 3T3 cells. Protein (20 µg) from the cytosolic (**C**), membrane (**M**), and nuclear (**N**) fractions was separated by SDS-PAGE. After western blotting, proteins specific to each fraction were detected using **A** annexin, **B** TIM23, and **C** lamin antibodies, and an HRP-conjugated secondary antibody.

Product	Contents	Cat. no.
Qproteome Cell Compartment Kit	For 10 subcellular fractionations: Extraction Buffers, Protease Inhibitor Solution, Benzonase Nuclease	37502

For further information: www.qiagen.com/PG/proteinpurification

Qproteome Nuclear Kits

For separation and fractionation of nucleic acid binding proteins

- Efficient separation of nuclei from cytosolic proteins
- Clean nucleic acid binding protein fraction for activity assays (Nuclear Protein Kit)
- Subfractionation of nucleic acid binding proteins for 2D-PAGE (Nuclear Subfractionation Kit)

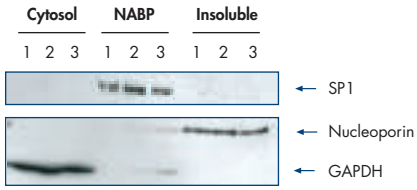
Product description

The Qproteome Nuclear Protein Kit contains buffers for isolation and fractionation of nucleic acid binding proteins. The Qproteome Nuclear Subfractionation Kit contains additional columns and resin for fractionation of nucleic acid binding proteins.

Applications

The Qproteome Nuclear Protein Kit delivers a nucleic acid binding protein fraction that is suitable for a range of activity assays. The additional fractionation provided by the Qproteome Nuclear Subfractionation Kit greatly facilitates analysis of low abundance proteins by 2D-PAGE.

Reproducible, Efficient Separation of Marker Proteins

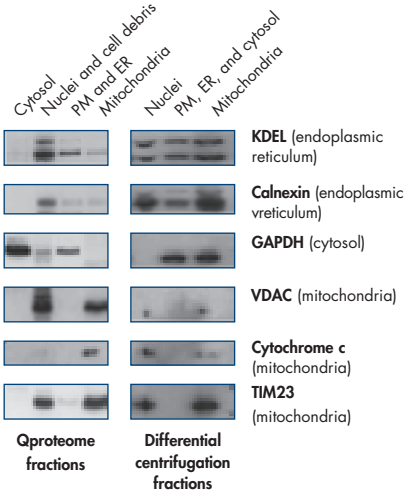


Three cell lysate preparations were processed in parallel using the Qproteome Nuclear Subfractionation Kit. Fractions were separated by SDS-PAGE. Fraction-specific markers (GAPDH, cytosolic fraction; transcription factor SP1, nucleic acid binding protein fraction [NABP]; and nucleoporin, insoluble fraction) were detected using protein-specific antibodies in a western blotting procedure.

Product	Contents	Cat. no.
Qproteome Nuclear Subfractionation Kit	For 6 nuclear protein preparations: Buffers, Reagents, Nuclear Protein Fractionation Columns (6), Nuclear Protein Fractionation Resin, Protease Inhibitor Solution, Benzonase Nuclease	37531
Qproteome Nuclear Protein Kit	For 12 nuclear protein preparations: Buffers, Reagents, Protease Inhibitor Solution, Benzonase Nuclease	37582

For further information: www.qiagen.com/PG/proteinpurification

Mitochondrial Fractions Virtually Free of Cross-Contamination



Western blots of mitochondrial preparations probed with antibodies specific for organelle-/ cell- compartment specific marker proteins. **PM:** plasma membrane; **ER:** endoplasmic reticulum.

New Qproteome Mitochondria Isolation Kit

For efficient isolation of high-purity mitochondria preparations

- High-purity, intact mitochondria — fully active proteins that are virtually free of contaminating proteins from other cell compartments
- Quality fractions time after time — thanks to a highly reproducible and standardized procedure
- Convenient and fast isolation in an easy-to-use kit format — no need for expensive specialized equipment or extra reagents

Product description

The Qproteome Mitochondria Isolation Kit provides buffers and reagents for isolation of high-purity mitochondria preparations.

Applications

Mitochondria are the subject of intense study in a number of fields, including apoptosis, proteomics, biomedical research, and drug discovery. The Qproteome Mitochondria Isolation Kit delivers high-purity mitochondria with proteins that retain their native conformation and full biological activity — making them highly suited for apoptosis studies, 2D-PAGE analysis, and other biochemical assays.

Product	Contents	Cat. no.
Qproteome Mitochondria Isolation Kit	Buffers and reagents for 12 high-purity mitochondrial preparations	37612

For further information: www.qiagen.com/PG/proteinexpression

New Qproteome Plasma Membrane Protein Kit

For efficient isolation of high-purity plasma membrane protein fractions

- High-purity plasma membrane fractions — fully active proteins that are virtually free of contaminating proteins from other cell compartments
- Quality fractions time after time — thanks to a highly reproducible and standardized procedure
- Convenient and fast isolation in an easy-to-use kit format — no need for expensive specialized equipment, protein derivatization, or extra reagents

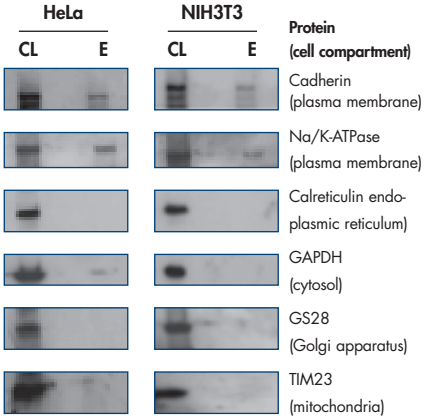
Product description

The Qproteome Plasma Membrane Protein Kit provides buffers and reagents for isolation of plasma-membrane proteins.

Applications

Unique bead-based purification technology in the Qproteome Plasma Membrane Kit delivers the highest purity plasma membrane fractions available from a commercial kit. The virtual absence of contaminants greatly facilitates analysis of low-abundance species (e.g., in mass spectrometry analyses). Unlike other methods, there is no need for biotinylation of surface proteins, meaning that all proteins retain their native conformation and full biological activity — making them highly suited for mass spectrometry analysis, receptor assays, cell signaling studies, and other drug discovery procedures.

Plasma Membrane Fractions Free from Cross-Contamination



Plasma membrane proteins were purified from either HeLa or NIH3T3 cell cultures using the Qproteome Plasma Membrane Protein Kit. Cell lysates **(CL)** and elution fractions **(E)** were separated by SDS-PAGE and transferred to a nitrocellulose membrane by western blotting. Proteins regarded as markers for different cell compartments were detected using protein-specific antibodies and an HRP-conjugated secondary antibody with chemiluminescent detection.

Product	Contents	Cat. no.
Qproteome Plasma Membrane Protein Kit	Buffers and reagents for 6 high-purity plasma membrane protein preparations	37601

For further information: www.qiagen.com/PG/proteinexpression

New Qproteome FFPE Tissue Kit

For efficient extraction of full-length proteins from formalin-fixed paraffin-embedded (FFPE) tissues

- Optimized conditions for extraction — complete proteins, suitable for SDS-PAGE and western blotting
- Efficient extraction — comparable to frozen tissue
- Enables comparison of protein expression — in disease and non-disease states

Product description

The Qproteome FFPE Tissue Kit provides buffers and reagents for extraction of proteins from FFPE tissue sections.

Applications

The standard histopathology and immunohistochemistry fixative formalin is usually used to preserve morphological details. Without further processing, the consequent crosslinking of the proteins in the sample means that this material is unsuitable for proteomic studies. The Qproteome FFPE Tissue Kit is used for extracting proteins from formalin-fixed, paraffin-embedded (FFPE) tissue sections. Extraction efficiency is comparable to that seen from frozen tissue, and the extracted proteins are suitable for applications such as western blot analysis.

Product	Contents	Cat. no.
Qproteome FFPE Tissue Kit (20)	For 20 preps: Buffers for extraction of proteins from FFPE tissue sections, collection tubes, sealing clips	37623
Qproteome FFPE Tissue Kit (100)	For 100 preps: Buffers for extraction of proteins from FFPE tissue sections, collection tubes, sealing clips	37625

For further information: www.qiagen.com/PG/proteinexpression

Qproteome Glycoprotein Kits

For isolation of glycoproteins

- Highly specific separation of glycoproteins according to the structure of their glycan moieties
- Profiling of glycoproteins in cells grown under different conditions or in different disease states
- A selection of lectin columns for comprehensive and precise glycoprotein characterization

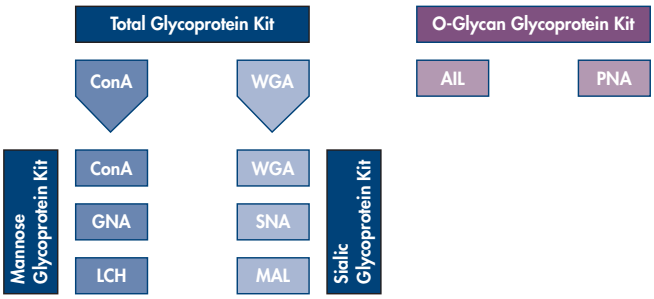
Product description

Qproteome Glycoprotein Kits contain lectin-resin filled spin columns, buffers, and reagents for the isolation of glycoproteins from cell lysate or serum samples.

Applications

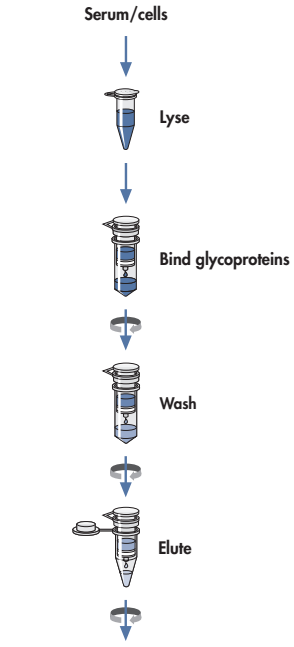
Qproteome Glycoprotein Kits offer highly specific separation of glycoproteins according to the structure of their glycan moieties, and permit profiling of glycoproteins in cells grown under different conditions. Purified glycoproteins are suitable for direct analysis using blotting procedures, 2D-PAGE, or mass spectrometry methods.

Comprehensive and Precise Analysis of Glycan Moieties

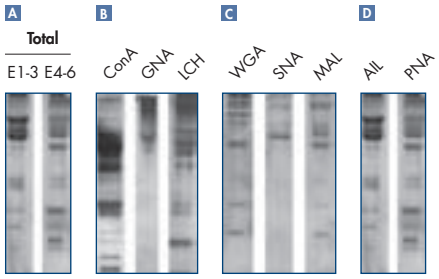


Initial analysis of glycoproteins can be carried out using the Total and O-Glycan Glycoprotein Kits. Depending on which lectin column binds a protein of interest, further studies on its precise nature can be performed using either the Mannose or Sialic Glycoprotein Kit.

Glycoprotein Fractionation Procedure



Highly Specific Glycoprotein Fractionation Using Lectin Spin Columns



Glycoproteins were fractionated from serum using the different lectin spin columns in glycoprotein fractionation kits and analyzed by SDS-PAGE followed by silver staining. A Elution steps 1–3 and 4–6 from Total Lectin Spin Columns in the Total Glycoprotein Kit. B Eluted glycoproteins from ConA, GNA, and LCH Spin Columns in the Mannose Glycoprotein Kit. C Eluted glycoproteins from WGA, SNA, and MAL Spin Columns in the Sialic Glycoprotein Kit. D Eluted glycoproteins from AIL and PNA Spin Columns in the O-Glycan Glycoprotein Kit.

Product	Contents	Cat. no.
Qproteome Total Glycoprotein Kit	For 6 total glycoprotein preps: Buffers, Lectin Spin Columns (6), Detergent Solution, Protease Inhibitor Solution, Collection Tubes (6 x 2 ml)	37541
Qproteome Mannose Glycoprotein Kit	For 6 mannose glycoprotein preps: ConA, GNA, and LCH Lectin Spin Columns (2 each); Buffers; Detergent Solution; Protease Inhibitor Solution; Collection Tubes (6 x 2 ml)	37551
Qproteome Sialic Glycoprotein Kit	For 6 sialic acid glycoprotein preps: WGA, SNA, and MAL Lectin Spin Columns (2 each); Buffers; Detergent Solution; Protease Inhibitor Solution; Collection Tubes (6 x 2 ml)	37561
Qproteome O-Glycan Glycoprotein Kit	For 6 O-glycan glycoprotein preps: AIL and PNA Lectin Spin Columns (3 each); Buffers; Protease Inhibitor Solution; Collection Tubes (6 x 2 ml)	37571

For further information: www.qiagen.com/PG/proteinpurification

Qproteome Depletion Kits

For separation of IgG and albumin from blood and blood products

- Efficient removal of IgG and/or albumin — facilitating analysis of less abundant proteins
- Highly specific depletion through use of immobilized monoclonal antibodies — ensuring that proteins of interest are not lost
- Easy-to-use spin column format in a fast procedure — saving time and streamlining analysis

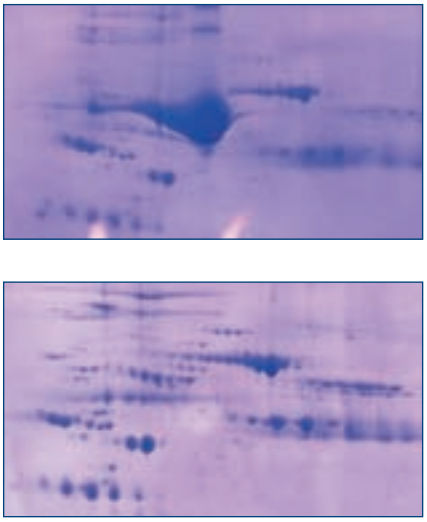
Product description

Qproteome Depletion Kits contain spin columns for depletion of IgG and/or albumin from human and murine serum or plasma samples.

Applications

The Qproteome Albumin/IgG Depletion Kit provides fast and specific removal of highly abundant albumin and IgG from human or murine serum and plasma samples to facilitate analysis of less abundant proteins.

Albumin/IgG Depletion Facilitates Analysis of Low-Abundance Proteins

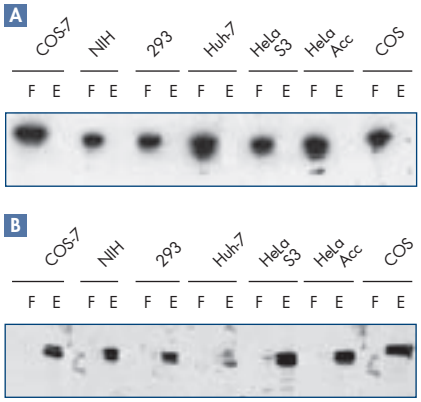


Coomassie® stained 2D-PAGE gels showing non-depleted (upper panel) and depleted (lower panel) plasma samples.

Product	Contents	Cat. no.
Qproteome Albumin/ IgG Depletion Kit	For albumin/IgG depletion of 6 human serum or plasma samples: 6 Albumin/ IgG Depletion Spin Columns	37521
Qproteome Murine Albumin Depletion Kit	For albumin depletion of 6 murine serum or plasma samples: 6 Murine Albumin Depletion Spin Columns	37591

For further information: www.qiagen.com/PG/proteinpurification

Complete Separation of Unphosphorylated and Phosphorylated Proteins



Protein-specific immunodetection of **A** unphosphorylated HSP-60 protein, and **B** phosphorylated p44 and p42 mitogen-activated protein kinase (MAPK) proteins. **F**: flow-through; **E**: eluate fractions. The antibody used to detect MAPK recognizes an epitope containing phosphorylated residues at Thr202 and Tyr204 in the p44 (upper band) and p42 (lower band) MAPK amino acid sequences. The absence of unphosphorylated HSP-60 in the eluate fraction and the absence of phosphorylated MAPK in the flow-through fraction demonstrate the complete separation of phosphorylated proteins using the PhosphoProtein Purification Kit.

PhosphoProtein Purification System

For separation and detection of phosphorylated proteins

PhosphoProtein Purification Kit

For purification of phosphorylated proteins by affinity chromatography

PhosphoSerine Antibody Q5

For detection of proteins containing phosphorylated serine residues

PhosphoThreonine Antibody Q7

For detection of proteins containing phosphorylated threonine residues

- Complete separation of phosphorylated and unphosphorylated proteins
- All you need in one kit, including columns, buffers, reagents, and ultrafiltration columns
- Cell-signaling studies without the need for radioactivity
- Detection of phosphorylated serine or threonine residues, irrespective of surrounding amino acids

Product description

The PhosphoProtein Purification System is used to separate eukaryotic cell lysates into two fractions, one containing phosphorylated and the other containing unphosphorylated proteins. Cell lysates are applied to PhosphoProtein affinity purification columns where phosphorylated proteins bind. The flow-through constitutes the unphosphorylated protein fraction. After washing, the phosphorylated proteins bound to the column are eluted using a phosphate buffer. After western blotting, proteins containing phosphorylated residues can be detected using PhosphoSerine or PhosphoThreonine antibodies.

Applications

The PhosphoProtein Purification Kit provides a complete separation of phosphorylated and unphosphorylated protein fractions for research in:

- Proteomics
- Cell signaling and apoptosis
- Protein kinases and oncology
- Immune disorders

Product	Contents	Cat. no.
PhosphoProtein Purification Kit (6)	6 PhosphoProtein Purification Columns, 6 Nanosep® Ultrafiltration Columns, Reagents, Buffers	37101
PhosphoSerine Antibody Q5 (100 µg)	100 µg mixture of anti-phosphoserine antibodies (isotypes mouse IgG1 and IgM, for 200 ml working solution)	37430
PhosphoThreonine Antibody Q7 (100 µg)	100 µg anti-phosphothreonine antibody (isotype mouse IgG1, for 200 ml working solution)	37420

For further information: www.qiagen.com/PG/proteinpurification

Qproteome GlycoArray Kit

For array-based characterization of glycoproteins

- No sample purification — allowing "real-time" monitoring of samples in culture medium
- No sample cleavage or separation — saving time during analysis
- Comprehensive qualitative and quantitative data from a single method
- Comparative analysis of multiple samples — quick and easy comparison of different clones, growth conditions, etc.

Product description

The Qproteome GlycoArray Kit contains lectin-based array slides, buffers, reagents, and software for comprehensive "fingerprint" analysis of glycan makeup in glycoproteins.

Applications

By providing a comprehensive analysis of glycan makeup, the Qproteome GlycoArray Kit can be used for glycoprotein studies in the fields of:

- Clone screening, selection, and optimization
- ADME and toxicology
- Stability testing
- QA/QC and batch monitoring

Product	Contents	Cat. no.
Qproteome GlycoArray Kit (6)	For 6 glycoprotein analyses: 6 Lectin-based Arrays, Incubation Frames, Buffers, CD containing analysis software and kit definition file	37702

For further information: www.qiagen.com/PG/proteinpurification

6xHis Detection: Reagent Specifications

	Penta·His Antibody (page 300)	RGS·His Antibody (page 300)	Tetra·His Antibody (page 300)	Anti·His HRP Conjugates (page 303)	Ni-NTA Conjugates (page 302)
Epitope detected	HHHHH	RGSHHHH*	HHHH	As relevant antibody§	n.a.
Dissociation constant, K_d (M)	5×10^{-9} – 1×10^{-8}	1×10^{-8} – 5×10^{-8}	1×10^{-8} – 5×10^{-8}	As relevant antibody§	n.d.
Sensitivity in dot blots (2 mm dots)†	10 pg	10 pg	10 pg	10 pg	n.a.
Sensitivity in dot blots (2 mm dots)‡	0.5 ng	0.5 ng	0.5 ng	n.d.	1–2 ng
Sensitivity in western blots†	50 pg	50 pg	50 pg	50 pg	n.a.
Sensitivity in western blots‡	2 ng	2 ng	2 ng	n.d.	2–5 ng
Direct detection on blots or in ELISA	Secondary antibody required	Secondary antibody required	Secondary antibody required	**YES**	**YES**
Conjugated enzyme	None	None	None	Horseradish peroxidase	Alkaline phosphatase/ Horseradish peroxidase

n.a.: Not applicable. n.d.: Not determined.

* Recombinant proteins expressed from pQE-9, pQE-30, pQE-31, pQE-32, pQE-40, pQE-80L, pQE-81L, pQE-82L, pQE-100 DoubleTag, pRSET (Invitrogen), and pBlueBacHis (Invitrogen) encode this epitope.

† Detection using chemiluminescent substrate.

‡ Detection using alkaline phosphatase chromogenic substrate. The apparent sensitivity on western blots is lower than on dot blots due to loss of protein during transfer.

§ Anti·His HRP Conjugates are available as Penta·His, Tetra·His, and RGS·His variants, and have the same 6xHis tag recognition and binding properties as the corresponding antibody.

Anti·His Antibodies

Anti·His Antibody Selector Kit

For cost-effective comparison and determination of optimal antibody for detection of 6xHis-tagged proteins

RGS·His Antibody and RGS·His Antibody, BSA-free

For sensitive detection of 6xHis-tagged proteins with an RGS·His epitope

Tetra·His Antibody, BSA-free

For sensitive detection of 6xHis-tagged proteins with HHHH epitopes

Penta·His Antibody, BSA-free

For sensitive detection of 6xHis-tagged proteins with HHHHH epitopes

All Anti·His Antibodies provide:

- Highly specific and sensitive detection of C-terminal, N-terminal, and internal 6xHis tags
- Negligible background signal in cell extracts

Product description

Monoclonal mouse Anti·His Antibodies are used to detect recombinant proteins carrying 6xHis tags. Three variants are available, each of which detects a different 6xHis-tag epitope.

Applications

QIA*express* Detection Systems, using Anti·His Antibodies, allow efficient detection of 6xHis-tagged proteins and are ideal for many applications including:

- Colony, dot, and western blotting procedures
- Screening for positive expression clones
- Monitoring expression levels and stability of 6xHis-tagged proteins
- Immunoprecipitation and ELISA
- Immunocytochemistry and immunohistochemistry
- Protein localization and targeting studies
- *x*MAP® bead-based assays

Product	Contents	Cat. no.
Anti·His Antibody Selector Kit	RGS·His Antibody, Penta·His Antibody, Tetra·His Antibody, all BSA-free, 3 µg each	34698
RGS·His Antibody (100 µg)	100 µg mouse anti-RGS$(H)_4$ (lyophilized, with BSA, for 1000 ml working solution)	34610
RGS·His Antibody, BSA-free (100 µg)	100 µg mouse anti-RGS$(H)_4$ (lyophilized, BSA-free, for 1000 ml working solution)	34650
Tetra·His Antibody, BSA-free (100 µg)	100 µg mouse anti-$(H)_4$ (lyophilized, BSA-free, for 1000 ml working solution)	34670
Penta·His Antibody, BSA-free (100 µg)	100 µg mouse anti-$(H)_5$ (lyophilized, BSA-free, for 1000 ml working solution)	34660

Please inquire for availability and pricing of bulk quantities.

For further information: www.qiagen.com/PG/proteinpurification

Ni-NTA Conjugates

For simple, direct detection of 6xHis-tagged proteins without secondary antibodies

- Direct detection of 6xHis-tagged proteins
- Greatly streamlined detection procedures that eliminate the need for antibodies
- Sensitive detection using small quantities of conjugate

Product description

Ni-NTA Conjugates are used to detect recombinant proteins carrying 6xHis tags without the need for antibodies. They consist of Ni-NTA conjugated to either horseradish peroxidase (HRP) or alkaline phosphatase (AP). In detection procedures, the Ni-NTA moiety binds to a protein's 6xHis tag and the complex is localized using chromogenic substrates that react with HRP or AP.

Applications

Ni-NTA Conjugates are recommended for use with chromogenic substrates, and for *E. coli* expression systems for:

- Western, dot, and colony blotting procedures

Product	Contents	Cat. no.
Ni-NTA HRP Conjugate	Horseradish-peroxidase-conjugated Ni-NTA (lyophilized, for 500 ml working solution)	34530
Ni-NTA AP* Conjugate	Alkaline-phosphatase-conjugated Ni-NTA (lyophilized, for 500 ml working solution)	34510

* Not available in all countries.

For further information: www.qiagen.com/PG/proteinpurification

Anti·His HRP Conjugate Kits

For sensitive, direct detection of 6xHis-tagged proteins

- High-sensitivity and high-speed detection of 6xHis-tagged proteins
- No need for secondary antibody
- Optimized blocking reagent supplied

Product description

Anti·His HRP Conjugates are for sensitive detection of recombinant proteins carrying 6xHis tags without the need for secondary antibodies. They consist of Anti·His antibodies conjugated to horseradish peroxidase (HRP). In detection procedures, the Anti·His antibody binds to a protein's 6xHis tag and the complex is localized using chemiluminescent or chromogenic substrates that react with HRP.

Applications

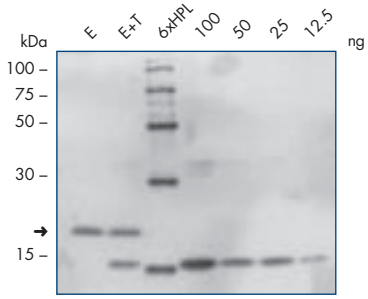
Anti·His HRP Conjugates can be used for direct chemiluminescent or chromogenic detection of 6xHis-tagged proteins in:

- Western, dot, and colony blotting procedures
- ELISA and other immunoassay procedures

Product	Contents	Cat. no.
RGS·His HRP Conjugate Kit	125 µl RGS·His HRP Conjugate, 5 g Blocking Reagent, 50 ml Blocking Reagent Buffer (10x concentrate)	34450
Penta·His HRP Conjugate Kit	125 µl Penta·His HRP Conjugate, 5 g Blocking Reagent, 50 ml Blocking Reagent Buffer (10x concentrate)	34460
Tetra·His HRP Conjugate Kit	125 µl Tetra·His HRP Conjugate, 5 g Blocking Reagent, 50 ml Blocking Reagent Buffer (10x concentrate)	34470

For further information: www.qiagen.com/PG/proteinpurification

Detection of 6xHis-Tagged Proteins



1 µg *E. coli* cell lysate (**E**), 1 µg *E. coli* cell lysate plus 25 ng purified 6xHis-tagged thioredoxin (**E+T**), or the indicated amount of purified 6xHis-tagged thioredoxin was loaded onto a 15% acrylamide gel, separated by SDS-PAGE, and electroblotted onto a nitrocellulose membrane. Chromogenic detection was carried out using Penta·His Biotin Conjugate with a streptavidin-alkaline phosphatase conjugate and NBT/BCIP detection reagent. The arrowed band is the endogenous, biotinylated *E. coli* biotin carboxyl carrier protein (BCCP). **6xHPL**: 6xHis Protein Ladder.

Penta·His Biotin Conjugate

For highly specific and sensitive detection of 6xHis-tagged proteins with HHHHH epitopes

Streptavidin–R-PE

For sensitive detection and localization of biotinylated antibodies

- Flexible detection using any streptavidin or avidin conjugate
- Highly sensitive fluorescent detection of any biotinylated molecule
- Optimized for use with the Penta·His Biotin Conjugate

Product description

In detection procedures, the Penta·His Conjugate binds to a protein's 6xHis tag and the complex is localized using avidin derivatives, such as Streptavidin, which can be conjugated to fluorescent dyes (e.g., Streptavidin–R-PE) or other proteins used in detection procedures (e.g., HRP or AP).

Applications

Penta·His Biotin Conjugate and Streptavidin–R-PE allow colorimetric, chromogenic, chemiluminescent, or fluorescent detection of 6xHis-tagged proteins in:

- Western and dot blotting
- ELISA and other immunoassay procedures
- xMAP multiplex assays (see page 313)

Product	Contents	Cat. no.
Penta·His Biotin Conjugate	125 µl Penta·His Biotin Conjugate, 200 µg/ml	34440
Streptavidin–R-PE	250 µg Streptavidin–R-phycoerythrin Conjugate, 1 mg/ml	922721

For further information: www.qiagen.com/PG/proteinpurification

Penta·His Alexa Fluor® Conjugates

For sensitive, direct immunofluorescent detection of 6xHis-tagged proteins

- Highly specific and sensitive detection of 6xHis-tagged proteins
- Direct detection without the need for a secondary antibody
- Broad instrument compatibility and high photostability

Product description

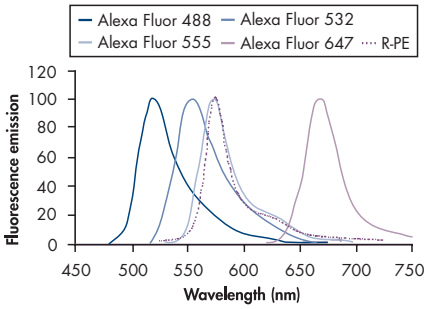
Penta·His Alexa Fluor Conjugates are for sensitive, direct immunofluorescent detection of recombinant proteins carrying 6xHis tags. They consist of Penta·His antibodies conjugated to intensely fluorescing Alexa Fluor 488, 532, 555, and 647 dyes. In detection procedures, the Penta·His antibody binds to a protein's 6xHis tag and the complex is localized by fluorescent microscopy.

Applications

Penta·His Alexa Fluor Conjugates allow sensitive direct immunofluorescent detection of 6xHis-tagged proteins and are highly suited for many applications including:

- Immunocytochemistry and immunohistochemistry
- Protein localization and targeting studies
- xMAP multiplex assays (see page 313)

Alexa Fluor and R-PE Emission Spectra

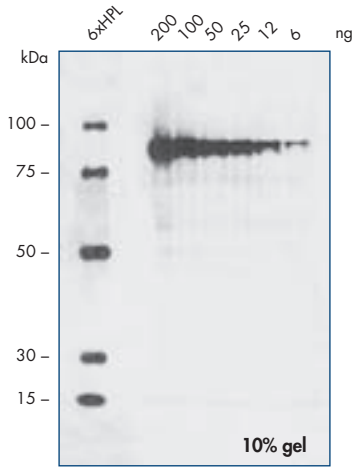


Normalized fluorescence emission spectra of Alexa Fluor dyes. Spectra were recorded in aqueous solution at pH 8.0 (Alexa Fluor 488), pH 7.2 (Alexa Fluor 532, 555, and 647), and pH 7.5 (R-PE).

Product	Contents	Cat. no.
Penta·His Alexa Fluor 488 Conjugate	125 µl Penta·His Alexa Fluor 488 Conjugate, 200 µg/ml	35310
Penta·His Alexa Fluor 532 Conjugate	125 µl Penta·His Alexa Fluor 532 Conjugate, 200 µg/ml	35330
Penta·His Alexa Fluor 555 Conjugate	125 µl Penta·His Alexa Fluor 555 Conjugate, 200 µg/ml	35350
Penta·His Alexa Fluor 647 Conjugate	125 µl Penta·His Alexa Fluor 647 Conjugate, 200 µg/ml	35370

For further information: www.qiagen.com/PG/proteinpurification

6xHis-Tagged DNA Polymerase Detected by Tetra·His Antibody in Huh7 Cells



The indicated amounts of purified 6xHis-tagged DNA polymerase mixed with crude extract from Huh7 cells (5 µg total protein per lane) were applied to a 10% SDS-polyacrylamide gel. After electrophoresis and western transfer, 6xHis-tagged proteins were detected with Tetra·His Antibody followed by chemiluminescent detection with AP-conjugated rabbit anti-mouse IgG and CDP-Star™ detection reagent. **6xHPL**: 6xHis Protein Ladder.

6xHis Protein Ladder

For convenient molecular weight determination of 6xHis-tagged proteins on western blots

- Premixed standards provide equal intensity bands on blots
- Saves time and simplifies western blotting of 6xHis-tagged proteins

Product description

The 6xHis Protein Ladder is a mixture of 5 different 6xHis-tagged proteins with molecular weights between 15 and 100 kDa. Once separated using SDS-PAGE and blotted, they are used as size markers and positive controls when using Anti·His antibodies for detection.

Applications

- Marker and positive control for western blotting

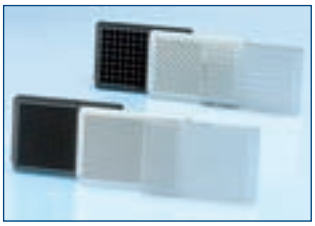
Product	Contents	Cat. no.
6xHis Protein Ladder	6xHis-tagged marker proteins (lyophilized, for 50–100 lanes on western blots)	34705

For further information: www.qiagen.com/PG/proteinpurification

Ni-NTA HisSorb Strips and Plates

For assays using 6xHis-tagged biomolecules

- Directed presentation of 6xHis-tagged biomolecules for enhanced signal-to-noise ratio and reproducibility
- Convenient multiwell-based assay system
- Reduced number of optimization steps allows more rapid assay design



Ni-NTA HisSorb Plates

Product description

Ni-NTA HisSorb Strips and Plates are 8-well strips and 96-well plates whose wells are coated with Ni-NTA. They are used for immobilization of 6xHis-tagged proteins in protein interaction assays, such as ELISA. Up to 0.3 µg protein is bound per well.

Applications

Ni-NTA HisSorb Strips and Plates are suitable for a range of applications including:

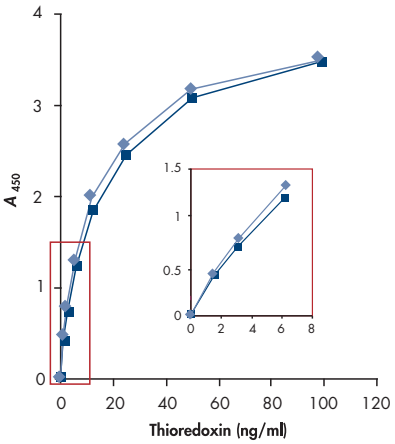
- Quantification of 6xHis-tagged biomolecules
- ELISA or RIA
- Expression-clone, hybridoma, and antibody screening
- Protein interaction studies

Product	Contents	Cat. no.
Ni-NTA HisSorb Strips (24)	2 racks of 12 x Ni-NTA-coated 8-well strips in 96-well format	35023
Ni-NTA HisSorb Plates (5)	5 Ni-NTA-coated, transparent 96-well plates	35061
Ni-NTA HisSorb Plates, white (5)	5 Ni-NTA-coated, opaque, white 96-well plates	35081

Please inquire about customized assay products available in minimum orders of 100 plates (allow 6 weeks for delivery). The customized products available include Ni-NTA HisSorb Plates (transparent, white, or black) in 96- and 384-well format, as well as plates coated with any of the QIA*express* Anti-His Antibodies (page 300) in 96- or 384-well format.

For further information: www.qiagen.com/PG/proteinassay

ELISA Using Ni-NTA HisSorb Strips and Tag·100 Antibody



Thioredoxin tagged with 6xHis at the N-terminus and with the Tag·100 at the C-terminus was diluted in 0.2% BSA in PBS, pH 7.2, applied to Ni-NTA HisSorb Strips either with (■) or without (◆) 25 µg/ml NIH/3T3 lysate protein and incubated for 1.5 h at room temperature (RT). The amount of immobilized protein was determined by incubating with the Tag·100 Antibody for 2 h at RT followed by peroxidase-conjugated anti-mouse IgG secondary antibody for 1 h at RT and detected using o-phenylenediamine as substrate.

DoubleTag Assay System

For expression and detection of proteins tagged with both 6xHis and Tag·100 epitopes

pQE-100 DoubleTag Vector DNA

For high-level expression of proteins tagged with both 6xHis and Tag·100

Tag·100 Antibody, BSA-free

For sensitive detection of MAPK1 proteins or proteins expressed from the pQE-100 DoubleTag Vector

- Universal assay system for drug and enzyme screening
- No need for protein-specific antibodies

Product description

Proteins expressed using the pQE-100 DoubleTag vector carry a 6xHis tag at their N-terminus and a Tag·100 epitope at their C-terminus. The Tag·100 epitope is recognized by the Tag·100 mouse monoclonal antibody.

Applications

By allowing directed immobilization via a 6xHis tag and detection by the Tag·100 epitope the DoubleTag Assay system is highly suited for:

- ELISA procedures, for example for drug screening or accurate protein quantification
- Monitoring MAPK1 gene silencing in human and mouse cells by western blot analysis (see page 235)

Product	Contents	Cat. no.
pQE-100 DoubleTag Vector DNA	25 µg pQE-100 (lyophilized)	33003
Tag·100 Antibody, BSA-free (100 µg)	100 µg mouse anti-Tag·100 (lyophilized, BSA-free, for 1000–2500 ml working solution for ELISA)	34680

For further information: www.qiagen.com/PG/proteinassay

BioMag® Secondary Antibody Suspensions

For magnetic cell separation and magnetocapture, immunoassays, and binding of immunoglobulins

- Well-suited for negative selection
- Fast and easy batch format, no columns required
- Easily adaptable to a range of vessel sizes
- Large particles for rapid cell separation
- Highly economical

Product description

BioMag Secondary Antibody Suspensions are magnetic particles coated with polyclonal antibodies.

Applications

BioMag secondary antibody suspensions provide a well-established and economical technology for indirect negative depletion in cell separation applications. They are also highly suited for use in enzyme immunoassays and radioassays that utilize the appropriate monoclonal primary antibody.

Product	Contents	Cat. no.
BioMag Goat Anti-Human IgG (50 ml)	BioMag goat anti-human IgG secondary antibody suspension (1 mg/ml)	310304
BioMag Goat Anti-Human IgG Fc (50 ml)	BioMag goat anti-human IgG (Fc-region specific) secondary antibody suspension (5 mg/ml)	310344
BioMag Goat Anti-Mouse IgG (50 ml)	BioMag goat anti-mouse IgG secondary antibody suspension (1 mg/ml)	310004
BioMag Goat Anti-Mouse IgG (500 ml)	BioMag goat anti-mouse IgG secondary antibody suspension (1 mg/ml)	310007

Product	Contents	Cat. no.
BioMag Goat Anti-Mouse IgG Fc (50 ml)	BioMag goat anti-mouse IgG (Fc-region specific) secondary antibody suspension (5 mg/ml)	310044
BioMag Goat Anti-Mouse IgG Fc (500 ml)	BioMag goat anti-mouse IgG (Fc-region specific) secondary antibody suspension (5 mg/ml)	310047
BioMag Goat Anti-Mouse IgM (50 ml)	BioMag goat anti-mouse IgM secondary antibody suspension (1 mg/ml)	310084
BioMag Goat Anti-Mouse IgM (500 ml)	BioMag goat anti-mouse IgM secondary antibody suspension (1 mg/ml)	310087
BioMag Goat Anti-Rabbit IgG (50 ml)	BioMag goat anti-rabbit IgG secondary antibody suspension (1 mg/ml)	310204
BioMag Goat Anti-Rabbit IgG (500 ml)	BioMag goat anti-rabbit IgG secondary antibody suspension (1 mg/ml)	310207
BioMag Goat Anti-Rat IgG (50 ml)	BioMag goat anti-rat IgG secondary antibody suspension (1 mg/ml)	310104
BioMag Goat Anti-Rat IgG (500 ml)	BioMag goat anti-rat IgG secondary antibody suspension (1 mg/ml)	310107
BioMag Goat Anti-Rat IgG Fc (50 ml)	BioMag goat anti-rat IgG (Fc-region specific) secondary antibody suspension (5 mg/ml)	310144
BioMag Goat Anti-Rat IgG Fc (500 ml)	BioMag goat anti-rat IgG (Fc-region specific) secondary antibody suspension (5 mg/ml)	310147
BioMag Sheep Anti-Fluorescein IgG (50 ml)	BioMag sheep anti-fluorescein IgG secondary antibody suspension (1 mg/ml)	310704
BioMag Sheep Anti-Fluorescein IgG (500 ml)	BioMag sheep anti-fluorescein IgG secondary antibody suspension (1 mg/ml)	310707

For further information: www.qiagen.com/PG/cellsep

BioMag Streptavidin Suspensions

For DNA probe assays, mRNA isolation, and separation of biotinylated compounds in solution

- Well-suited for proteomics, cell biology, and nucleic acid purification
- Fast and easy batch format, no columns required
- Easily adaptable to a range of vessel sizes
- Large particles for rapid cell separation
- Highly economical

Product description

BioMag Streptavidin Suspensions are magnetic particles coated with Streptavidin.

Applications

BioMag streptavidin suspensions are available in standard or nuclease-free format, highly suited for applications in proteomics, cell biology, and nucleic acid purification. They are suitable for use in DNA probe assays, mRNA isolation, or for rapid separation of a biotinylated component in solution. BioMag streptavidin suspensions are also well suited for use in enzyme immunoassays and cell sorting.

Product	Contents	Cat. no.
BioMag Streptavidin (5 ml)	BioMag streptavidin suspension (5 mg/ml)	311711
BioMag Streptavidin (50 ml)	BioMag streptavidin suspension (5 mg/ml)	311714
BioMag Nuclease-Free Streptavidin (10 ml)	BioMag nuclease-free streptavidin suspension (1 mg/ml)	311732

For further information: www.qiagen.com/PG/cellsep

BioMag Protein A and Protein G Suspensions

For high-affinity binding of immunoglobulins, removal of Fc fragments, and immunoassays

- Highly suited for immunoprecipitation applications
- Fast and easy batch format, no columns required
- Easily adaptable to a range of vessel sizes
- Highly economical

Product description

BioMag Protein A and Protein G Suspensions are magnetic particles coated with Protein A or Protein G.

Applications

BioMag Protein A and Protein G suspensions are highly suited for immunoprecipitation applications. They are also well suited for use in immunoassays or can be used for removal of Fc fragments during Fab fragment purification.

Magnets

For separating magnetic particles

Product	Contents	Cat. no.
BioMag Protein A (10 ml)	BioMag Protein A suspension (5 mg/ml)	311802
BioMag Protein G (10 ml)	BioMag Protein G suspension (5 mg/ml)	311812
Single-Tube Magnet	Magnet for separating magnetic particles in a 1.5 ml or 2 ml tube	36910
12-Tube Magnet	Magnet for separating magnetic beads in 12 x 1.5 ml or 2 ml tubes	36912
15 ml/50 ml Tube Magnet	Magnet for separating magnetic particles in 5 x 15 ml and 3 x 50 ml tubes	36935
Flask Magnet	Magnet for separating magnetic particles in a cell culture flask	36937

For further information: www.qiagen.com/PG/cellsep

Automated

LiquiChip® 200 Workstation

For multiplex bead-based *x*MAP assays

- Multiplexing capacity provides more information using less sample
- Highly flexible system allows easy and rapid assay development
- High sensitivity in protein assays, down to picogram levels
- An extensive support network for instrumentation and applications
- Most up-to-date *x*MAP instrumentation

LiquiChip 200 Workstation.

Product description

The LiquiChip Workstation is used to analyze bead-based interaction assays. A system of bead color-coding enables up to 100 separate interactions to be analyzed simultaneously. The workstation includes a reader, a microplate handler for processing of 96-well plates, a system-fluid unit, a computer with TFT monitor, and software for assay and data analysis.

Applications

Virtually all types of protein-based interaction assay can be quickly and easily established using the LiquiChip system, including:

- Immunoassays
- Protein–protein and protein–nucleic acid interaction assays (e.g., interaction mapping)
- Enzyme assays (e.g., kinase, phosphatase, and protease assays)
- DNA hybridization assays

Product	Contents	Cat. no.
LiquiChip 200 Workstation	LiquiChip Reader; LiquiChip Microplate Handler and LiquiChip Fluid Module; computer; operating system, TFT-monitor; installation; 3 year warranty on parts and labor; yearly Preventive Maintenance visit	Inquire
LiquiChip 200 Workstation (Analyzer)	LiquiChip Reader, LiquiChip Microplate Handler and Fluid Module, computer, operating system, TFT monitor, installation, 3 year warranty on parts and labor, yearly preventative maintenance visit, LiquiChip Analyzer software	Inquire

The LiquiChip Workstation is not available in all countries; please inquire.

For further information: www.qiagen.com/PG/liquichip

Efficient Data Analysis

Standard curves are generated by automatic selection of the optimal curve-fitting equation, saving time and ensuring accurate results.

LiquiChip Analyzer Software

For highly accurate and efficient analysis of *x*MAP protein assay data

- Easy to use with many time-saving functions — automatic calculation of standard concentrations and selection of optimal curve-fitting formula
- A tool developed specifically for analysis of multiplex protein assays — comprehensive data analysis and viewing tools in a highly intuitive user interface based around assay analysis workflow
- State-of-the art curve-fitting algorithms — for highest accuracy in assay analysis
- Compatibility with all *x*MAP instruments and Microsoft Windows applications — open system with spreadsheet-style fields for easy import and export of data
- Full 21 CFR Part 11 compatibility for electronic record-keeping (optional) — facilitating use in regulated environments

Product description

Windows-based LiquiChip Analyzer Software has been developed for fast and efficient processing of multiplex protein assay data generated by the LiquiChip Workstation or any other *x*MAP instrument.

Product	Contents	Cat. no.
Software Pack LiquiChip Policy Manager	Software upgrade LiquiChip Policy Manager (including hardware lock)	9016743
Upgrade LiquiChip Analyzer (Research) +	For *x*MAP systems operated by Luminex/ LiquiChip IS 2.x.: Includes computer, TFT monitor, LiquiChip Analyzer software, upgrade LiquiChip IS 2.3 software, on-site installation and training	9239395
Upgrade LiquiChip Analyzer (Research)	Software upgrade LiquiChip Analyzer Software, on-site installation and training	9239396

For further information: www.qiagen.com/PG/liquichip

Automated

LiquiChip Activated Beads

For efficient covalent immobilization of antibodies and other thiol-containing biomolecules in LiquiChip assays

- Fast and easy direct immobilization using a one-tube procedure
- No pre-activation or multiple wash steps
- Efficient immobilization of antibodies
- Suitable for use with any biomolecule containing a free thiol group

Product description

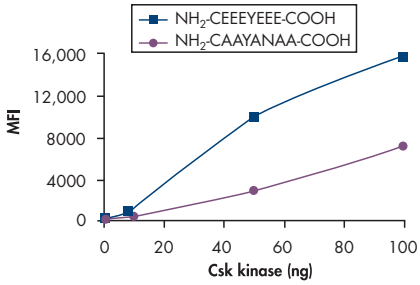
LiquiChip Activated Beads enable covalent immobilization of thiol-containing biomolecules (e.g., antibodies, GST-fusion proteins) for LiquiChip assays. Immobilizing different molecules on beads with different codes enables multiplexing of assays.

Applications

By allowing fast and easy covalent immobilization of thiol-containing molecules, LiquiChip Activated Beads enable highly sensitive *x*MAP assays including:

- Sandwich immunoassays
- Peptide-based kinase and protease assays

Kinase Assay Using LiquiChip Activated Beads



Substrate peptides (10 µg each) were coupled via an N-terminal cysteine residue to 2.5 x 10^5 LiquiChip Activated Beads. The peptide-coated LiquiChip beads were incubated for 1 h at 30°C with the indicated amounts of purified Csk kinase. Phosphorylation of the peptide was detected by sequentially adding a phosphotyrosine-specific mouse monoclonal antibody, a goat anti-mouse biotin conjugate, and Streptavidin-PE.

Product	Contents	Cat. no.
LiquiChip Activated Beads (500)	Activated Beads code 61; 0.5 ml for 500 homogeneous assay points	922540
LiquiChip Activated Bead Set A (4 x 500)	Activated Beads code 61, 62, 63, and 64; 0.5 ml each for 4 x 500 homogeneous assay points	922541
LiquiChip Activated Bead Set B (4 x 500)	Activated Beads code 65, 66, 67, and 68; 0.5 ml each for 4 x 500 homogeneous assay points	922543

For further information: www.qiagen.com/PG/liquichip

Automated

LiquiChip Ni-NTA Beads

For immobilization of His-tagged capture molecules via the Ni-NTA–6xHis-tag interaction

- 6xHis-tag chemistry used at all stages of protein handling, from purification to assay
- Universal, directed immobilization of functionally active 6xHis-tagged proteins via their N- or C-terminal 6xHis tag
- Minimal requirement for optimization of coupling conditions
- Tight binding, enabling multiplex assays using different 6xHis-tagged proteins

Product description

LiquiChip Ni-NTA Beads are coated with Ni-NTA and enable immobilization of 6xHis-tagged proteins for LiquiChip assays. Immobilizing different proteins on beads with different codes enables multiplexing of assays.

Applications

By providing directed immobilization of 6xHis-tagged proteins in *x*MAP assays, LiquiChip Ni-NTA Beads enable highly sensitive protein-based assays including:

- Immunoassays
- Protein–protein and protein–nucleic acid interaction assays (e.g., interaction mapping)
- Enzyme assays (e.g., kinase, phosphatase, and protease assays)

Product	Contents	Cat. no.
LiquiChip Ni-NTA Beads (500)	Ni-NTA Beads code 52; 0.25 ml for 500 homogeneous assay points	922500
LiquiChip Ni-NTA Bead Set A (4 x 500)	Ni-NTA Beads code 50, 52, 54, and 58; 0.25 ml each for 4 x 500 homogeneous assay points	922501
LiquiChip Ni-NTA Bead Set B (4 x 500)	Ni-NTA Beads code 32, 34, 36, and 38; 0.25 ml each for 4 x 500 homogeneous assay points	922503
LiquiChip Ni-NTA Bead Set C (4 x 500)	Ni-NTA Beads code 24, 26, 28, and 30; 0.25 ml each for 4 x 500 homogeneous assay points	922505

For further information: www.qiagen.com/PG/liquichip

Automated

LiquiChip Penta·His Beads

For immobilization of His-tagged capture molecules via Penta·His Antibodies

- 6xHis-tag chemistry used at all stages of protein handling, from purification to assay
- Universal, directed immobilization of functionally active 6xHis-tagged proteins via their N- or C-terminal 6xHis tag
- Tight binding, enabling multiplex assays using different 6xHis-tagged proteins
- Antibody–antigen mediated immobilization enables addition of reagents that may disturb the Ni-NTA–6xHis tag interaction (e.g., EDTA)

Product description

LiquiChip Penta·His Beads coated with Penta·His Antibody and enable immobilization of 6xHis-tagged proteins for LiquiChip assays. Immobilizing different proteins on beads with different codes enables multiplexing of assays.

Applications

By providing directed immobilization of 6xHis-tagged proteins in *x*MAP assays, LiquiChip Penta·His Beads enable highly sensitive protein-based assays including:

- Immunoassays
- Protein–protein and protein–nucleic acid interaction assays
- Enzyme assays (e.g., kinase, phosphatase, and protease assays)

Product	Contents	Cat. no.
LiquiChip Penta·His Beads (500)	Penta·His Beads code 81; 0.25 ml for 500 homogeneous assay points	922520
LiquiChip Penta·His Bead Set A (4 x 500)	Penta·His Beads code 75, 77, 79, and 81; 0.25 ml each for 4 x 500 homogeneous assay points	922521
LiquiChip Penta·His Bead Set B (4 x 500)	Penta·His Beads code 51, 53, 55, and 57; 0.25 ml each for 4 x 500 homogeneous assay points	922523
LiquiChip Penta·His Bead Set C (4 x 500)	Penta·His Beads code 6, 8, 17, and 19; 0.25 ml each for 4 x 500 homogeneous assay points	922525

For further information: www.qiagen.com/PG/liquichip

Automated

LiquiChip Carboxy Beads

For covalent immobilization of capture molecules in LiquiChip assays

- Versatile, general-purpose immobilization of virtually any biomolecule
- Proven carbodiimide coupling chemistry

Product description

LiquiChip Carboxy Beads enable covalent immobilization of biomolecules possessing a free amino group (e.g., antibodies, proteins and peptides, amino-modified oligos) for LiquiChip assays. Immobilizing different molecules on beads with different codes enables multiplexing of assays.

Applications

By allowing covalent immobilization of virtually any biomolecule, LiquiChip Carboxy Beads enable sensitive *x*MAP assays including:

- Immunoassays
- Protein–protein and protein–nucleic acid interaction assays
- Enzyme assays (e.g., kinase, phosphatase, and protease assays)
- Receptor–ligand assays
- DNA hybridization assays

Product	Contents	Cat. no.
LiquiChip Carboxy Beads (500)	Carboxy Beads code 21; 1 ml for 500 homogeneous assay points	922400
LiquiChip Carboxy Bead Set A (4 x 500)	Carboxy Beads code 11, 13, 15, and 21; 1 ml each for 4 x 500 homogeneous assay points	922402
LiquiChip Carboxy Bead Set B (4 x 500)	Carboxy Beads code 31, 33, 35, and 37; 1 ml each for 4 x 500 assay points	922404
LiquiChip Carboxy Bead Set C (4 x 500)	Carboxy Beads code 40, 42, 44, and 46; 1 ml each for 4 x 500 assay points	922406

For further information: www.qiagen.com/PG/liquichip

Automated

LiquiChip Broad-Range Ser/Thr and Tyr Kinase Kits

For detection and measuring activity of a wide range of serine/threonine and tyrosine kinases

- Multiple substrates enabling detection of a much wider range of Ser/Thr kinases
- Sensitive kinase assay without the need for radioactivity
- Ready-to-run kits containing all you need for assay and detection

Product description

The LiquiChip Broad-Range Ser/Thr and Tyr Kinase Kits contain kinase-substrate–coated LiquiChip Beads, antibodies specific for phosphorylated serine and threonine or tyrosine residues, and fluorescent detection reagents, enabling assay of a wide range of kinases.

Applications

LiquiChip Broad-Range Ser/Thr and Tyr Kinase Kits can be used for sensitive measurement of a wide range of kinase activities in:

- Cell-signaling studies
- Kinase-inhibitor screening

Product	Contents	Cat. no.
LiquiChip Broad-Range Ser/Thr Kinase Kit	For 100 kinase assay points: substrate-coated LiquiChip Beads, anti-phosphoserine/threonine antibodies, biotinylated anti-mouse IgG, Streptavidin–PE, stop solution, 96-well test plate, assay template software	922081
LiquiChip Broad-Range Tyr Kinase Kit	For 100 kinase assay points: substrate-coated LiquiChip Beads, anti-phosphotyrosine antibodies, biotinylated anti-mouse IgG, Streptavidin–PE, stop solution, 96-well test plate, assay template software	922083

For further information: www.qiagen.com/PG/liquichip

Automated

LiquiChip Human Cytokine Kits

For flexible detection and measurement of human cytokines

- Modular kit concept allows researchers to flexibly combine assays according to their individual research needs
- Highly sensitive measurement of up to 15 cytokines simultaneously in a single small-volume sample
- Ready-to-run kits including beads, buffers, and detection reagents

Product description

The LiquiChip Human Cytokine Core Kit contains buffers, reagents, and standards for assay of human cytokines using the LiquiChip System. Using this kit in conjunction with one or more LiquiChip Human Cytokine Detection Kits, which contain LiquiChip Beads coated with monoclonal cytokine-specific antibodies and monoclonal cytokine-specific detection antibodies, enables multiplex detection of cytokines in a sandwich immunoassay. The LiquiChip Human Serum Dilution Kit contains buffers required for accurate assay of cytokines in plasma and serum samples.

Applications

LiquiChip Human Cytokine Core and Detection Kits can be used for sensitive multiplex measurement of cytokine levels in cell-culture supernatants, blood, serum, plasma, tissue lysates, and lavages for:

- Studies on the immune and inflammatory response
- Drug screening
- Toxicology studies

Product	Contents	Cat. no.
LiquiChip Human Cytokine Core Kit	For 96 LiquiChip assay points: Cytokine Standards, Buffers, Reagents, Streptavidin–Phycoerythrin, Mixing Vials (1.5 ml)	922200
LiquiChip Human Serum Dilution Kit	LiquiChip Human Serum Standard Diluent (2 x 6 ml), LiquiChip Human Serum Dilution Buffer (2 x 10 ml)	922300
LiquiChip Human IL-1b Detection Kit	For 96 assay points: LiquiChip Human IL-1b Beads (bead code 08), Human IL-1b Antibody	923000
LiquiChip Human IL-2 Detection Kit	For 96 assay points: LiquiChip Human IL-2 Beads (bead code 21), Human IL-2 Antibody	923001
LiquiChip Human IL-4 Detection Kit	For 96 assay points: LiquiChip Human IL-4 Beads (bead code 52), Human IL-4 Antibody	923002
LiquiChip Human IL-5 Detection Kit	For 96 assay points: LiquiChip Human IL-5 Beads (bead code 09), Human IL-5 Antibody	923003

Product	Contents	Cat. no.
LiquiChip Human IL-6 Detection Kit	For 96 assay points: LiquiChip Human IL-6 Beads (bead code 38), Human IL-6 Antibody	923004
LiquiChip Human IL-8 Detection Kit	For 96 assay points: LiquiChip Human IL-8 Beads (bead code 32), Human IL-8 Antibody	923005
LiquiChip Human IL-10 Detection Kit	For 96 assay points: LiquiChip Human IL-10 Beads (bead code 36), Human IL-10 Antibody	923006
LiquiChip Human IL-12 (p70) Detection Kit	For 96 assay points: LiquiChip Human IL-12 (p70) Beads (bead code 50), Human IL-12 (p70) Antibody	923007
LiquiChip Human IL-13 Detection Kit	For 96 assay points: LiquiChip Human IL-13 Beads (bead code 20), Human IL-13 Antibody	923008
LiquiChip Human GM-CSF Detection Kit	For 96 assay points: LiquiChip Human GM-CSF Beads (bead code 54), Human GM-CSF Antibody	923009
LiquiChip Human IFNg Detection Kit	For 96 assay points: LiquiChip Human IFNg Beads (bead code 34), Human IFNg Antibody	923010
LiquiChip Human TNFa Detection Kit	For 96 assay points: LiquiChip Human TNFa Beads (bead code 06), Human TNFa Antibody	923011
LiquiChip Human Eotaxin Detection Kit	For 96 assay points: LiquiChip Human Eotaxin Beads (bead code 17), Human Eotaxin Antibody	923012
LiquiChip Human MCP-1 Detection Kit	For 96 assay points: LiquiChip Human Human MCP-1 Beads (bead code 22), Human Human MCP-1 Antibody	923013
LiquiChip Human RANTES Detection Kit	For 96 assay points: LiquiChip Human RANTES Beads (bead code 18), Human RANTES Antibody	923014

For further information: www.qiagen.com/PG/liquichip

Automated

LiquiChip Mouse Cytokine Kits

For flexible detection and measurement of mouse cytokines

- Modular kit concept allows researchers to flexibly combine assays according to their individual research needs
- Highly sensitive measurement of up to 15 cytokines simultaneously in a single small-volume sample
- Ready-to-run kits including beads, buffers, and detection reagents

Product description

The LiquiChip Mouse Cytokine Core Kit contains buffers, reagents, and standards for assay of mouse cytokines using the LiquiChip System. Using this kit in conjunction with one or more LiquiChip Mouse Cytokine Detection Kits, which contain LiquiChip Beads coated with monoclonal cytokine-specific antibodies and monoclonal cytokine-specific detection antibodies, enables multiplex detection of cytokines in a sandwich immunoassay. The LiquiChip Mouse Serum Dilution Kit contains buffers required for accurate assay of cytokines in plasma and serum samples.

Applications

LiquiChip Mouse Cytokine Core and Detection Kits can be used for sensitive multiplex measurement of cytokine levels in cell-culture supernatants, blood, serum, plasma, tissue lysates, and lavages for:

- Studies on the immune and inflammatory response
- Drug screening
- Toxicology studies

Product	Contents	Cat. no.
LiquiChip Mouse Cytokine Core Kit	For 96 LiquiChip assay points: Cytokine Standards, Buffers, Reagents, Streptavidin–Phycoerythrin, Mixing Vials (1.5 ml)	922201
LiquiChip Mouse Serum Dilution Kit	LiquiChip Mouse Serum Standard Diluent (2 x 6 ml), LiquiChip Mouse Serum Dilution Buffer (10 x 6 ml)	922301
LiquiChip Mouse IL-1b Detection Kit	For 96 assay points: LiquiChip Mouse IL-1b Beads (bead code 08), Mouse IL-1b Antibody	923015
LiquiChip Mouse IL-2 Detection Kit	For 96 assay points: LiquiChip Mouse IL-2 Beads (bead code 21), Mouse IL-2 Antibody	923016
LiquiChip Mouse IL-4 Detection Kit	For 96 assay points: LiquiChip Mouse IL-4 Beads (bead code 52), Mouse IL-4 Antibody	923017
LiquiChip Mouse IL-5 Detection Kit	For 96 assay points: LiquiChip Mouse IL-5 Beads (bead code 09), Mouse IL-5 Antibody	923018

Product	Contents	Cat. no.
LiquiChip Mouse IL-6 Detection Kit	For 96 assay points: LiquiChip Mouse IL-6 Beads (bead code 38), Mouse IL-6 Antibody	923019
LiquiChip Mouse KC Detection Kit	For 96 assay points: LiquiChip Mouse KC Beads (bead code 32), Mouse KC Antibody	923020
LiquiChip Mouse IL-10 Detection Kit	For 96 assay points: LiquiChip Mouse IL-10 Beads (bead code 36), Mouse IL-10 Antibody	923021
LiquiChip Mouse IL-12 (p70) Detection Kit	For 96 assay points: LiquiChip Mouse IL-12 p70) Beads (bead code 50), Mouse IL-12 (p70) Antibody	923022
LiquiChip Mouse IL-13 Detection Kit	For 96 assay points: LiquiChip Mouse IL-3 Beads(bead code 20), Mouse IL-3 Antibody	923023
LiquiChip Mouse GM-CSF Detection Kit	For 96 assay points: LiquiChip Mouse GM-CSF Beads (bead code 54), Mouse GM-CSF Antibody	923024
LiquiChip Mouse IFNg Detection Kit	For 96 assay points: LiquiChip Mouse IFNg Beads (bead code 34), Mouse IFNg Antibody	923025
LiquiChip Mouse TNFa Detection Kit	For 96 assay points: LiquiChip Mouse TNFa Beads (bead code 06), Mouse TNFa Antibody	923026
LiquiChip Mouse MCP-1 Detection Kit	For 96 assay points: LiquiChip Mouse Mouse Detection Kit MCP-1 Beads (bead code 22), Mouse Mouse MCP-1 Antibody	923027
LiquiChip Mouse RANTES Detection Kit	For 96 assay points: LiquiChip Mouse RANTES Beads (bead code 18), Mouse RANTES Antibody	923028
LiquiChip Mouse IL-1a Detection Kit	For 96 assay points: LiquiChip Mouse IL-1a Beads (bead code 37), Mouse IL-1a Antibody	923029

For further information: www.qiagen.com/PG/liquichip

LiquiChip Cell Signaling Kits

For flexible detection and measurement of cell signaling molecules

- Modular kit concept allows researchers to flexibly combine assays according to their individual research needs
- Measure multiple cell signaling molecules simultaneously in a single small-volume sample
- Highly sensitive detection using RCAT signal amplification

Product description

The LiquiChip RCAT Cell Signaling Core Kit contains buffers and reagents for assay of cell signaling molecules using *x*MAP systems. Using this kit in conjunction with one or more LiquiChip Cell Signaling Detection Kits, which contain LiquiChip Beads coated with analyte-specific antibodies and biotinylated analyte-specific detection antibodies, enables highly sensitive detection of cell signaling molecules in a sandwich immunoassay.

Applications

LiquiChip Cell Signaling Core and Detection Kits can be used for sensitive multiplex measurement of cell signaling molecule levels in cell-culture supernatants, blood, serum, plasma, tissue lysates, and lavages for:

- Cell-signaling and apoptosis studies
- Drug screening
- Toxicology studies

LiquiChip RCAT Booster Kit (Biotin)

For signal amplification in *x*MAP assays

- Increased sensitivity of assay enables detection of low-abundance analytes and increases assay dynamic range
- Suitable for any *x*MAP assay that uses a biotinylated detection antibody

Product description

The LiquiChip RCAT Booster Kit (Biotin) contains an anti-biotin antibody, a reaction mix, and a DNA polymerase. During the RCAT reaction, the DNA polymerase elongates an oligonucleotide that is conjugated to the anti-biotin antibody. Biotinylated dNTPs in the reaction mix are incorporated into the growing DNA strand. After addition of Streptavidin–R-PE, the increased amount of biotin associated with the bead greatly increases the assay signal.

Applications

- Amplification of signals in *x*MAP assays that use a biotinylated detection antibody

Product	Contents	Cat. no.
LiquiChip RCAT Cell Signaling Core Kit	For 96 assay points: Buffers, Reagents, RCAT DNA Polymerase, Streptavidin–Phycoerythrin, Filter Plate, Mixing Vials	922202
LiquiChip Total PARP Detection Kit*	For 96 assay points: LiquiChip Human Total PARP Beads (bead code 18), Human Total PARP Antibody	923030
LiquiChip Cleaved PARP Detection Kit*	For 96 assay points: LiquiChip Human Cleaved PARP Beads (bead code 28), Human Cleaved PARP Antibody	923031
LiquiChip Active Caspase 3 Detection Kit	For 96 assay points: LiquiChip Human Caspase 3 Beads (bead code 27), Human Caspase 3 Antibody	923032
LiquiChip Active Caspase 8 Detection Kit	For 96 assay points: LiquiChip Human Caspase 8 Beads (bead code 25), Human Caspase 8 Antibody	923033
LiquiChip Total IkBa Detection Kit†	For 96 assay points: LiquiChip Human Total IkBa Beads (bead code 20), Human Total IkBa Antibody	923034
LiquiChip Phospho-IkBa Detection Kit†	For 96 assay points: LiquiChip Human Phospho-IkBa Beads (bead code 29), Human Phospho-IkBa Antibody	923035
LiquiChip Total GSK3 Detection Kit	For 96 assay points: LiquiChip Human GSK3 Beads (bead code 35), Human GSK3 Antibody	923038
LiquiChip Phospho PKCa Detection Kit‡	For 96 assay points: LiquiChip Phospho PKCa Beads (bead code 77), Phospho PKCa Antibody	923039
LiquiChip Total PKCa Detection Kit‡	For 96 assay points: LiquiChip Total PKCa Beads (bead code 63), Total PKCa Antibody	923040
LiquiChip RCAT Booster Kit (Biotin)	For 96 assay points: RCAT Reaction Mix, RCAT Biotin Antibody, RCAT DNA Polymerase, Buffer	922203

* Because the antibodies immobilized on LiquiChip Human Total PARP and Cleaved PARP Beads cross-react with both forms, total and cleaved PARP cannot be assayed simultaneously. † Because the antibodies immobilized on LiquiChip Human IkBa and LiquiChip Human Phospho-IkBa Beads cross-react with both forms, IkBa and Phospho-IkBa cannot be assayed simultaneously.

‡ Because the antibodies immobilized on LiquiChip Phospho PKCa and Total PKCa Beads cross-react with both forms, phospho PKCa and total PKCa cannot be assayed simultaneously.

For further information: www.qiagen.com/PG/liquichip

LiquiChip Control and Calibration Beads

For checking calibration and validation of the LiquiChip Reader (page 313)

- Fast, easy, and reliable system calibration and validation
- Consistent interassay reproducibility

Product description

LiquiChip Control and Calibration Beads are microscopic polystyrene beads that carry defined bead codes and amounts of reporter fluorescence. They are used to calibrate and validate the LiquiChip Reader instrument.

LiquiChip System Fluid

For carrying assay samples through the LiquiChip Reader (page 313)

- Specially formulated for use in *x*MAP assays with the LiquiChip Reader
- Convenient concentrate saves storage space

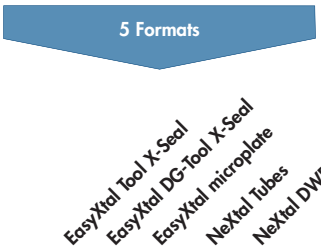
Product description

LiquiChip System Fluid is a solution that carries samples through the tubing of the LiquiChip Reader. It is supplied as a concentrate.

Product	Contents	Cat. no.
LiquiChip Control Bead Kit	Classification Control Beads (CON1, 5 ml); Reporter Control Beads (CON2, 5 ml)	922912
LiquiChip Calibration Bead Kit	Classification Calibration Beads (CAL1, 5 ml); Reporter Calibration Beads (CAL2, 5 ml)	922911
LiquiChip System Fluid	LiquiChip System Fluid (10x concentrate, 5 liters), for 50 liters working solution	922902

For further information: www.qiagen.com/PG/liquichip

EasyXtal Screening Suites — Multiple Screens in Numerous Formats



PreScreen Assay		■				For identification of optimal initial protein concentrations
Classics Suite	■	■	■	■	■	The classical suites for initial screening of proteins
Classics Lite Suite	■	■	■	■	■	The classical suites for initial screening of proteins
Cryos Suite	■	■	■	■	■	The classical suites for initial screening of proteins
pHClear Suite	■	■	■	■	■	For systematic analysis of precipitant concentration and pH
pHClearII Suite	■	■	■	■	■	For systematic analysis of precipitant concentration and pH
JCSG+ Suite	■	■	■	■	■	Optimized sparse matrix for initial crystallization screening
PACT Suite	■	■	■	■	■	For systematic analysis of the effect of pH; anions, and cations
Anions Suite	■	■	■	■	■	Various salts at two concentrations and four different pHs
Cations Suite	■	■	■	■	■	Various salts at two concentrations and four different pHs
PEGs Suite	■	■	■	■	■	Polyethylene glycols of various molecular weights
PEGsII Suite	■	■	■	■	■	Polyethylene glycols of various molecular weights
AmSO4 Suite	■	■	■	■	■	Ammonium sulfate, one of the most popular precipitants
MPD Suite		■	■	■	■	MPD, the most popular organic precipitant
MbClass Suite		■	■	■	■	For initial screening of membrane proteins
MbClassII Suite		■	■	■	■	For initial screening of membrane proteins
ProComplex Suite	■	■	■	■	■	For the analysis of protein-protein complexes
Nucleix Suite	■	■	■	■	■	For initial screening of nucleic acids
ComPAS Suite	■	■	■	■	■	For rapid analysis of polymers, alcohols, and salts
Opti-Salts Suite	■	■	■			For rapid optimization of initial crystallization hits

■: Available in this format; Also available: EasyXtal Refill-Hits and stock solutions in NeXtal Tubes

A

B

A EasyXtal Tool X-Seal pre-filled with the screening suite of choice B X-Seal crystallization support

Pre-filled EasyXtal Tool X-Seal

For fast setup of crystallization conditions and pre-filled with the Screening Suite of choice

- World's largest offering of premixed crystallization conditions in unique kit formats
- Convenient setup without solution transfer reduces time requirements and errors
- Easy-to-modify conditions with increased experimental flexibility
- Controlled environment and fresh solutions every time
- Maximized reproducibility through online access to production reports

Product description

The pre-filled EasyXtal Tool X-Seal is supplied in a suite format which consists of 96 crystallization supports X-seal and 4 x 24-well crystallization tools containing 1 ml of solution per well, giving a total of 96 different ready-to-use crystallization conditions.

Applications

Pre-filled EasyXtal Tool kits are the first easy-to-use kits for manual hanging drop crystallization setup. The pre-filled EasyXtal Tool X-Seal provides all the benefits of the unique EasyXtal Tool X-Seal (page 347). The screw-in, greaseless crystallization supports are easy to set up, and wells can be reopened to modify conditions without having to set up a new tray. Innovative screening strategies, such as the Pro-Active Strategy are made easy. The crystallization supports contain the new X-Seal, which is made from an advanced O-ring material that minimizes evaporation.

The high-convenience pre-filled EasyXtal Tool X-Seal eliminates the need for time-consuming solution transfers, and reduces the risk of pipetting errors while setting up experiments.

Product	Contents	Cat. no.
Pre-filled EasyXtal Tool X-Seal	4 x 24-well Crystallization Tools containing 1 ml Suite solution per well, 96 X-Seal crystallization supports	Varies

For further information: www.qiagen.com/PG/crystallization

Pre-filled EasyXtal DG-Tool X-Seal

For multi-drop setup of crystallization conditions without spreading

- World's largest offering of premixed crystallization conditions in unique kit formats
- Convenient setup without solution transfer reduces time requirements and errors
- Easy-to-modify conditions for increased experimental flexibility
- Crystallization support with cavities for evenly shaped drops and improved visualization
- Maximized reproducibility through online access to production reports

A

B

A EasyXtal DG-Tool X-Seal pre-filled with the screening suite of choice B DropGuard X-Seal crystallization support

Product description

The pre-filled EasyXtal DG-Tool X-Seal is supplied in a suite format which consists of 96 DropGuard crystallization supports X-seal and 4 x 24-well crystallization tools containing 1 ml of solution per well, for a total of 96 different ready-to-use crystallization conditions.

Applications

Pre-filled EasyXtal Tool kits are the first easy-to-use kits for manual hanging drop crystallization setup. The pre-filled EasyXtal DG-Tool X-Seal supplies all the benefits of the unique EasyXtal DG-Tool X-Seal (page 347). The screw-in, greaseless crystallization supports are easy to set up, and wells can be reopened to modify conditions without having to set up a new tray. Innovative screening strategies, such as the Pro-Active Strategy are made easy. The crystallization supports (patent pending) have 6 cavities of 2 different sizes. Three cavities accommodate 1 µl +1 µl drops and three others 2 µl + 2 µl drops. The cavities isolate the drops and prevent them from spreading and running into one another. In addition, the crystallization supports contain the new X-Seal that is made from an advanced O-ring material that minimizes evaporation. The high-convenience pre-filled EasyXtal DG-Tool X-Seal eliminates the need for time-consuming solution transfers, and reduces the risk of pipetting errors while setting up experiments.

Product	Contents	Cat. no.
Pre-filled EasyXtal DG-Tool X-Seal	4 x 24-well DropGuard Crystallization Tools containing 1 ml Suite solution per well, 96 X-Seal DropGuard crystallization supports	Varies

For further information: www.qiagen.com/PG/crystallization

EasyXtal Microplates

For sitting drop setup in ready-to-use, pre-filled microplates

- Unique ready-to-use product – pre-filled with the Screening Suite of choice
- Fast and easy manual or automated setup
- Individually sealed wells to avoid cross-contamination and condensation problems
- World's largest offering of premixed crystallization conditions
- Maximized reproducibility through online access to production reports

Product description

Pre-filled EasyXtal microplates are sold in a suite format which consists of 1 x 96-well microplate pre-filled with 100 µl Screening Suite solution per reagent reservoir. Reagent reservoirs are individually sealed with a piercable aluminium seal. Also supplied are a sheet of high-optical–quality universal microplate pressure-sensitive sealing tape and 1 x Piercing Tool.

Applications

Pre-filled EasyXtal microplates are the first easy-to-use kits for sitting drop protein crystallization. These unique products can be used for manual or automated setup.

Product	Contents	Cat. no.
Prefilled EasyXtal µplate C-RB*	Corning conical round-bottom microplate containing 96 x 100 µl Suite solutions, piercing tool, sealing tape	Varies
Prefilled EasyXtal µplate C-CFB*	Corning conical flat-bottom treated microplate containing 96 x 100 µl Suite solutions, piercing tool, sealing tape	Varies
Prefilled EasyXtal µplate G-RB*	Greiner CrystalQuick round bottom microplate containing 96 x 100 µl Suite solutions, piercing tool, sealing tape	Varies
Prefilled EasyXtal µplate G-FB*	Greiner CrystalQuick flat bottom microplate containing 96 x 100 µl Classics Lite Suite solutions, piercing tool, sealing tape	Varies

* There are minimum order requirements for pre-filled EasyXtal Microplates. For more information and to order products online, visit www.qiagen.com/crystallization .

For further information: www.qiagen.com/PG/crystallization

NeXtal DWBlocks

For manual or automated setup of protein crystallization screening conditions

- 1.5 ml solution of each screening suite condition in a 96-well format
- Bulk format for manual or automated setup in microplates
- Heat-sealed, pierceable foil ensures optimal storage and shipping
- Maximized reproducibility through online access to production reports

Product description

Screening Suites in deep-well blocks are supplied as 1 x pierceable deep-well block containing 1.5 ml of each of the Screening Suite conditions per well, 1 x Piercing Tool, and a sheet of adhesive foil.

Applications

The deep-well block format is designed for setup of crystallization conditions in microplates, either manually or using automated liquid handling stations. The deep-well block can be resealed using adhesive foil for subsequent microplate setups.

NeXtal Tubes

For screening crystallization conditions

- Tubes containing 10 ml of each screening suite condition solution
- World's largest offering of premixed crystallization conditions
- Ring–sealed tubes to minimize evaporation for increased shelf life
- Maximized reproducibility through online access to production reports

Product description

Screening Suites in NeXtal Tubes are supplied as 96 x 10 ml O-ring–sealed tubes.

Applications

The NeXtal Tube format is designed for users who require large volumes. The improved O-ring seal ensures high quality, provides freshness control for screening solutions; and reduces evaporation between experimental setups.

Product	Contents	Cat. no.
Pre-Filled NeXtal DWBlocks	Piercable deep-well block containing 96 x 1.5 ml Suite solution per well, piercing tool, adhesive foil	Varies
Pre-Filled NeXtal Tubes	96 x 10 ml tubes containing Suite solutions	Varies

For further information: www.qiagen.com/PG/crystallization

EasyXtal Pre-Screen Assay

For identification of optimal initial protein concentration

- Increases the probability of crystallization events in subsequent screening
- Ready-to-use, pre-filled kit for fast results
- Controlled environment and fresh solutions every time
- Maximized reproducibility through online access to production reports

Product description

The Pre-Screen Assay is arranged in three mini-grids (6 conditions each) with one mini-grid for each precipitant type. Using two concentrations of the same chemical, a direct relation can be observed between protein concentration, precipitant concentration, and precipitant chemical family. Results are divided between insoluble (precipitation in most cases) and soluble (clear drops). By analyzing the results of the assay, the concentration of protein to be used in initial screening versus most popular chemical families can be easily determined.

Applications

The EasyXtal Pre-Screen Assay is the first, easy-to-use kit that helps optimize protein concentration for the different precipitant types thus increasing the probability of nucleation and crystallization events during initial screenings.

Product	Contents	Cat. no.
EasyXtal Pre-Screen Assay	1 x pre-filled 24-well DropGuard Crystallization Tool with 24 X-seal DropGuard Crystallization Supports	130222

For further information: www.qiagen.com/PG/crystallization

Screening Suites

For protein crystallization using 96 distinct screening conditions

- World's largest offering of crystallization conditions — increasing the chance of finding the optimal condition
- Systematically organized screens — easy interpretation of results
- Highest quality standards, certified by production reports — maximum reproducibility
- Widest range of pre-filled kits and bulk formats — highest flexibility in choice
- Individual refill solutions available — increased reproducibility for post-screening

When promising results are obtained in a certain condition, it is vital that this exact chemical composition is used as the basis for further investigations. Each Screening Suite condition is individually available as a large-volume Refill-Hit Solution, whose composition is certified by detailed production reports. Alternatively, stock solutions and recipes can be used to reproduce original conditions using a liquid handling instrument. Stock solutions are also certified by detailed production reports.

Applications

QIAGEN protein crystallization products can be used for de novo crystallization trials, or for optimization around a given set of conditions. Protein crystal structures can be used for:

- Native/Mutant protein structure analysis
- Structure-based drug design
- Studies of enzymatic mechanisms and structure–function relationships
- Protein taxonomy
- Studies of protein complexes

Core screens for initial investigations

Using classic solutions from the literature	Classics, Classics Lite, and Cryos Suites (see page 334)
By systematic analysis of precipitant concentration and pH	pHClear and pHClear II Suites (see page 335)
Using an optimized sparse matrix	JCSG+ Suite (see page 336)
By systematic analysis of the effect of pH, anions, and cations	PACT Suite (see page 337)

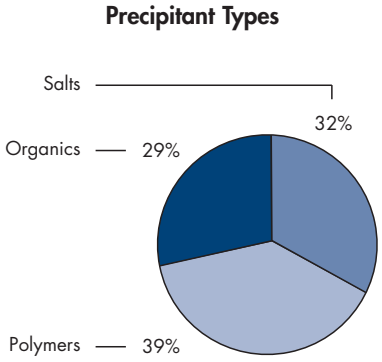
Screens analyzing single precipitant types

Using various salts at two concentrations and four different pH values	Anions and Cations Suites (see page 338)
Using polyethylene glycols of varying molecular weights	PEGs and PEGs II Suites (see page 339)
Using ammonium sulfate	AmSO4 Suite (see page 340)
Using 2-methyl-2, 4-pentandiol (MPD)	MPD Suite (see page 341)

Screens for specialized applications

Screening conditions for membrane proteins	MbClass and MbClass II Suites (see page 342)
Screening conditions for protein-protein complexes	Protein Complex Suite (see page 343)
Screening conditions for nucleic acids	Nucleix Suite (see page 344)
Rapid analysis of polymers, alcohols, and salts	ComPAS Suite (see page 344)
Rapid optimization of initial crystallization hits	Opti-Salts Suite (see page 345)

Each individual condition of every Screening Suite is available as an EasyXtal Refill-Hit (see page 346).



The Classic, Classics Lite, and Cryos Suites follow the sparse matrix approach and represent a wide sampling of the most popular chemicals found in crystallography. All three precipitant types (salts, polymers, and organics) are used.

The Classics, Classics Lite, and Cryos Suites

For initial screening of protein crystallization conditions

- Premixed suites representing the most popular crystallography chemicals
- Based on the work by Jancarik and Kim (1)
- Controlled environment and fresh solutions every time
- Ready-to-use pre-filled kits and bulk formats
- Maximized reproducibility through online access to production reports

Product description

The Classics, Classics Lite, and Cryos Suites are well-suited for initial screening. Crystallization conditions in the Classics Suite are set at high concentrations, to evaluate their effect on protein solubility. Pushing the saturation limit brings valuable information but may also favor precipitation. One effective strategy to overcome this is to use the complementary Classics Lite Suite, whose precipitant concentrations are half those of the Classics Suite. Side-by-side review of the results obtained with these two Suites may provide information on protein solubility. Solutions from The Cryos Suite contain glycerol at specific concentrations favoring crystal cryoprotection.

See page 333 for an overview of all available screening suites.

1. Jancarik, J., and Kim, S.-H. (1991) J. Appl. Cryst. **24**, 409.

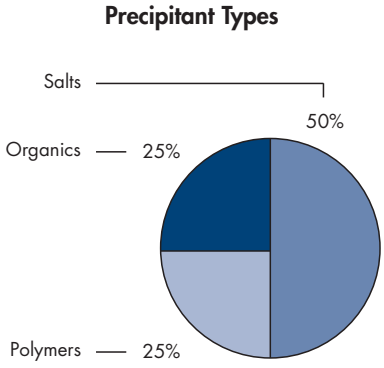
Product	EasyXtal Tool X-Seal Cat. no.	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The Classics Suite	130101	130201	130901	130701
The Classics Lite Suite	130102	130202	130902	130702
The Cryos Suite	130103	130203	130903	130703

For further information: www.qiagen.com/PG/crystallization

The pHClear and pHClear II Suites

For systematic analysis of precipitant concentration and pH

- Based on the eight most popular precipitants at various concentrations
- Wide pH-range coverage to analyze the effect of pH on proteins
- Controlled environment and fresh solutions every time
- Ready-to-use pre-filled kits and bulk formats
- Maximized reproducibility through online access to production reports



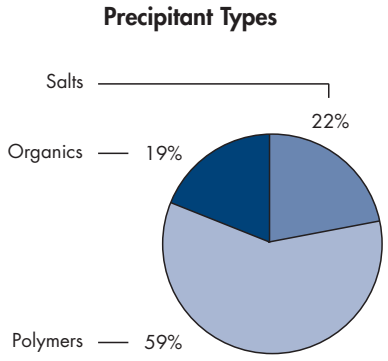
Product description

The pHClear and pHClear II Suites represent a wide sampling of chemical space and are particularly well suited for initial screening steps. In these Suites, series of grids are created around various concentrations of popular precipitants: Salts (Na/K phosphate, Na malonate, Na chloride, and ammonium sulfate), Polymers (PEG 6000 with and without Li chloride) and Organics (MPD and isopropanol) covering a wide pH-range (4.0 to 9.0). Within these grids, the concentration of each chemical ranges from low to high (saturation point). This gives insights into how the precipitant chemical interacts with the protein as well as delivering information on the effect of varying pH.

See page 333 for an overview of all available screening suites.

Product	EasyXtal Tool X-Seal Cat. no.	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The pHClear Suite	130109	130209	130909	130709
The pHClear II Suite	130110	130210	130910	130710

For further information: www.qiagen.com/PG/crystallization



The JCSG+ Suite

For initial crystallization screening using an optimized sparse matrix

- Premixed suite based on the results of the Joint Center for Structural Genomics and members of the European Genomics Consortium
- Controlled environment and fresh solutions every time
- Ready-to-use pre-filled kits and bulk formats
- Maximized reproducibility through online access to production reports

Product description

The JCSG+ suite is the result of several experiments made at the Joint Center for Structural Genomics (JSCG) and members of the European Structural Genomic Consortium. The JCSG identified the "core 67" conditions in which a large number of proteins crystallized (1). Newman and Perrakis (both members of the European Structural Genomic Consortium) expanded these 67 core conditions to a complete 96-member screening suite by filling out the pH profile and enhancing the range of precipitants within the screen (2). The JCSG+ Suite is ideal for initial screening of crystallization conditions.

1. Page, R. et al. (2003) Acta.Cryst. **D59**, 1028.
2. Newman, J. et al. (2005) Acta.Cryst. **D61**, 1426.

Product	EasyXtal Tool X-Seal Cat. no.	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The JCSG+ Suite	130120	130220	130920	130720

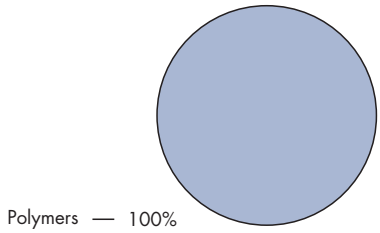
For further information: www.qiagen.com/PG/crystallization

The PACT Suite

For systematic analysis of the effect of pH and anions and cations

- Premixed suite based on the work of Newman et al. (1)
- PEG/ion combinations for systematic analysis of cations and anions at defined pHs
- Controlled environment and fresh solutions every time
- Ready-to-use pre-filled kits and bulk formats
- Maximized reproducibility through online access to production reports

Precipitant Types



Product description

The PACT Suite is highly suited for evaluating the effect of pH, anions, and cations in combination with the precipitant PEG. The systematic approach gives very helpful insights into the effects of each component by keeping the others constant. The premixed suite consists of three mini-grid approaches.

Twenty-four conditions are designed around PEG 1500 at different pHs. Four different buffer systems are used (SPG, MIB, PCB, and MMT). A pH gradient from pH 4 to pH 9 is produced. Within this portion of the screen, the effect of pH change is decoupled from the presence of different ions, since all buffers are present in the same concentration in all tested pHs.

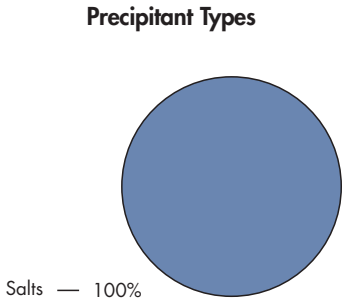
Twenty-four conditions evaluate the effect of PEG versus cations. In these conditions, PEG 6000 is combined with different chlorides. This enables users to investigate the effect of different cations at defined pHs in a very systematic way.

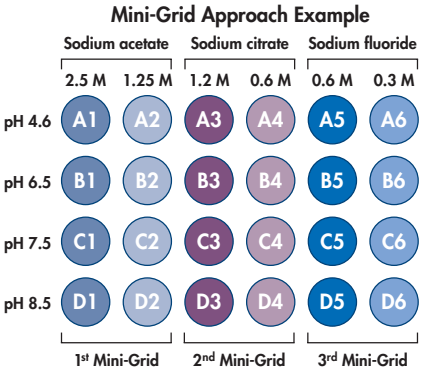
The last 48 conditions are designed around PEG 3350. Using the same buffers in these conditions allows users to evaluate the effect of different anions at defined pHs. The PEG/anion screen is more extensive as anions generally have a greater effect on the solubility of proteins.

1. Newman, J. et al. (2005) Acta.Cryst. **D61**, 1426.

Product	EasyXtal Tool X-Seal Cat. no.	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The PACT Suite	130118	130218	130918	130718

For further information: www.qiagen.com/PG/crystallization





Example of mini-grid approach. Various salts at two concentrations and 4 different pHs analyze the effect of salts on the protein.

The Anions and Cations Suites

For screening using various salts at two concentrations and four different pH values

- Easily view trends for different salt and pH combinations
- Controlled environment and fresh solutions every time
- Various formats available including ready-to-use pre-filled kits and other formats
- Maximized reproducibility through online access to production reports

Product description

The Anion and Cation Suites allow rapid and easy evaluation of protein solubility behavior with the most popular salts used in protein crystallization. They are contained in mini-grids consisting of 2 concentrations of salt at 4 different pH values (in 24-well format). Cross-referencing between minigrids gives precious information on the effect of pH on the protein. The high-concentration conditions of the different salts are at 70–80% saturation level to promote dehydration. The low-concentration conditions are set at half of the high concentration to enhance differences due to concentration, while keeping conditions in a range that promote crystallization.

Product	EasyXtal Tool X-Seal Cat. no.	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The Anions Suite	130107	130207	130907	130707
The Cations Suite	130108	130208	130908	130708

For further information: www.qiagen.com/PG/crystallization

The PEGs and PEGs II Suites

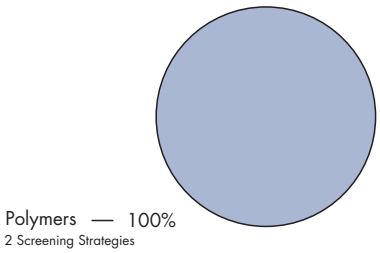
For screening using polyethylene glycols of different molecular weights

- The most popular family of precipitants: polyethylene glycol polymers
- Three screening strategies for maximum insights
- Controlled environment and fresh solutions every time
- Ready-to-use pre-filled kits and other formats
- Maximized reproducibility through online access to production reports

The first half of The PEGs Suite (conditions 1–48) screens for polymers of a wide range of molecular weights (from 200 up to 20,000), set at 2 concentrations and 4 different pHs. This multi-grid approach allows users to evaluate the effect of 48 different solutions and identify trends of behavior according to pH, molecular weight, and PEG concentration. The second half of The PEGs Suite (conditions 49–96) contains a series of low concentration salts and PEG 3350 to evaluate the effects of PEG-salt combinations on the protein. To retrieve more information from The PEGs Suite, users can run the first half of the Suite, review the results, and then adjust the pH of the second half accordingly. The conditions of the PEGs II Suite have been selected as a directed sparse matrix to complement the 2 screening strategies covered by The PEGs suite. It provides sampling of the PEG-containing solutions of the crystallization space. It allows screening for different combinations of co-precipitants, salts, and buffers that proved to be successful for other proteins.

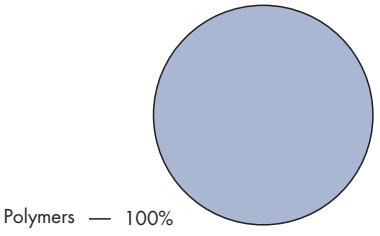
PEGs Suite

PEGs Suite Precipitant Types



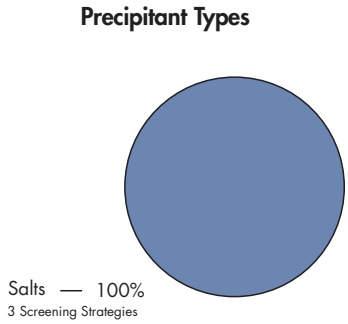
PEGs II Suite

PEGs II Suite Precipitant Types



Product	EasyXtal Tool X-Seal Cat. no.	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The PEGs Suite	130104	130204	130904	130704
The PEGs II Suite	130116	130216	130916	130716

For further information: www.qiagen.com/PG/crystallization



The AmSO4 Suite

For refinement of promising conditions containing $AmSO_4$

- Three screening strategies combined for maximum insights
- Controlled environment and fresh solutions every time
- Ready-to-use pre-filled kits and bulk formats
- Maximized reproducibility through online access to production reports

Product description

Each crystallization solution of this suite contains $AmSO_4$ as a precipitant. The $AmSO_4$ Suite combines 3 different strategies. This allows coverage of a wide chemical space around this precipitant and simple data analysis. Conditions 1–48 are a combination of $AmSO_4$ with 48 different salts known to be effective as co-crystallizers. This strategy is similar to that of PEG versus Ions, and allows identification of the combinations of $AmSO_4$ and salts that promote nucleation and crystal growth. Conditions 49–72 consist of a 4 x 6 grid-sampling of $AmSO_4$ concentrations (from 0.5 M to 3.5 M) vs pH (4.0 to 9.0). This grid is used to evaluate with higher precision the effect of these factors on crystallization of your protein, and to visualize possible trends. Conditions 73–96 are the most popular from the BMCD (1), and have been selected as a directed sparse matrix sampling of the $AmSO_4$-containing solutions of the crystallization space. This last subset allows screening for different combinations of co-precipitants, salts, and buffers that proved to be successful for other proteins. Screening with this Suite shows whether the precipitant $AmSO_4$ has the potential to lead to crystals of a particular protein.

1. Gilliland, G.L., Tung, M., Blakeslee, D.M., and Ladner, J. (1994) The Biological Macromolecule Crystallization Database, Version 3.0: New Features, Data, and the NASA Archive for Protein Crystal Growth Data. Acta Crystallogr. **D50**, 408.

Product	EasyXtal Tool X-Seal Cat. no.	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The AmSO4 Suite	130105	130205	130905	130705

For further information: www.qiagen.com/PG/crystallization

The MPD Suite

For refinement of promising conditions containing MPD (2-methyl-2,4-pentandiol)

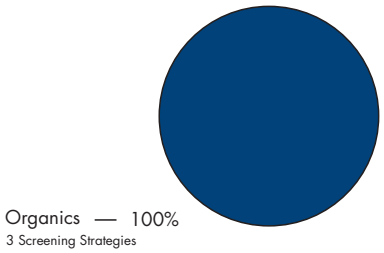
- A range of conditions containing MPD, the most popular organic precipitant
- Three screening strategies combined for maximum insights
- Controlled environment and fresh solutions every time
- Ready-to-use pre-filled kits and bulk formats
- Maximized reproducibility through online access to production reports

Product description

Conditions 1–48 consist of a combination of MPD with 48 different salts known to be effective as co-crystallizers. This strategy is similar to PEGs versus ions, and allows identification of effective combinations of MPD and salts that promote nucleation and crystal growth. Conditions 49–72 consist of a 4 x 6 grid-sampling of MPD concentrations (from 10 to 65% v/v) versus pH (4.0 to 9.0). This strategy is used to evaluate with a higher precision the effect of concentration and pH on protein crystallization, and also to visualize possible trends.

Conditions 73–96 are the most popular ones from the BMCD (1), and have been selected as a directed sparse matrix sampling. This last subset allows screening of different combinations of co-precipitants, salts, and buffers. Screening with this Suite shows whether the precipitant MPD has the potential to lead to crystals of a particular protein. Like most low-molecular non-volatile alcohols, MPD is also an effective cryoprotectant. Cryoprotectants protect crystals from breaking due to the formation of crystalline ice when performing flash-freezing experiments.

Precipitant Types

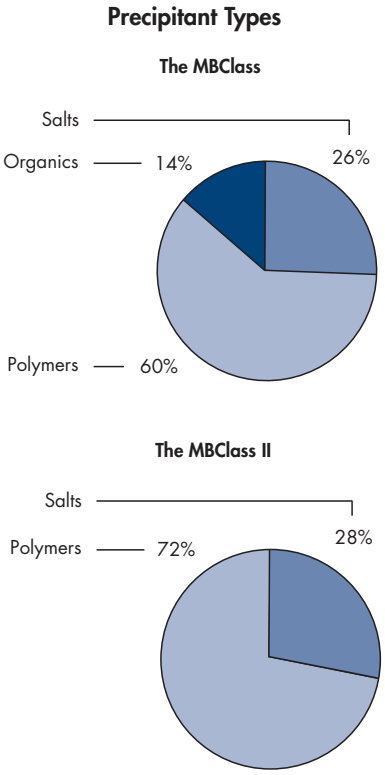


The MPD Suite supplies crystallization solutions organized in 3 different strategies around the precipitant.

1. Gilliland, G.L., Tung, M., Blakeslee, D.M., and Ladner, J. (1994) The Biological Macromolecule Crystallization Database, Version 3.0: New Features, Data, and the NASA Archive for Protein Crystal Growth Data. Acta Crystallogr. **D50**, 408.

Product	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The MPD Suite	130206	130906	130706

For further information: www.qiagen.com/PG/crystallization



The MbClass and MbClass II Suites

For rapid analysis of conditions containing polymers, alcohols, and salts

- Crystallization conditions ideally suited for membrane proteins
- Covers the most successful conditions from literature
- Controlled environment and fresh solutions every time
- Ready-to-use pre-filled kits and bulk formats
- Maximized reproducibility through online access to production reports

Product description

In the MbClass Suite, 96 unique conditions that proved to be successful for membrane proteins have been selected and indexed according to main precipitants. The MbClass II Suite was designed using crystallization conditions of α-helical membrane proteins providing high-resolution diffraction data. Statistical analyses were performed on each chemical found in these conditions to select the best ones. By choosing each precipitant, buffer, and salt according to the resulting analysis, 96 crystallization conditions were created for all types of membrane proteins. Together, the MbClass and MbClass II Screening Suites provide an effective initial screening set of crystallization conditions for membrane proteins.

Product	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The MbClass Suite	130211	130911	130711
The MbClass II Suite	130212	130912	130712

For further information: www.qiagen.com/PG/crystallization

The Protein Complex Suite

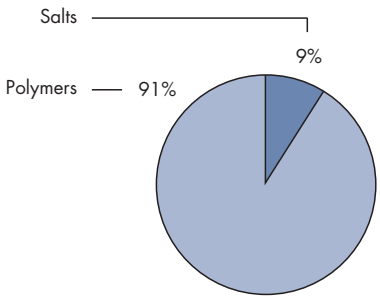
For the analysis of protein–protein complexes

- Based on the work of Radaev and Sun (1)
- Includes the most successful conditions from protein databanks and BMCD for protein–protein complexes
- Ready-to-use pre-filled kits and other formats
- Maximized reproducibility through online access to production report

The Protein Complex Suite was specifically developed to focus on the optimal crystallization space for protein–protein complexes. Both the Protein Data Bank and BMCD were surveyed to identity the best precipitants and variables which were shown to play a positive role in the crystallization of such macromolecules. The highest success rate was obtained with conditions containing PEG of molecular weight between 3000 and 8000. Protein complexes required lower concentrations of the precipitant, probably because they are often less soluble than their individual components. The Protein Complexes Suite is highly suited for initial screening of protein–protein complexes but other screens should be considered for oligomeric proteins, such as photoreaction centers, light harvesting complexes, nucleosomes, and proteosomes. These complexes appear to show unique crystallization behaviors, and it is therefore recommended to choose a screening strategy based on published results.

1. Radaev, S. and Sun, P. (2002) Crystallization of protein-protein complexes. J. Appl. Cryst. **35**, 674.

Precipitant Types



Product	EasyXtal Tool X-Seal Cat. no.	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The Protein Complex Suite	130115	130215	130915	130715

For further information: www.qiagen.com/PG/crystallization

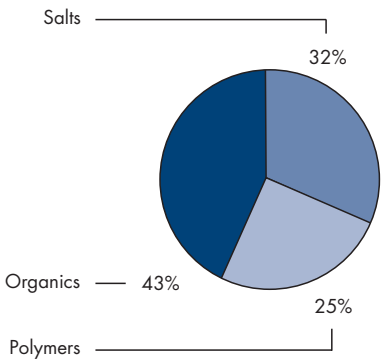
The Nucleix Suite

For initial screening of protein–nucleic acid complexes

- Crystallization conditions perfectly suited for protein–nucleic acid complexes
- Controlled environment and fresh solutions every time
- Ready-to-use pre-filled kits and bulk formats
- Maximized reproducibility through online access to production reports

The Nucleix Suite was specifically developed to focus on the optimal crystallization space for protein–nucleic acid complexes. Both the Protein Data Bank and BMCD were surveyed to identity the best precipitants and variables which were shown to play a positive role in the crystallization of such macromolecules.

Precipitant Types



The ComPAS Suite

For rapid analysis of conditions containing polymers, alcohols, and salts

- Complementary initial screening solutions selected from BMCD's most successful crystallization conditions
- Three precipitant types: polymers, alcohols, and salts
- Ready-to-use pre-filled kits and bulk formats
- Maximized reproducibility through online access to production reports

Product	EasyXtal Tool X-Seal Cat. no.	EasyXtal DG-Tool Cat. no.	NeXtal DWBlock Cat. no.	NeXtal Tubes Cat. no.
The Nucleix Suite	130119	130219	130919	130719
The ComPAS Suite	130117	130217	130917	130717

For further information: www.qiagen.com/PG/crystallization

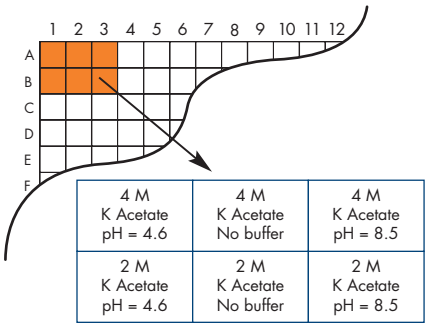
The Opti-Salts Suite

For rapid optimization of initial crystallization hits

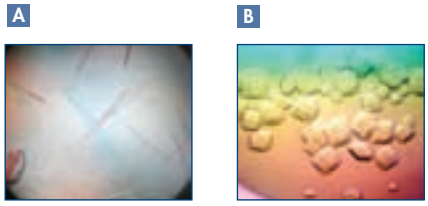
- Premixed suite representing the most important optimization variables
- Organized into 15 mini-grids with 1 control grid for easy interpretation of results
- Accelerated and simplified optimization process with ready-to-use pre-filled kits
- Maximized reproducibility through online access to production reports

Product description

The Opti-Salts Suite offers an easy-to-use kit for crystallization optimization facilitating the otherwise time-consuming procedure of developing expanded grids around an original hit condition. Organized in 15 mini-grids (6 conditions each) and 1 control mini-grid, the Opti-Salts Suite makes the identification of the most important variables easy. Individual Screening Suite conditions are available as EasyXtal Refill-Hit Solutions (4 x 12.5 ml tubes). By mixing the original hit condition in a ratio of 9:1 with the Opti-Salts solutions, a new and unique subset of crystallization conditions is generated. Mixing can be performed manually or using an automated liquid handling system.



Example of one mini-grid of the Opti-Salts microplate.



A From initial hit to B high-resolution crystals, obtained with the Opti-Salts Suite. Courtesy of Jerome Basquin, Crystallization Platform EMBL, Heidelberg, Germany.

Product	Contents	Cat. no.
EasyXtal Tool X-Seal Opti-Salts Suite	4 x 24-well Crystallization Tools containing 100 µl Opti-Salts Suite solution per well, 96 X-Seal crystallization supports	130121
EasyXtal DG-Tool X-Seal Opti-Salts Suite	4 x 24-well DropGuard Crystallization Tools containing 100 µl Opti-Salt Suites solution per well, 96 X-Seal DropGuard crystallization supports	130221

For further information: www.qiagen.com/PG/crystallization

EasyXtal Refill-Hits

For screening around individual Screening Suites conditions

- Easily reproduce successful or promising crystallization conditions
- Each individual Screening Suite condition available in O-ring sealed tubes
- Controlled environment and fresh solutions every time
- Maximized reproducibility through online access to production reports

NeXtal Stock Solutions

For recreating Screening Suite conditions

- Ideal for developing grids around original hit conditions
- 3 Stock solution kits available: Cryoprotectants, Salts, and Buffers*
- Compatible with all EasyXtal Screening Suites
- Maximized reproducibility through online access to production reports

* Over 250 additional single stock solutions are available. Visit www.qiagen.com/crystallization to see the complete list.

Product	Contents	Cat. no.
EasyXtal Refill-Hits (4 x 12.5 ml)	Individual conditions from any Screening Suite	Varies
NeXtal Stock Kit Cryo	24 x 10 ml tubes containing a selection of cryoprotectants	132981
NeXtal Stock Kit Salt	48 x 10 ml tubes containing a selection of salts	132985
NeXtal Stock Kit Buffer	48 x 10 ml tubes containing solutions with a wide range of final pH (2.2 to 11.6)	132983

For further information: www.qiagen.com/PG/crystallization

EasyXtal Crystallization Tools

For fast setup of crystallization conditions

- Screw-in, greaseless crystallization supports for easier setup and crystal recovery
- Easy-to-modify conditions for innovative screening strategies
- Crystallization support with cavities for evenly shaped drops and improved visualization
- Labeled cavities for multidrop experiments

Product description

EasyXtal Tools are supplied as empty 24-well plates with a capacity of 1 ml of solution per well and 24 crystallization supports. Extra crystallization supports can be ordered separately.

Applications

DropGuard crystallization supports enable easy setup of 6 drops per well and eliminate problems of drop spreading while using organic chemicals such as MPD or detergents.

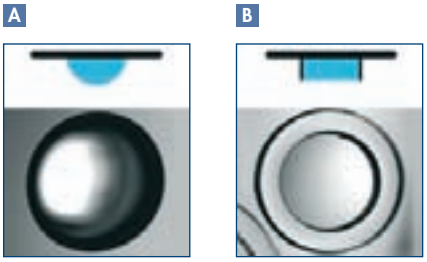
Each support contains three cavities to accommodate 1 µl + 1 µl drops and three others for 2 µl + 2 µl drops. The cavities isolate drops and prevent contact among them, enabling easy recovery of crystals without disrupting neighboring drops. In addition, the cavities can be used to test different protein concentrations in the same well or screen different ligands or additives. The DropGuard crystallization tool is highly suited for safe screening or growing membrane protein crystals in the presence of detergents, using the hanging drop method. The flattening of the drop caused by the cavities improves visualization by reducing the shadow usually observed at the edge of crystallization drops.

X-Seal crystallization supports contain the new X-Seal, which is made from an advanced O-ring material that minimizes evaporation and increases the useful life of reservoir solutions.

EasyXtal Crystallization Tools and Supports

A EasyXtal Crystallization Tool B X-Seal Crystallization Support C DropGuard Crystallization Support with 6 embedded cavities D DropGuard Crystallization Support X-Seal.

Flattened Drops for Easier Visualization



A Hanging drop in standard crystallization support- side view and top view B Hanging drop in DropGuard crystallization support.

Product	Contents	Cat. no.
EasyXtal DG-Tool (50)	50 DropGuard Crystallization Tools: 50 x 24-well plates each with 24 DropGuard crystallization supports	132033
EasyXtal DG-Tool (100)	100 DropGuard Crystallization Tools: 100 x 24-well plates each with 24 DropGuard crystallization supports	132035
EasyXtal DG-CrystalSupport (25)	25 racks each with 24 DropGuard crystallization supports (total of 600 DropGuard crystallization supports)	132083
EasyXtal DG-Tool X-Seal (50)	50 DropGuard Crystallization Tools X-Seal: 50 x 24-well plates each with 24 DropGuard X-Seal crystallization supports	132013
EasyXtal DG-Tool X-Seal (100)	100 DropGuard Crystallization Tools X-Seal: 100 x 24-well plates each with 24 DropGuard X-Seal crystallization supports	132015
EasyXtal DG-CrystalSupport X-Seal (25)	25 racks each with 24 DropGuard X-Seal crystallization supports (total of 600 DropGuard X-Seal crystallization supports)	132063
EasyXtal Tool (50)	50 x 24-well plates each with 24 crystallization supports	132023
EasyXtal Tool (100)	100 x 24-well plates each with 24 crystallization supports	132025
EasyXtal Crystal Support (25)	25 racks each with 24 crystallization supports (total of 600 crystallization supports)	132073
EasyXtal Tool X-Seal (50)	50 x 24-well plates each with 24 X-Seal crystallization supports	132003
EasyXtal Tool X-Seal (100)	100 x 24-well plates each with 24 X-Seal crystallization supports	132005
EasyXtal CrystalSupport X-Seal (25)	25 racks each with 24 X-Seal crystallization supports (total of 600 X-Seal crystallization supports)	132053

For further information: www.qiagen.com/PG/crystallization

EasyXtal Bridges Cfbottom

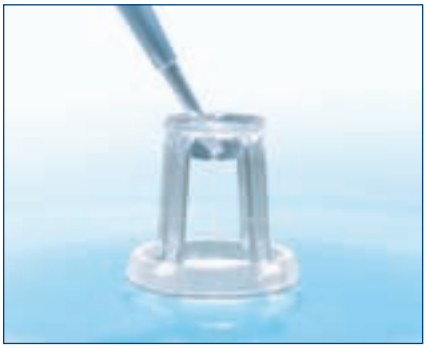
For setting up sitting drop experiments in EasyXtal Tools

- Easy setup of sitting drop experiments
- Improved stability and visualization
- Fully compatible with EasyXtal Tools

Product description

EasyXtal Bridges are plastic supports for setup of sitting drop experiments in EasyXtal Tools. Protein drops are pipetted into the bridge, which is subsequently placed within an EasyXtal Tool well and sealed with a crystallization support. A new improved design increases stability in and out of the wells and visualization. EasyXtal Bridges are highly suited to growing crystals in bigger drops or performing different experimental strategies.

Easy Xtal Bridges for Easy Setup of Sitting Drop Experiments



EasyXtal Sealing Tape and Adhesive Foil

For sealing EasyXtal Microplates and NeXtal Deep-well Blocks

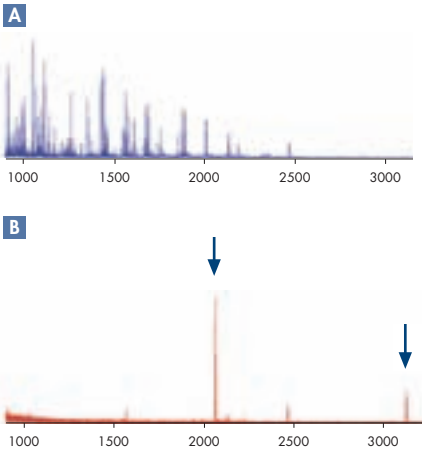
- Efficient seal to retain freshness of solutions
- Pierceable foil for use with automated pipetting devices

Sealing Tape and Adhesive Foil

Product	Contents	Cat. no.
EasyXtal Bridges Cfbottom (100)	100 conical flat-bottom bridges	132097
EasyXtal Sealing Tapes (100)	Microplate sealing tapes (100 sheets)	132105
NeXtal DWBlock Adhesive Foils	100 pierceable/peelable adhesive foils for deep-well blocks	132101

For further information: www.qiagen.com/PG/crystallization

Efficient On-Chip Isolation and Concentration of Phosphopeptides



A mixture of 10 fmol β-casein tryptic digest and 100 fmol phosphorylase B digest was processed and analyzed on A a Mass·Spec·Focus Chip and B a Mass·Spec·Focus IMAC Chip. The two arrowed peaks correspond to Arg48–Lys63 with a phosphorylated serine residue at position 50 (m/z = 2062) and Arg16–Arg40 with phosphorylated serine residues at positions 30, 32, 33, and 34 (m/z = 3123).

Mass·Spec·Focus IMAC Chip Kits

For isolation of phosphopeptides from MALDI-MS samples

- Efficient and specific isolation of phosphopeptides — greatly facilitates phosphorylation mapping
- Efficient concentration of dilute sample solutions — use of larger volumes lowers limits of detection for easier identification of low-abundance peptides
- SPOC (Sample Preparation On a Chip) technology — reduces sample loss and avoids compromising sample integrity
- Unsurpassed reproducibility and accuracy — reliable and standardized results

Product description

Each Mass·Spec·Focus IMAC Chip contains up to 96 precisely defined "virtual wells". Each well consists of a series of concentric rings, each with a different wettability. The boundary zone is a hydrophobic non-wettable surface that confines sample droplets when they are loaded. Chelated iron ions in the affinity capture zone form an immobilized metal affinity chromatography (IMAC) coating that binds phosphopeptides. The wells are washed to remove salts and non-phosphorylated peptides. Matrix solution is then added and is focused together with the sample in the analysis zone. The focusing effect enables up to 35 µl sample to be applied per well, allowing even dilute sample solutions to be effectively analyzed. The sample concentration effect greatly lowers the limit of detection compared to offline sample preparation and spotting on a conventional stainless steel MALDI target plate. Performing the target enrichment procedure on the chip instead of using a pipet-tip device minimizes sample losses and maximizes signals.

Applications

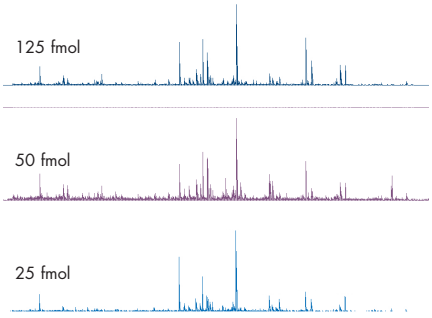
Mass·Spec·Focus IMAC Chips are used for on-chip purification and concentration of phosphopeptides for MALDI mass spectrometric analysis in:

- Proteomics
- Biomarker discovery and validation
- Toxicology
- Disposable chips suitable for archiving and reanalysis

Product	Contents	Cat. no.
Mass·Spec·Focus IMAC Chip Type 1	For Shimadzu Kratos MALDI-MS instruments: 6 chips with 16 wells for on-chip purification and concentration of phosphopeptides from MALDI samples	49400
Mass·Spec·Focus IMAC Chip Type 2	For Waters MALDI-MS instruments: 1 chip with 96 wells for on-chip purification and concentration of phosphopeptides from MALDI samples	49401
Mass·Spec·Focus IMAC Chip Type 3	For Applied Biosystems MALDI-MS instruments: 1 chip with 25 wells for on-chip purification and concentration of phosphopeptides from MALDI samples	49402
Mass·Spec·Focus IMAC Chip Type 4	For Applied Biosystems MALDI-MS instruments: 1 chip with 64 wells for on-chip purification and concentration of phosphopeptides from MALDI samples	49403
Mass·Spec·Focus IMAC Chip Type 5	For Thermo Electron MALDI-MS instruments: 6 chips with 16 wells for on-chip purification and concentration of phosphopeptides from MALDI samples	49404
Mass·Spec·Focus IMAC Chip Type 6	For Bruker Daltonics MALDI-MS instruments: 6 chips with 16 wells for on-chip purification and concentration of phosphopeptides from MALDI samples	49405
Mass·Spec·Focus Chip Solvent Kit	For preparing MALDI samples: acetonitrile, ethanol, 0.1% TFA, CHCA, DHB, ammonium citrate, peptide standard, tubes	49200

For further information: www.qiagen.com/PG/MALDI

Sensitive Detection of Peptides from an In-Gel Digest



Phosphorylase B was subjected to an in-gel digest and eluted using a MOPS buffer. The indicated amount of peptides was loaded onto, desalted, and concentrated using three separate spots of a Mass·Spec·Focus Desalting Chip. 25 fmol was found to be sufficient to deliver a Mascot score of 122, an unambiguous identification.

Mass·Spec·Focus Desalting Chip Kits

For cleanup and high-sensitivity analysis of MALDI-MS samples

- Unsurpassed reproducibility and accuracy — reliable and standardized results
- Efficient concentration of dilute sample solutions — use of larger volumes lowers limits of detection for easier identification of low-abundance peptides
- SPOC (Sample Preparation On a Chip) technology for removal of salts and other contaminants — reduces sample loss and avoids compromising sample integrity

Product description

Each Mass·Spec·Focus Desalting Chip contains up to 96 precisely defined "virtual wells". Each well consists of a series of concentric rings, each with a different wettability. The boundary zone is a hydrophobic non-wettable surface that confines sample droplets when they are loaded. In the affinity capture zone, a reverse-phase coating binds analytes. The wells are washed to remove salts and other contaminants commonly found in tryptic digests that adversely affect the generation of MALDI spectra. Matrix solution is then added and is focused together with the sample in the analysis zone. The focusing effect enables up to 35 µl sample to be applied per well, allowing even dilute sample solutions to be effectively analyzed. The sample concentration effect dramatically lowers the limit of detection compared to offline sample preparation and spotting on a conventional stainless steel MALDI target plate. Performing the desalting procedure on the chip instead of using a pipet-tip device minimizes sample losses and maximizes signals, and enables identification of peptides at low concentrations.

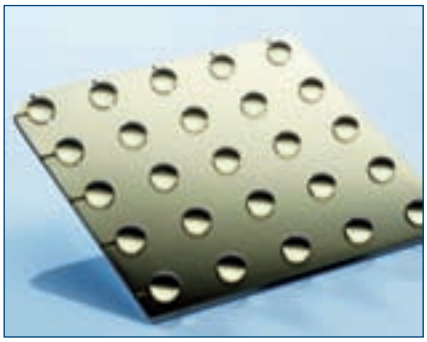
Applications

Mass·Spec·Focus Desalting Chips are used for on-chip cleanup and concentration of samples for MALDI mass spectrometric analysis in:

- Proteomics
- Biomarker discovery and validation
- Toxicology
- Disposable chips suitable for archiving and reanalysis

Product	Contents	Cat. no.
Mass·Spec·Focus Desalting Chip Type 1	For Shimadzu Kratos MALDI-MS instruments: 6 chips with 16 wells for on-chip cleanup and concentration of MALDI samples	49300
Mass·Spec·Focus Desalting Chip Type 2	For Waters MALDI-MS instruments: 1 chip with 96 wells for on-chip cleanup and concentration of MALDI samples	49301
Mass·Spec·Focus Desalting Chip Type 3	For Applied Biosystems MALDI-MS instruments: 1 chip with 25 wells for on-chip cleanup and concentration of MALDI samples	49302
Mass·Spec·Focus Desalting Chip Type 4	For Applied Biosystems MALDI-MS instruments: 1 chip with 64 wells for on-chip cleanup and concentration of MALDI samples	49303
Mass·Spec·Focus Desalting Chip Type 5	For Thermo Electron MALDI-MS instruments: 6 chips with 16 wells for on-chip cleanup and concentration of MALDI samples	49304
Mass·Spec·Focus Desalting Chip Type 6	For Bruker Daltonics MALDI-MS instruments: 6 chips with 16 wells for on-chip cleanup and concentration of MALDI samples	49305
Mass·Spec·Focus Chip Solvent Kit	For preparing MALDI samples: acetonitrile, ethanol, 0.1% TFA, CHCA, DHB, ammonium citrate, peptide standard, tubes	49200

For further information: www.qiagen.com/PG/MALDI



Mass·Spec·Focus Chip.

Mass·Spec·Focus Chip Kits

For highly sensitive MALDI-MS analysis of peptides and peptide mixtures

- Efficient concentration of dilute sample solutions — use of larger volumes lowers limits of detection for easier identification of low-abundance peptides
- SPOC (Sample Preparation On a Chip) technology — reduces sample loss and avoids compromising sample integrity
- Unsurpassed reproducibility — reliable and standardized results

Product description

Each Mass·Spec·Focus Chip contains up to 96 precisely defined "virtual wells". Each well consists of a series of concentric rings, each with a different wettability. The boundary zone is a hydrophobic non-wettable surface that confines sample droplets when they are loaded. As the sample droplet dries, it is focused and concentrated in the analysis zone. This focusing effect enables up to 35 µl sample to be applied per well, allowing even dilute sample solutions to be effectively analyzed. Once the sample spot is dry, a solution of MALDI matrix is added and allowed to co-crystallize with the sample. The sample concentration effect lowers the limit of detection some 1000-fold compared to offline sample preparation and spotting on a conventional stainless steel MALDI target plate.

Applications

Mass·Spec·Focus Chips are used for on-chip concentration of samples for MALDI mass spectrometric analysis in:

- Proteomics
- Biomarker discovery and validation
- Toxicology
- Disposable chips suitable for archiving and reanalysis

Mass·Spec·Focus Chip Solvent Kit

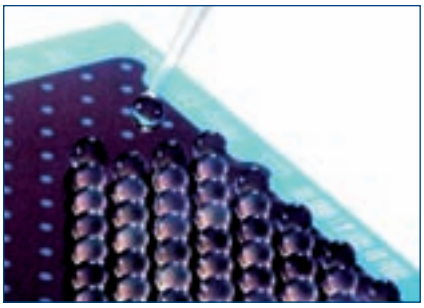
For optimal results with Mass·Spec·Focus Chips

- Proven compatibility with Mass·Spec·Focus Chips — no concerns over purity/ suitability for MALDI
- Highest quality reagents — reliable, standardized analysis

Product	Contents	Cat. no.
Mass·Spec·Focus Chip Type 1	For Shimadzu Kratos MALDI-MS instruments: 6 chips with 16 wells for on-chip concentration of MALDI samples	49201
Mass·Spec·Focus Chip Type 2	For Waters MALDI-MS instruments: 1 chip with 96 wells for on-chip concentration of MALDI samples	49202
Mass·Spec·Focus Chip Type 3	For Applied Biosystems MALDI-MS instruments: 1 chip with 25 wells for on-chip concentration of MALDI samples	49203
Mass·Spec·Focus Chip Type 4	For Applied Biosystems MALDI-MS instruments: 1 chip with 64 wells for on-chip concentration of MALDI samples	49204
Mass·Spec·Focus Chip Type 5	For Thermo Electron MALDI-MS instruments: 6 chips with 16 wells for on-chip concentration of MALDI samples	49205
Mass·Spec·Focus Chip Type 6	For Bruker Daltonics MALDI-MS instruments: 6 chips with 16 wells for on-chip concentration of MALDI samples	49206
Mass·Spec·Focus Chip Solvent Kit	For preparing MALDI samples: acetonitrile, ethanol, 0.1% TFA, CHCA, DHB, ammonium citrate, peptide standard, tubes	49200

For further information: www.qiagen.com/PG/MALDI

Sample Confinement Using an Ultrahydrophobic Surface



Mass·Spec·Turbo Peptide Chips

For highly sensitive high-throughput analysis of peptides and peptide mixtures using MALDI-MS

- SPOC (Sample Preparation On a Chip) technology — Reduced risk of losing sample and streamlined handling using prespotted matrix
- High resolution and throughput in LC-MALDI using high-density chips
- Easier identification of more peptides through improved mass accuracy and sensitivity
- Easy integration into existing high-throughput processes through compatibility with automated sample loaders/spotters

Product description

Each Mass·Spec·Turbo Peptide Chip provides precisely defined α-cyano-4-hydroxycinnamic acid (CHCA) MALDI matrix spots. Samples are simply pipetted onto spots either manually or using a microfraction collector, where they are confined due to the ultraphobic nature of the surface surrounding the spot. As the sample dries, it is concentrated in the area of the matrix spot. After the sample has dried, the spots are re-crystallized by immersion in a finishing solution. The chip is then mounted onto the sample stage of a MALDI mass spectrometer and the mass spectrum measured. Mass·Spec·Turbo Chips deliver higher sensitivity (up to a factor of 100) than conventional stainless steel sample plates and other commercially available MALDI-MS targets.

Applications

Mass·Spec·Turbo Peptide Chips are used for high-throughput sample prep for MALDI mass spectrometric analysis in:

- Proteomics
- Biomarker discovery and validation
- Toxicology

Product	Contents	Cat. no.
Mass·Spec·Turbo 192 Peptide Chip 1	For use on Applied Biosystems 4700 MALDI-MS instruments: 2 chips each with 192 CHCA matrix spots and 6 calibration spots, Finishing Solution (2 x 100 ml)	49000
Mass·Spec·Turbo 192 Peptide Chip 2	For use on Applied Biosystems QSTAR and Voyager MALDI-MS instruments: 2 chips each with 192 CHCA matrix spots and 6 calibration spots, Finishing Solution (2 x 100 ml)	49001
Mass·Spec·Turbo 625 Peptide Chip 1	For use on Applied Biosystems 4700 MALDI-MS instruments: 2 chips each with 625 CHCA matrix spots and 6 calibration spots, Finishing Solution (2 x 100 ml)	49002
Mass·Spec·Turbo 625 Peptide Chip 2	For use on Applied Biosystems QSTAR and Voyager MALDI-MS instruments: 2 chips each with 625 CHCA matrix spots and 6 calibration spots, Finishing Solution (2 x 100 ml)	49003
Mass·Spec·Turbo 1600 Peptide Chip 1	For use on Applied Biosystems 4700 MALDI-MS instruments: 2 chips each with 1600 CHCA matrix spots and 6 calibration spots, Finishing Solution (2 x 100 ml)	49004
Mass·Spec·Turbo 1600 Peptide Chip 2	For use on Applied Biosystems QSTAR and Voyager MALDI-MS instruments: 2 chips each with 1600 CHCA matrix spots and 6 calibration spots, Finishing Solution (2 x 100 ml)	49005

For further information: www.qiagen.com/PG/liquichip

Mass·Spec·Turbo Protein Chips

For highly sensitive high-throughput analysis of proteins using MALDI-MS

- Unparalleled sensitivity — up to 100-fold over conventional targets for easier identification of low-abundance species
- Simple procedure, ready-to-use chips with pre-spotted sinapinic matrix — suitable for archiving and revisiting, no memory effects
- Compatible with automated sample loaders/spotters — easy integration into existing high-throughput processes

Product description

Each Mass·Spec·Turbo 192 Protein Chip provides 192 precisely defined sinapinic acid matrix spots. Protein samples are pipetted either manually or using a microfraction collector onto spots where they are confined due to the ultraphobic nature of the surface surrounding the spot. As the sample dries, it is concentrated in the area of the matrix spot. After the sample has dried, the spots are re-crystallized by immersion in a finishing solution. The chip is then mounted onto the sample stage of a MALDI mass spectrometer and the mass spectrum measured. Mass·Spec·Turbo chips deliver higher sensitivity than conventional stainless steel sample plates and other commercially available MALDI targets.

Applications

Mass·Spec·Turbo Protein Chips are used for high-throughput sample prep for MALDI mass spectrometric analysis in:

- Proteomics
- Biomarker discovery and validation
- Toxicology

Product	Contents	Cat. no.
Mass·Spec·Turbo 192 Protein Chip 1	For use on Applied Biosystems 4700 MALDI-MS instruments: 2 chips each with 192 sinapinic acid matrix spots and 6 calibration spots, Finishing Solution (2 x 100 ml)	49100
Mass·Spec·Turbo 192 Protein Chip 2	For use on Applied Biosystems QSTAR and Voyager MALDI-MS instruments: 2 chips each with 192 sinapinic acid matrix spots and 6 calibration spots, Finishing Solution (2 x 100 ml)	49101

For further information: www.qiagen.com/PG/MALDI

Mass·Spec·Turbo Chip Holder 1

For mounting Mass·Spec·Turbo Type 1 Chips in Applied Biosystems 4700 instruments

- Prevents electrostatic charging during spectrum acquisition
- Ensures accurate and consistent data acquisition across the entire chip

Product	Contents	Cat. no.
Mass·Spec·Turbo Chip Holder 1	Holder for Mass·Spec·Turbo Type 1 Chips: for use with Applied Biosystems 4700 MALDI instruments	49910

Probot Table (9 Chips)

For automated sample loading using the Probot Microfraction Collector

- Full compatibility with the Probot system — automatically loads up to 14,400 samples

Product description

The Probot Table (9 Chips) provides a support for up to 9 Mass·Spec·Turbo Chips during automated sample loading using the Probot Microfraction Collector.

Product	Contents	Cat. no.
Probot Table (9 Chips)	Multichip holder for automated sample loading using the Probot Microfraction Collector	49902

For further information: www.qiagen.com/PG/MALDI