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Protein Extraction

Protein Extraction Reagents

70921 BugBuster® 10X Protein Extraction Reagent Minimum Quantity: 2 L

- A detergent formulation for the gentle disruption of the cell wall of *E. coli* to liberate active proteins in preparation for purification or other applications. Requires centrifugation of bacterial cultures.
- Fully compatible with the affinity supports GST•Bind™, GST•Mag™, His•Bind®, His•Mag™, and S•Tag™ Resins, or other chromatography matrices.
- Bioprocessing enzymes Benzonase® Nuclease and rLysozyme™ Solution are recommended to reduce viscosity and increase the extraction efficiency, especially for larger proteins.

71092 PopCulture® Reagent Minimum Quantity: 3 L

- A detergent-based concentrate that is added directly to cultures of *E. coli* to effectively extract soluble proteins without the need for centrifugation.
- Recombinant proteins can be directly screened in the crude extract, or purified by adding an affinity matrix and completing typical purification procedures.
- Can be adapted to high-throughput robotic processing of samples for proteomics research and any application that would benefit from the increased speed and convenience it provides.
- Bioprocessing enzymes Benzonase® Nuclease and rLysozyme™ Solution are recommended to reduce viscosity and the extraction efficiency, especially for larger proteins.

71167 Insect PopCulture Reagent Minimum Quantity: 3 L

- A detergent formulation for total insect cell culture extraction from suspension cultures or adherent cells without the need for centrifugation.
- Ideal for automated expression-level screening and fully compatible with Ni-NTA His•Bind® Resin affinity purification.
- May produce higher protein yields due to target protein recovery from both medium and cells.

Bioprocessing Enzymes

Benzonase® Nuclease

- Benzonase Nuclease is a genetically engineered endonuclease from *Serratia marcescens*. It degrades all forms of DNA and RNA (single stranded, double stranded, linear and circular) while having no proteolytic activity.
- Benzonase is an excellent choice for viscosity reduction to reduce processing time and increase yields of protein and is compatible with BugBuster and PopCulture *E. coli* lysis reagents.
- The enzyme completely digests nucleic acids to 5'-monophosphate terminated oligonucleotides 2 to 5 bases in length (below the hybridization limit), which is ideal for removal of nucleic acids from recombinant proteins, enabling compliance with FDA guidelines for nucleic acid contamination.
- Benzonase Nuclease is available in ultrapure (> 99% by SDS-PAGE) and pure (> 90%) grades at a standard concentration of 25 U/μl and at a high concentration (HC) of 250 U/μl. Both preparations are free of detectable protease and have specific activity > 1 × 10⁶ units/mg protein. The > 99% purity grade is tested for endotoxins and contains < 0.25 EU/1,000 units. The product is supplied as a 0.2 μm filtered solution in 50% glycerol.
- Unit definition: one unit is defined as the amount of enzyme that causes a ΔA₂₆₀ of 1.0 in 30 minutes, which corresponds to complete digestion of 37 μg DNA.
- Benzonase Nuclease is only sold in pack sizes that are listed in the table below.

Benzonase® Nuclease	Pack Size	Cat. No.	Min. Qty.
Benzonase® Nuclease, Purity > 99%	10 KU	70664	200 KU
Benzonase® Nuclease HC, Purity > 99%	25 KU	71206	500 KU
Benzonase® Nuclease, Purity > 90%	10 KU	70746	200 KU
Benzonase® Nuclease HC, Purity > 90%	25 KU	71205	500 KU

71230 Lysonase™ Bioprocessing Reagent Minimum Quantity: 15 ml

- Lysonase combines the activities of rLysozyme Solution and Benzonase Nuclease to significantly increase protein extraction efficiency and facilitate downstream processing of protein extracts.
- rLysozyme Solution contains a highly purified, stabilized recombinant lysozyme with specific activity 250 times greater than that of chicken egg white lysozyme. Benzonase Nuclease is a genetically engineered nonspecific endonuclease that degrades all forms of DNA and RNA (single stranded, double stranded, circular, linear), reducing extract viscosity, and increasing protein yield.
- For efficient protein extraction with BugBuster (10 μl Lysonase/1 g cell paste) and PopCulture (2 μl Lysonase/1 ml cell culture) Reagent.

Product	Min. Qty.
70921 BugBuster® 10X Protein Extraction Reagent	2 L
71092 PopCulture® Reagent	3 L
71167 Insect PopCulture Reagent	3 L
70664 Benzonase® Nuclease, Purity > 99%	200 KU
71206 Benzonase Nuclease HC, Purity > 99%	500 KU
70746 Benzonase Nuclease, Purity > 90%	200 KU
71205 Benzonase Nuclease HC, Purity > 90%	500 KU
71230 Lysonase™ Bioprocessing Reagent	15 ml



Product	Min. Qty.
71110 rLysozyme™ Solution	60,000 KU
71297 rLysozyme Solution, Veggie™ Grade	60,000 KU
101500 AEBSF, Hydrochloride	10 g
616370 Aprotinin, Bovine Lung, Crystalline	1 g
108975 Leupeptin, Hemisulfate	1 g
539132 Protease Inhibitor Cocktail Set II	Inquire
539134 Protease Inhibitor Cocktail Set III	Inquire

71110 rLysozyme™ Solution

Minimum Quantity: 60,000 KU

- rLysozyme Solution contains a highly purified and stabilized recombinant lysozyme that can be used for lysis of *E. coli*.
- Very small amounts of rLysozyme (3000–5000 U/g cell paste) enhance the efficiency of protein extraction with BugBuster® and PopCulture® Reagents.
- The specific activity of rLysozyme (1700 KU/mg, Note 1 KU = 1000 units) for *E. coli* lysis is 250 times greater than that of chicken egg white lysozyme. rLysozyme is optimally active at physiological pH.
- Unit definition: one unit of rLysozyme is defined as the amount of enzyme necessary to cause a decrease of 0.025 A₄₅₀ units per minute at 25°C in a 1-ml suspension (1 mg/ml) of Tuner™(DE3) cells in 0.5X BugBuster diluted with 50 mM Tris-HCl, pH 7.5.

71297 rLysozyme Solution, Veggie™ Grade

Minimum Quantity: 60,000 KU

- rLysozyme Solution, Veggie Grade is a special grade of rLysozyme prepared using certified animal-free or disease-free reagents.
- All of the steps in the preparation of the recombinant enzyme use reagents of nonanimal origin, with the exception of the IPTG used to induce protein expression. IPTG is chemically synthesized by a stringent process from D-galactose isolated from lactose derived from certified disease-free cows.
- Has the same stability and specific activity as rLysozyme Solution and requires no protocol changes.

Protease Inhibitors

101500 AEBSF, Hydrochloride

Minimum Quantity: 10 g

- Specific, irreversible inhibitor of serine proteases.
- Inhibits chymotrypsin, kallikrein, plasmin, thrombin, trypsin, and related thrombolytic enzymes.
- β -secretase inhibitor that inhibits β -amyloid peptide (A β) production and enhances amyloid precursor protein (sAPPu) secretion.
- Purity: > 97%.
- Off-white solid. HYGROSCOPIC. Soluble in 100 mM in H₂O. Stability: only slight hydrolysis at alkaline pHs (8–9). CAS 30827-99-7, M.W. 239.5.

616370 Aprotinin, Bovine Lung, Crystalline

Minimum Quantity: 1 g

- Competitive and reversible inhibitor of esterase and protease activity.
- Inhibits a number of different proteases, including chymotrypsin, coagulation factors involved in the prephase of blood clotting, kallikrein ($K_d = 1 \times 10^{-7}$ M), plasmin ($K_d = 2.3 \times 10^{-10}$ M), tissue and leukocytic proteinases, and trypsin ($K_d = 5 \times 10^{-14}$ M).
- Does not inhibit Factor Xa and thrombin.
- Relatively acid- and heat-stable.
- Purity: \geq 95%. Contaminants: endotoxin, < 10 EU/mg.
- Specific activity: \geq 5500 K.I.U./mg protein. One Kallikrein Inhibitory Unit (K.I.U.) is identical to the quantity of protease inhibitor that has the ability to inhibit two kallikrein units by 50% under optimal conditions. Note: 1 K.I.U. = 0.025 antiplasmin units (APU) or 0.0031 trypsin inhibitor units.
- White to off-white lyophilized solid. Soluble in H₂O. pH optimum 5–7, pI 10.5. RTECS YN5080000, CAS 9087-70-1, M.W. 6512.

108975 Leupeptin, Hemisulfate

Minimum Quantity: 1 g

- Reversible inhibitor of trypsin-like proteases and cysteine proteases.
- Known to inhibit activation-induced programmed cell death and to restore defective immune responses of HIV⁺ donors.
- White lyophilized solid. HYGROSCOPIC. Soluble in H₂O. CAS 103476-89-7, M.W. 475.6.

539132 Protease Inhibitor Cocktail Set II

Minimum Quantity: Inquire

- A cocktail of five protease inhibitors with broad specificity for the inhibition of aspartic, cysteine, serine, and metalloproteases as well as aminopeptidases.
- Recommended for use with bacterial cell extracts.
- Each vial contains 20 mM AEBSF, HCl, 1.7 mM Bestatin, 200 mM E-64, 85 mM EDTA, and 2 mM Pepstatin A.
- Lyophilized. 1 set = 5 ml. A volume of 5 ml is recommended for 20 g *E. coli*.

539134 Protease Inhibitor Cocktail Set III

Minimum Quantity: Inquire

- A cocktail of six protease inhibitors with broad specificity for the inhibition of aspartic, cysteine, and serine proteases as well as aminopeptidases. Does not contain EDTA.
- This cocktail is recommended for use with bacterial extracts being used for metal chelation chromatography, mammalian cell and tissue extracts.
- The inhibitors are provided as a solution in DMSO at the following concentrations: 100 mM AEBSF, HCl, 80 mM Aprotinin, 5 mM Bestatin, 1.5 mM E-64, 2 mM Leupeptin Hemisulfate, and 1 mM Pepstatin A. A volume of 1 ml is sufficient for 20 g of tissue.

Detergents, Non-ionic

300410 Digitonin, High Purity Minimum Quantity: 10 g

- Non-ionic detergent commonly used to solubilize membrane-bound proteins.
- White solid. PROTECT FROM MOISTURE. Soluble in EtOH or H₂O. Aggregation number 60–70. RTECS IH2050050, CAS 11024-24-1, M.W. 1229.3.

300411 Digitonin, Alcohol-Soluble, High Purity Minimum Quantity: 20 g

- Non-ionic detergent commonly used to solubilize membrane-bound proteins.
- White solid. PROTECT FROM MOISTURE. Soluble in EtOH. Aggregation number 60–70. RTECS IH2050050, CAS 11024-24-1, M.W. 1229.3.

Detergents, Ionic

220411 Chenodeoxycholic Acid, Sodium Salt Minimum Quantity: 100 g

- Bile acid that has been shown to increase intracellular Ca²⁺ in isolated rat hepatocyte couplets.
- Induces a permeability transition in freshly isolated rat liver mitochondria.
- Purity: > 95% Heavy metals: < 10 ppm.
- White solid. HYGROSCOPIC Soluble in H₂O or aqueous buffers. RTECS FZ2231000, CAS 2646-38-0, M.W. 414.6.

220201 CHAPS Minimum Quantity: 250 g

- Zwitterionic detergent that combines features of bile salts and N-alkyl sulfobetaines.
- Capable of solubilizing the opiate receptor to a state exhibiting reversible binding of opiates.
- Capable of disaggregating cytochrome P450 to its monomeric form without denaturation.
- Small micellar molecular weight; a high critical micellar concentration.
- Can be removed from either gels or protein solutions by dialysis across a membrane.
- Purity: ≥ 98%.
- White solid. HYGROSCOPIC. Conductivity (1.0 M, 24°C): < 100 mmhos. Soluble in H₂O. Aggregation number; 4–14, CMC; 6–10 mM, micellar weight; 6150. CAS 75621-03-3, M.W. 614.9.

220202 CHAPSO Minimum Quantity: 100 g

- Unique detergent with high CMC that solubilizes membrane-bound proteins in their native state.
- Capable of solubilizing opiate receptor to a state exhibiting reversible binding of opiates.
- Purity: > 98% .
- White solid. Soluble in H₂O. Aggregation number: 1.

264101 Deoxycholic Acid, Sodium Salt, ULTROL® Grade Minimum Quantity: 5 kg


- Intended for use as a detergent to solubilize membrane-bound proteins in their native state.
- Purity: ≥ 99%
- White solid. HYGROSCOPIC . Absorbance (10%, H₂O, 290 nm): ≤ 0.25. Soluble in H₂O. Aggregation number: 3–12, CMC: 2–6 mM, micellar weight: 1200–4900. pKa 6.2. RTECS FZ2250000, CAS 302-95-4, M.W. 414.6.

Detergents, Zwittergents Minimum Quantity: 500 g

Zwitterionic Detergents are unique in that they offer the combined properties of ionic and non-ionic detergents. Like non-ionic detergents, the zwittergents do not possess a net charge, lack conductivity and electrophoretic mobility, and do not bind to ion-exchange resins. However, like ionic detergents, zwittergents are efficient at breaking protein-protein interactions. Zwitterionic detergents offer an alternative to non-ionic and anionic detergents for solubilizing membrane proteins.

Zwitterionic Detergents				
Detergent	Cat. No.	M.W. (anhydrous)	CMC (mM)	Aggregation No.
ZWITTERGENT® 3-08 Detergent	693019	279.6	330	
ZWITTERGENT 3-10 Detergent	693021	307.6	25–40	41
ZWITTERGENT 3-12 Detergent	693015	335.6	2–4	55
ZWITTERGENT 3-14 Detergent	693017	363.6	0.1–0.4	83
ZWITTERGENT 3-16 Detergent	693023	391.6	0.01–0.06	155

Product	Min. Qty.
300410 Digitonin, High Purity	10 g
300411 Digitonin, Alcohol-Soluble, High Purity	20 g
220411 Chenodeoxycholic Acid, Sodium Salt	100 g
220201 CHAPS	250 g
220202 CHAPSO	100 g
264101 Deoxycholic Acid, Sodium Salt, ULTROL® Grade	5 kg
693019 ZWITTERGENT® 3-08 Detergent	500 g
693021 ZWITTERGENT 3-10 Detergent	500 g
693015 ZWITTERGENT 3-12 Detergent	500 g
693017 ZWITTERGENT 3-14 Detergent	500 g
693023 ZWITTERGENT 3-16 Detergent	500 g



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