

PROTEASES

Proteolytic cleavage of peptide bonds is one of the most important mechanisms affecting the properties of proteins. Proteases are ubiquitously distributed in all tissues and biological fluids. They are widely used as probes for the study of macromolecular structure, active site isolation through proteolytic fingerprinting, sequence analysis, and as tools for intervention of normal and pathological events. They are involved in a multitude of physiological processes ranging from functional activation or inactivation of proteins to their complete dissolution to simple amino acids. CALBIOCHEM® is pleased to offer an extensive collection of proteases for your research needs. Please call our Technical Services Department or your local sales office for more information on any of these and related products and ask for a free copy of our product listing of **Protease Inhibitors**.

Product Description	Cat. No.	Comments	Known Inhibitors	Size
Acylamino Acid-Releasing Enzyme, Porcine Liver	114799	Acylamino-acid-releasing enzyme that liberates the N-terminal acylamino acid from N-acetylated peptides.	—	500 mU
ALCALASE®, <i>Bacillus licheniformis</i>	126741	Consists primarily of subtilisin A. Suitable for the hydrolysis of proteins.	—	500 ml
Aminopeptidase M, Porcine Kidney	164598	Catalyzes the hydrolysis of N-terminal residue from di-, tri-, and polypeptides.	Actinonin, Amastatin	50 U
Atrolysin C, <i>Crotalus atrox</i>	189350	A zinc metalloproteinase that cleaves extracellular proteins such as collagen type IV, fibronectin, gelatins, laminin, and nidogen but has no effect on interstitial collagen types I, III, or V.	—	10 µg 50 µg
Bromelain, Pineapple Stem	203761	Non-specific cysteine protease that hydrolyzes a variety of proteins, peptides, esters, and amides.	α ₁ -Antitrypsin, Iodoacetate, TLCK, TPCK	100 KU
Calpain I, Human Erythrocytes	208713	A Ca ²⁺ -dependent heterodimeric cysteine proteinase with low Ca ²⁺ requirement.	Calpain Inhibitor I, Calpastatin, EST	500 µg
Calpain I, Porcine Erythrocytes	208712	A Ca ²⁺ -dependent cysteine protease with low Ca ²⁺ requirements.	Calpain Inhibitor I, Calpastatin, EST	1 mg
Calpain II, Porcine Kidney	208715	A Ca ²⁺ -dependent cysteine protease with high Ca ²⁺ requirements.	Calpain Inhibitor II, Calpastatin, EST	1 mg
Calpain II, Rat, Recombinant, High Purity, <i>E. coli</i>	208718	A Ca ²⁺ -dependent cysteine protease with high Ca ²⁺ requirements.	Calpain Inhibitor II, Calpastatin, EST	250 µg 1 mg
Carboxypeptidase A, Bovine Pancreas	217286	A metalloprotease that hydrolyzes carboxyl-terminal peptide linkage of amides and peptides having L-configuration.	Amastatin, EDTA and other Zn ²⁺ chelators, Cu ²⁺ , Fe ³⁺ , Pb ²⁺ , oxalate	1000 U
Carboxypeptidase B, Porcine Pancreas	217356	A metalloprotease that removes carboxy-terminal Arg, Lys, and Orn from trypsin-excised peptides.	EDTA and other Zn ²⁺ chelators, ε-Amino- <i>n</i> -caproic Acid	250 IU
Carboxypeptidase W, Wheat	217373	Catalyzes the release of C-terminal amino acid residues from various proteins and peptides.	—	150 U
Carboxypeptidase Y, Excision Grade, Yeast	217372	A serine protease designed for determination of carboxy-terminal residues during protein sequencing.	AESBF, Aprotinin, DFP, PMSF	20 µg
Cathepsin B, Bovine Spleen	219366	One of the most investigated lysosomal cysteine proteinases that is widely distributed in a variety of tissues.	Cathepsin Inhibitor II	10 U
Cathepsin D, Bovine Kidney	219398	A major lysosomal aspartic proteinase widely distributed in many cell types.	Cathepsin Inhibitors I - III	300 U
Cathepsin D, Bovine Spleen	219396	A major lysosomal aspartic proteinase widely distributed in many cell types.	Cathepsin Inhibitors I - III	1000 U

Product Description	Cat. No.	Comments	Known Inhibitors	Size
Cathepsin B, Human Liver	219362	The most investigated enzyme of all lysosomal cysteine proteases. Upregulation and secretion of cathepsin B have been shown to occur in many types of tumors and to correlate positively with their invasive and metastatic capabilities.	Antipain, Cathepsin Inhibitor II, Cystatin, Leupeptin	5 µg
Cathepsin B, Human Liver	219364	The most abundant lysosomal cysteine proteinase. Has been implicated in the pathogenesis of rheumatoid arthritis, muscular dystrophy, and tumor metastasis. Upregulates MMP activities and stimulates angiogenesis.	Antipain, Cathepsin Inhibitor II, Cystatin, Leupeptin	5 U
Cathepsin D, Human Liver	219401	A major lysosomal aspartyl protease in mammalian cells produced as a 52 kDa proenzyme.	Pepstatin A	15 U 30 U
Cathepsin D, Human Spleen	219394	A major lysosomal aspartic proteinase widely distributed in many cell types.	Pepstatin A	50 µg
Cathepsin G, Human Neutrophil	219373	A serine protease that degrades collagen and proteoglycans. Has been implicated in connective tissue-related disorders.	Chymostatin, DFP	100 mU
Cathepsin H, Bovine Kidney	219416	Cathepsin H is a lysosomal cysteine protease involved in the degradation of intracellular proteins.	Cystatin	100 µg
Cathepsin H, Human Liver	219404	May function as an aminopeptidase as well as an endopeptidase.	Cystatin	25 µg
Cathepsin L, <i>Paramecium tetraurelia</i>	219412	Most potent of the lysosomal proteinases.	Cystatin, Z-Phe-Phe-CHN ₂ , Cathepsin Inhibitors I - V	500 mU
Cathepsin L, Human Liver	219402	The most potent of the lysosomal proteinases, having a higher activity than cathepsins B and H in the degradation of a variety of physiological protein substrates.	Cystatin, Z-Phe-Phe-CHN ₂ , Cathepsin Inhibitors I - V	25 µg
Cathepsin S, Bovine Spleen	219388	Lysosomal cysteine protease of macrophages and microglia. Also processes β-amyloid peptide and may play a role in Alzheimer's disease.	Cystatin, Cathepsin S Inhibitor	25 µg
Cathepsin S, Bovine Kidney	219418	Cathepsin L is the most active of the lysosomal proteases.	Cystatin, Cathepsin S Inhibitor	300 mU
Chymase, Human Skin	230780	Chymotrypsin-like serine proteases purified from human skin mast cells.	—	10 µg
α-Chymotrypsin, Bovine Pancreas	230832	Catalyzes the hydrolysis of peptides, amides, and esters at bonds involving the carboxyl groups of aromatic L-amino acids.	AEBSF, α ₁ -Antitrypsin, Aprotinin, DFP, PMSF, TPCK, α ₂ -Macroglobulin	2 MU
Chymotrypsin, Bovine Pancreas, High Purity, Endotoxin-Free	230834	An endoproteinase that preferentially hydrolyzes peptide bonds involving carboxyl groups of aromatic amino acids.	AEBSF, Aprotinin, Chymotrypsin Inhibitors I & II, PMSF, TPCK	200 mg 500 mg
Chymotrypsin, Human Pancreas	230900	Pancreatic digestive enzyme. Higher levels are found in serum of patients with cystic fibrosis.	AEBSF, Aprotinin, Chymotrypsin Inhibitors I & II, PMSF, TPCK	50 µg
Coagulation Factor Xa, Human Plasma	233526	Hydrolyzes peptide and ester bonds at carboxyl group of arginine.	AEBSF, Antithrombin, DFP, PMSF	10 U
Coagulation Factor α-XIIa, Human	233493	A serine protease that activates Factor XI to XIa in the contact activation system.	3,4-Dichlorocoumarin, α ₂ -Plasmin Inhibitor	500 µg
Collagenase, Type I, <i>Clostridium histolyticum</i>	234153	Crude solid that contains several collagenases, a sulfhydryl protease, clostripain, and trypsin-like proteolytic activities.	EDTA, Reducing Agents	100 mg 1 g
Collagenase, Type III, <i>Clostridium histolyticum</i>	234134	Catalyzes the hydrolysis of native collagen to peptides.	EDTA, Reducing Agents	250 U
Collagenase, <i>Paralithodes camtschatica</i> Hepatopancreas	234133	A mixture of collagenolytic proteases with high activity against different types of collagens, especially those with resistance to clostridial collagenases. Suitable for harvesting endothelial cells.	EDTA, Reducing Agents	10 KU

Product Description	Cat. No.	Comments	Known Inhibitors	Size
Dansyl-Pepstatin	251702	A fluorogenic titrant for pepstatin-sensitive carboxyl proteases, such as pepsin, cathepsin D, chymotrypsin, and rennet.	—	500 µg
Dipeptidylpeptidase IV, <i>Aspergillus orizae</i>	317628	A serine protease that removes N-terminal dipeptides from polypeptides having unsubstituted N-termini. Penultimate residue must be Ala, Pro, or Hyp.	AEBSF, PMSF, Dipeptidyl Peptidase IV Inhibitors I & II	5 mU
Dispase, <i>Bacillus polymyxa</i>	322120	Extremely stable microbial metalloprotease suitable for use in cell cultures.	EDTA	25 U
Elastase, Human Neutrophil	324681	Degrades elastin, collagen, and proteoglycan. Has been implicated in the development of pulmonary emphysema and rheumatoid arthritis.	DFP, Elastinal, α_2 -Macroglobulin	50 µg 100 µg
Elastase, Porcine Pancreas, High Purity, Crystallized	324682	Catalyzes the hydrolysis of proteins and peptides, including albumin, casein, denatured collagen, elastin, fibrin, and hemoglobin, and a number of synthetic substrates containing aspartic acid, phenylalanine, or tyrosine.	DFP, Elastinal, α_2 -Macroglobulin	250 U 1000 U
Elastase, Porcine Pancreas, High Purity, Endotoxin-Free	324723	Hydrolyzes peptide bonds, especially those adjacent to neutral amino acids.	DFP, Elastinal, α_2 -Macroglobulin,	5 mg
Elastase, <i>Pseudomonas aeruginosa</i>	324676	Hydrolyzes elastin. Implicated in the inflammatory process from <i>P. aeruginosa</i> infection.	DFP, Elastinal, α_2 -Macroglobulin	100 µg
Endopeptidase, Neutral, Porcine Kidney	324762	A cell surface, zinc-containing metallopeptidase that is abundant in the brush border membrane of the kidney proximal tubules.	—	100 µg
Endoproteinase Arg-C, Excision Grade, <i>Clostridium histolyticum</i>	324711	A serine protease that cleaves peptide bonds specifically at the C-terminal side of arginine residues.	DFP, α_2 -Macroglobulin, TLCK	5 µg
Endoproteinase Asp-N, Excision Grade, <i>Pseudomonas fragi</i>	324708	A metalloprotease that hydrolyzes proteins at N-terminal side of Asp and Cys residues.	Aprotinin, DFP, Leupeptin, TLCK	2 µg
Endoproteinase Glu-C, <i>Staphylococcus aureus</i>	324712	A serine protease that specifically hydrolyzes peptide bonds at carboxylic side of Glu and Asp residues.	DFP, α_2 -Macroglobulin	20 U
Endoproteinase Glu-C, Excision Grade, <i>Staphylococcus aureus</i>	324713	A serine protease that specifically hydrolyzes peptide bonds at carboxylic side of Glu and Asp residues.	DFP, α_2 -Macroglobulin	50 µg
Endoproteinase Lys-C, <i>Lysobacter enzymogenes</i>	324714	A serine protease that specifically hydrolyzes amide or ester bonds at C-terminal of Lys in peptides and proteins.	Aprotinin, DFP, Leupeptin, TLCK	3 U
Endoproteinase Lys-C, Excision Grade, <i>Lysobacter enzymogenes</i>	324715	A serine protease that specifically hydrolyzes amide or ester bonds at C-terminal of Lys in peptides and proteins. Useful in sequence verification and analysis of protein structural domains and cleavage of fusion proteins.	Aprotinin, DFP, Leupeptin, TLCK	5 µg
Enterokinase, Light Chain, Bovine Recombinant, <i>E. coli</i>	324792	A serine protease that activates trypsinogen by cleavage following the lysine residue of the Asp-Asp-Asp-Asp-Lys sequence.	—	5 U
N-Glycosidase F, <i>Chryseobacterium meningosepticum</i> , Recombinant, <i>E. coli</i>	362300	This enzyme catalyzes the hydrolysis of N-glycans from high mannose, hybrid and complex glycopeptides, and from glycoproteins generating asparagine-linked oligosaccharides.	—	50 mU
Isopeptidase T	419700	Involved in the hydrolysis of isopeptide linkages of poly Ub chains.	—	25 µg
Kallikrein, Human Plasma	420307	A serine protease that releases bradykinin from kininogen.	AEBSF, Aprotinin, 3,4-Dichloro-coumarin, Leupeptin	50 µg
Kallikrein, Human Urine	420313	A serine protease that releases bradykinin from kininogen.	AEBSF, Aprotinin, 3,4-Dichloro-coumarin, Leupeptin	0.1 U 0.5 U

Product Description	Cat. No.	Comments	Known Inhibitors	Size
Kallikrein, Porcine Pancreas	420306	Liberates vasoactive peptides from their inactive kininogen precursors.	AESBF, Aprotinin, 3,4-Dichloro-coumarin, Leupeptin	500 U
MMP-1, Proenzyme Human Rheumatoid Synovial Fibroblast	444208	Cleaves fibrillar type I collagen.	—	5 µg
MMP-2, Proenzyme Human Rheumatoid Synovial Fibroblast	444213	Exists in a stable, but non-covalent 1:1 complex with TIMP-2. Requires activation just prior to use.	TIMP-2	5 µg
MMP-2/TIMP-2 Complex, Human Rheumatoid Synovial Fibroblast	444214	Secreted by several cell types. MMP-2 and TIMP-2 form a stable, but non-covalent 1:1 complex. The pro-MMP2/TIMP-2 complex has been shown to inhibit other MMPs such as collagenase and gelatinase secreted by human rheumatoid synovial fibroblasts and by human neutrophils.	—	5 µg
MMP-3, Catalytic Domain, Human, Recombinant	444217	Highly purified recombinant enzyme containing the 22 kDa catalytic domain of MMP-3.	MMP-3 Inhibitors I - VI	5 µg
MMP-7, Human, Recombinant, <i>E. coli</i>	444270	MMP-7, the smallest member of the matrix metalloproteinase family that can degrade a wide range of gelatins, proteoglycans, and glycoproteins of the matrix and can activate several other MMPs.	—	100 µg
MMP-7 Proenzyme, Human, Recombinant, <i>E. coli</i>	538540	Latent form of matrix metalloproteinase believed to be a key factor in the regulation of metastasis.	—	100 µg
MMP-8, Human Neutrophil Granulocyte	444229	MMP-8 is an N-linked, complex glycoprotein that preferentially hydrolyzes Type I collagen versus Types II and III.	Doxocycline, MMP-8, Inhibitor I	5 µg
MMP-9, Monomer, Human Neutrophil Granulocyte	444231	Highly purified native enzyme derived from stimulated neutrophils. Enzyme should be activated just prior to use.	MMP-9/MMP-13 Inhibitors I & II, TIMP-1	5 µg
MMP-9, Dimer, Human Neutrophil Granulocyte	444232	Highly purified dimeric native enzyme derived from stimulated neutrophils. Enzyme should be activated just prior to use.	MMP-9/MMP-13 Inhibitors I & II, TIMP-1	5 µg
MMP-9-Lipocalin Complex, Human Neutrophil Granulocyte	444233	Highly purified native enzyme complex derived from stimulated neutrophils. Disulfide-bridged complex of MMP-9 and a 25 kDa protein that belongs to the lipocalin family and displays homology with the α_2 -macroglobulin-related protein from rats.	MMP-9/MMP-13 Inhibitors I & II, TIMP-1	5 µg
MMP-9-Lipocalin-TIMP-1 Complex, Human Neutrophil Granulocyte	444234	Highly purified native enzyme complex derived from stimulated neutrophils. The ternary MMP-9/lipocalin/TIMP-1 complex behaves like the progelatinase B/TIMP-1 complex, acting as an inhibitor of active MMPs. Following activation, the complex acts as a gelatinase, with reduced activity.	MMP-9/MMP-13 Inhibitors I & II, TIMP-1	5 µg
MMP-13 Proenzyme, His•Tag®, Human, Recombinant, <i>Spodoptera frugiperda</i>	444248	This 452 amino acid proenzyme contains an N-terminal propeptide that confers latency to the proenzyme, a Ca ²⁺ - and Zn ²⁺ -binding catalytic domain, a hinge region, and a C-terminal hemopexin domain. Hydrolyzes collagen type II 5 to 6 times faster than collagens type I and III. Exhibits high activity towards gelatin and degrades α_1 -antichymotrypsin and plasminogen activator inhibitor-2 (PAI-2).	MMP-9/MMP-13 Inhibitors I & II	10 µg
Papain, Carboxymethylated, Immobilized	512501	Carboxymethylated papain coupled to agarose gel useful for the purification of cystatin and cystatin-related protease inhibitors.	AESBF, Antipain, Cystatin, E-64, Leupeptin, PMSF, TLCK, TPCK	2 ml
Papain, <i>Carica papaya</i>	5125	Requires a free sulfhydryl group for its activity. Hydrolyzes peptides bonds involving basic amino acids.	AESBF, Antipain, Cystatin, E-64, Leupeptin, PMSF, TLCK, TPCK	50 g

Product Description	Cat. No.	Comments	Known Inhibitors	Size
Pepsin, Porcine Stomach Mucosa	516360	Secreted by the mucosal lining of stomach. Active in acidic pH range.	Pepstatin A	500 mg 2.5 g
Plasmin, Human Plasma	527621	Produced by the activation of plasminogen. Catalyzes the solubilization of fibrin clots.	AESBF, Aprotinin, Benzamidine, 3,4-Dichlorocoumarin, PMSF, TLCK	10 U
Plasmin, EACA- and Lysine-Free, Human Plasma	527624	Plasmin, free of ϵ -aminocaproic acid.	AESBF, Aprotinin, Benzamidine, PMSF, TLCK	10 U
Plasmin, Human, Immobilized	527802	Produced by activation of plasminogen. Catalyzes the solubilization of fibrin clots and is immobilized.	AESBF, Aprotinin, Benzamidine, PMSF, TLCK	2 ml
PRONASE® Protease, <i>Streptomyces griseus</i>	53702	Liquefies mucins and digests proteins to free amino acids without any decomposition. Can be used to isolate viable chondrocytes.	α_1 -Antitrypsin, Trypsin Inhibitor	10, 25 KU 50 KU 250 KU 500 KU
PRONASE® Protease, Nuclease-Free, <i>Streptomyces griseus</i>	537088	Liquefies mucins and digests proteins to free amino acids without any decomposition. Can be used to isolate viable chondrocytes.	α_1 -Antitrypsin, Trypsin Inhibitor	5, 10 KU 25 KU 50 KU 100 KU
Proteinase K, <i>Tritirachium album</i>	539480	A highly potent serine protease that acts on native and denatured proteins of high molecular weights. May be used in the presence of SDS.	AESBF, DFP, PMSF, Trypsin Inhibitor	500 U 2000 U
Protease Assay Kit	539125	Suitable for the quantitative determination of protease activity in biological samples.	—	1 kit
Pyroglutamyl Aminopeptidase, <i>Pyrococcus furiosus</i> , Recombinant, <i>E. coli</i>	545126	Cleaves pyroglutamate from the N-terminus of polypeptide chains.	—	10 mU
Renin, Human Kidney	553861	Acts on plasma substrate angiotensinogen to split off inactive decapeptide angiotensin I, which is converted to active agent angiotensin II.	—	50 mU
Subtilisin A, <i>Bacillus licheniformis</i>	572908	A serine endoprotease with broad specificity towards native and denatured proteins.	AESBF, Aprotinin, DFP, PMSF, α_2 -Macroglobulin	10 U
Thermolysin, <i>Bacillus thermoproteolyticus</i>	58656	A zinc metalloendoprotease with specificity towards Ile, Leu, Met, and Val.	AgNO ₃ , Citrate, EDTA, α_2 -Macroglobulin, Oxalate	2500 KU
Thrombin, Bovine, High Activity	604980	Formed from prothrombin during the clotting process. Converts fibrinogen to fibrin.	AESBF, PMSF, Antithrombin, TLCK, 3,4-Dichlorocoumarin, Leupeptin	100 U 500 U
Thrombin, Bovine Plasma	605157	Formed from prothrombin during the clotting process. Converts fibrinogen to fibrin. Thrombin, Bovine, High Activity (Cat No. 604980) is also available.	AESBF, PMSF, Antithrombin, TLCK, 3,4-Dichlorocoumarin, Leupeptin	1000 U
Thrombin, Immobilized, Human Plasma	605204	Formed from prothrombin during the clotting process. Converts fibrinogen to fibrin. Thrombin bound to agarose beads. Easily removed by centrifugation.	AESBF, PMSF, Antithrombin, TLCK, 3,4-Dichlorocoumarin, Leupeptin	1 ml
Thrombin, Plasminogen-Free, Bovine Plasma	605160	Provided as lyophilized solid in CaCl ₂ , NaCl, and PEG.	AESBF, PMSF, Antithrombin, TLCK, 3,4-Dichlorocoumarin, Leupeptin	1000 U
Thrombin, Human Plasma	605190	Lyophilized in NaCl and citrate buffer. Thrombin, Human, High Activity (Cat No. 605195) is also available.	AESBF, PMSF, Antithrombin, TLCK, 3,4-Dichlorocoumarin, Leupeptin	100 U 1000 U
Thrombin, Citrate-Free, Human Plasma	605206	Formulation useful when citrate is undesirable in the experimental procedure.	AESBF, PMSF, Antithrombin, TLCK, 3,4-Dichlorocoumarin, Leupeptin β	100 U

Product Description	Cat. No.	Comments	Known Inhibitors	Size
Thrombin, Human Plasma, High Activity	605195	Designed for use in thrombin time tests.	—	100 U 1000 U
Tissue Plasminogen Activator, Human	612200	A serine protease with thrombolytic properties. Binds to fibrin via lysine binding sites and activates plasminogen to form plasmin.	Plasminogen Activator Inhibitor-1	100 µg 1 mg
Trypsin, Bovine Pancreas	6502	A serine protease that hydrolyzes amides, peptides and proteins at C-terminal side of Arg and Lys residues.	AEBSF, Antipain, Aprotinin, DFP, Leupeptin, PMSF, TLCK, Trypsin Inhibitor	2.5 MU 25 MU
Trypsin, Bovine Pancreas, High Purity, Endotoxin-Free	650200	Serine protease which specifically hydrolyzes peptide bonds at the C-terminus side of arginine and lysine residues.	AEBSF, Antipain, Aprotinin, DFP, Leupeptin, PMSF, TLCK, Trypsin Inhibitor	100 mg 300 mg
Trypsin, Excision Grade, Bovine Pancreas	650211	Useful for sequence analysis.	AEBSF, Antipain, Aprotinin, DFP, Leupeptin, PMSF, TLCK, Trypsin Inhibitor	100 µg
Trypsin, Iodination Grade, Human Pancreas	650275	Highly purified form of trypsin provided as salt-free solid.	AEBSF, Antipain, Aprotinin, DFP, Leupeptin, PMSF, TLCK, Trypsin Inhibitor	50 µg
Tryptase, Human Lung	650366	Tryptase is a serine protease that is an important mediator of allergic reactions that activates G-protein-coupled receptors through proteolysis, thus amplifying histamine release.	AEBSF, Antipain, Aprotinin, DFP, Leupeptin, PMSF, TLCK, Trypsin Inhibitor	25 µg
Urokinase, Human Urine	672112	A thrombolytic agent that converts plasminogen to plasmin.	—	10 KU
Urokinase, High Molecular Weight, Human Urine	672081	A serine protease that acts as a thrombolytic agent.	—	3000 U
Urokinase, Low Molecular Weight, Human Urine	672101	A serine protease that acts as a thrombolytic agent.	—	3000 U

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AEBSF: 4-(2-Aminoethyl)-benzenesulfonyl fluoride, HCl

DFP: Diisopropyl fluorophosphate

E-64: L-trans-Epoxy succinyl-leucylamide-(4-guanidino)-butane

EDTA: Ethylenediamine tetraacetic acid

PCMB: p-Chloromercuribenzoate

PMSF: Phenylmethylsulfonyl fluoride

TLCK: L-1-Chloro-3-(4-tosylamido)-7-amino-2-heptanone

TPCK: L-1-Chloro-3-(4-tosylamido)-4-phenyl-2-butanone

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