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Enzyme Product Catalog (February 2009)

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I. General Information on Enzyme Products

EnzySource offers a broad range of novel or proprietary enzymes including ene reductases for chiral reduction of double bonds, ketone reductases for synthesis of chiral alcohols, nitrile hydratases for hydrolysis of nitriles to amides, nitrilases for transforming nitriles to carboxylic acids, oxynitrilases for asymmetric C-C bond formation, ω -transaminases for conversion of ketones to chiral amines, and glycosidases. EnzySource also offers a wide range of hydrolytic enzymes (lipases, proteases, amidases, esterases) and their immobilized form in collaboration with ChiralVision (CV and IMM items).

- ❖ **Large-scale product delivery time:** 1-2 months for kilograms; 2-3 months for over 10-100 kilograms
- ❖ **In-house production:** our customers can also choose to produce enzymes in-house based on confidential agreement

For additional information on individual enzymes, their activity, purity and other specifications, bulk pricing, and delivery time, please contact enzymes@enzysource.com.

II. Contract R&D Services for Enzyme Development & Chemical Synthesis

We also provide cost-effective and high quality customer services including enzyme development and production, biotransformations to synthesize chiral molecules and drug metabolites to meet your need. **Our business model is fee-for-service** and we aspire to be your reliable partner in lowering the cost of enzyme development and their synthetic applications. As a research-driven and customer-focused company, our experienced team has streamlined the gene-to-protein-to-chemistry process to provide a broad range of services for industrial applications:

- ❖ Genome mining and enzyme library development
- ❖ Enzyme cloning, expression, formulation
- ❖ Enzyme production and purification (liter to >1,000L)
- ❖ Protein engineering and directed evolution
- ❖ Enzyme and microbial screening for chemical transformations
- ❖ Biosynthesis of chiral building blocks and intermediates
- ❖ Scaling up biotransformations
- ❖ Enzymatic synthesis of drug metabolites

For additional information on contract R&D services, FTE rate and delivery timeline, please contact enzymes@enzysource.com.

With state-of-the-art research facility, the company is located at Hangzhou city, one hour away by train from Shanghai. Famous for its West Lake (Xi Hu), it is one of the most scenic cities in China. Moreover, it is home to over 30 colleges and universities, more than 80 natural science research institutes, and hundreds of biotechnological and pharmaceutical companies. For further information, please visit www.EnzySource.com.

III. Enzyme Catalog

Ene Reductases			
<p>This library of ene reductases (ES-ERED) is able to catalyze regio- and stereoselective double reduction of a variety of α, β-unsaturated aldehydes, ketones, nitriles, nitros, amides. For example, (<i>R</i>)-carvone, cinnamaldehyde, citral, 2-cyclohexen-1-one, methyl vinyl ketone, cyclohexanone, 2-cyclohexen-1-one, duroquinone, ethyl-3-(2-furyl)propanoate, N-ethylmaleimide, ketoisophorone, maleic anhydride, maleimide, menadione, 3-methyl-2-butenal, 3-methyl-2-cyclohexanone, 2-methylpentanal, <i>trans,trans</i>-2,4-hexadienal, (<i>E</i>)-4-phenyl-3-butene-2-one, 4-phenyl-3-butyn-2-one, 3-phenyl-2-methylpropanal, TNT, 2,6,6-trimethyl-2-cyclohexen-1,4-dione. For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing, please contact enzymes@enzymsource.com.</p>			
Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-ERED-101	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-102	ene reductase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-ERED-103	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-104	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-105	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-106	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-107	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-108	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-109	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-110	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-111	ene reductase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-ERED-112	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-113	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-114	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-115	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-116	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-117	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050

ES-ERED-118	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-119	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-120	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-121	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-122	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-123	ene reductase	α , β -unsaturated aldehydes, ketones, nitriles, nitros, amides	50 mg \$315; 1 g \$1,050
ES-ERED-2300	ene reductase	a set of twenty-three ene reductases, 50 mg each	\$3,360

Ketoreductases

This library of ketone reductases (ES-KRED) is able to catalyze regio- and stereoselective **reduction of a wide range of aldehydes, β -ketoesters, α -ketoesters and ketones**. For example, glyceraldehyde and phenylacetaldehyde; ethyl acetoacetate, ethyl 2-oxo-4-phenylbutyrate and ethyl 2-ethylacetoacetate; ethyl 2-oxobutyrate and ethyl 2-oxo-4-phenylbutyrate; acetophenone, 4'-*tert*-butylacetophenone, 2-chloroacetophenone, cyclopentanone, cyclohexanone, cycloheptanone, 2-heptanone, 4'-methylacetophenone, 4'-methoxyacetophenone, 2-octanone, 3-octanone, 2-nonanone, 4-(trifluoromethyl)acetophenone. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing, please contact enzymes@enzysource.com.**

Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-KRED-101	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-102	ketoreductase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-KRED-103	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-104	ketoreductase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-KRED-105	ketoreductase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-KRED-106	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-107	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-108	ketoreductase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-KRED-109	ketoreductase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-KRED-110	ketoreductase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-KRED-111	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-112	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-113	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050

ES-KRED-141	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones, thermostable	50 mg \$315; 1 g \$1,050
ES-KRED-142	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-143	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-144	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-145	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-146	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones, thermostable	50 mg \$315; 1 g \$1,050
ES-KRED-147	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-148	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-149	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-150	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-151	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-152	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-153	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones, thermostable	50 mg \$315; 1 g \$1,050
ES-KRED-154	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-155	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones, thermostable	50 mg \$315; 1 g \$1,050
ES-KRED-156	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-157	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-158	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-159	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-160	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-161	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-162	ketoreductase	aldehydes, β -ketoesters, α -ketoesters and ketones	50 mg \$315; 1 g \$1,050
ES-KRED-6200	ketoreductase	a set of sixty-two ketoreductases, 50 mg each	\$9,100

Nitrile Hydratases

This library of nitrile hydratases (ES-NHT) is able to catalyze the synthesis of chiral amides through regio- and stereoselective **hydrolysis of a variety of aliphatic and aromatic nitriles** such as

acrylonitrile, adiponitrile, benzonitrile, n-butyronitrile, n-capronitrile, chloroacetonitrile, 4-cyanopyridine, 3-cyanopyridine, glycolonitrile, 4-hydroxybenzonitrile, 3-hydroxybutyronitrile, 2-hydroxy-4-phenylbutyronitrile, 3-hydroxypropionitrile, 3-hydroxyvaleronitrile, isobutyronitrile, methacrylonitrile, 4-methylmandelonitrile, 2-nitro-5-thiocyanatobenzoic acid, 3-phenoxymandelonitrile, propionitrile, valeronitrile. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing, please contact enzymes@enzysource.com.**

Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-NHT-101	nitrile hydratase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NHT-102	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-103	nitrile hydratase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NHT-104	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-105	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-106	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-107	nitrile hydratase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NHT-108	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-109	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-110	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-111	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-112	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-113	nitrile hydratase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NHT-114	nitrile hydratase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NHT-115	nitrile hydratase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NHT-116	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-117	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-118	nitrile hydratase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NHT-119	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-120	nitrile hydratase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NHT-121	nitrile hydratase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NHT-122	nitrile hydratase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NHT-123	nitrile hydratase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NHT-124	nitrile hydratase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NHT-2400	nitrile hydratase	a set of twenty-four nitrile hydratases, 50 mg each	\$3,500

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Nitrilases			
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This library of nitrilases (ES-NIT) is able to catalyze the synthesis of chiral carboxylic acids through regio- and stereoselective **hydrolysis of a wide range of aliphatic and aromatic nitriles** such as acetylbenzoxitrile, O-acetylmandelonitrile, adiponitrile, 3-aminopropionitrile, 2-, 3- and 4-cyanopyridine, 4-cyanobenzaldehyde, cyanopyrazine, fumaronitrile, 2-furonitrile, glutaronitrile, indole-3-acetonitrile, isophthalonitrile, 2-methylglutaronitrile, 2-methyl-3-butenenitrile, 1-naphthylacetonitrile, 2-naphthylacetonitrile, naproxenenitrile, 2-phenylpropionitrile, 2-phenylvaleronitrile, 2-phenylbutyronitrile, 2-phenylglycinonitrile, 4-propylbenzoxitrile, 2-thiopheneacetonitrile, 3-thiopheneacetonitrile. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing, please contact enzymes@enzymsource.com.**

Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-NIT-101	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-102	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NIT-103	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-104	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-105	nitrilase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-106	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-107	nitrilase	aliphatic and aromatic nitriles, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-108	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NIT-109	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NIT-110	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-111	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NIT-112	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-113	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NIT-114	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NIT-115	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-116	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-117	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-118	nitrilase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-NIT-119	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-120	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-121	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-122	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050

ES-NIT-123	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NIT-124	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NIT-125	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-126	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-127	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-128	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-129	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-130	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-131	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-132	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-133	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-134	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-135	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-136	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-137	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-138	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-139	nitrilase	aliphatic and aromatic nitriles	50 mg \$315; 1 g \$1,050
ES-NIT-140	nitrilase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-NIT-4000	nitrilase	a set of forty nitrilases, 50 mg each	\$5,900

Oxynitrilases

This library of oxynitrilases or hydroxynitrile lyases (ES-HNL) is able to catalyze regio- and stereoselective **synthesis of (R)-cyanohydrins or (S)-cyanohydrins from a variety of aromatic, aliphatic and heterocyclic aldehydes, ketones.** For example, acetaldehyde and its derivatives, acetophenone, acrolein, 2-allyloxyheptanal, benzaldehyde and its derivatives, 2-benzyloxypropanal, butanal and derivatives, cyclohexanone derivatives, decanal, 4-deoxy-2,3-O-isopropylidene-D-threose, dodecanal, 2-furancarboxaldehyde, glyceraldehyde and derivatives, (2E,4E)-hexa-2,4-dienal, lactaldehyde, 2-methoxy-3-phenylpropanal, 6-methyl-5-hepten-2-one, 2-naphthaldehyde, (2E)-penta-2,4-dienal, 3-phenylpropenal, 3-phenylpropionaldehyde, 3-phenoxypropanal, 3-phenylpropionaldehyde, 4-phenylbutan-2-one, tetrahydro-2H-3-pyranone, tetrahydro-3-furanone, thiophen-2-carbaldehyde, undecanal. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing,** please contact enzymes@enzymsource.com.

Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-HNL-101	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones, thermostable	50 mg \$315; 1 g \$1,050
ES-HNL-102	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones, thermostable	50 mg \$315; 1 g \$1,050

ES-HNL-103	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones, thermostable	50 mg \$315; 1 g \$1,050
ES-HNL-104	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones, thermostable	50 mg \$315; 1 g \$1,050
ES-HNL-105	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones, thermostable	50 mg \$315; 1 g \$1,050
ES-HNL-106	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones, thermostable	50 mg \$315; 1 g \$1,050
ES-HNL-107	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-108	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-109	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-110	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-111	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-112	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-113	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-114	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-115	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-116	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-117	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-118	(S)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	50 mg \$315; 1 g \$1,050
ES-HNL-1800	(S)-oxynitrilase	a set of eighteen (S)-oxynitrilases, 50 mg each	\$2,800
ES-HNL-119	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes, ketones	5 KU \$315; 50 KU \$1,050
ES-HNL-120	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	5 KU \$315; 50 KU \$1,050
ES-HNL-121	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	5 KU \$315; 50 KU \$1,050
ES-HNL-122	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	50 mg \$315; 1 g \$1,050
ES-HNL-123	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	50 mg \$315; 1 g \$1,050
ES-HNL-124	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	50 mg \$315; 1 g \$1,050
ES-HNL-125	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	50 mg \$315; 1 g \$1,050
ES-HNL-126	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	50 mg \$315; 1 g \$1,050
ES-HNL-127	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	50 mg \$315; 1 g \$1,050

ES-HNL-128	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	50 mg \$315; 1 g \$1,050
ES-HNL-129	(R)-oxynitrilase	aromatic, aliphatic and heterocyclic aldehydes	50 mg \$315; 1 g \$1,050
ES-HNL-1100	(R)-oxynitrilase	a set of eleven (R)-oxynitrilases, 5 KU or 50 mg each	\$1,750

ω-Transaminases			
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This library of ω -transaminases (ES-ATA) is able to catalyze regio- and stereoselective **synthesis of chiral amines, amino acids and their derivatives from a variety of aliphatic and aromatic ketoacids, aldehydes, ketones and ketoses**. For example, acetoin, acetophenone, benzaldehyde, 2-butanone, (*E*)-cinnamaldehyde, cyclohexanone, dihydroxyacetone, l-erythrulose, D-erythrose, D-fructose, glycolaldehyde, glyceraldehyde, α -ketoglutarate, hexanal, 1-indanone, 4-methoxyphenylacetone, nonanal, pyruvate, phenylacetaldehyde, vanillin, D-xylulose. **Potential amine donors** include α -amino acids, γ -aminobutyrate, β -alanine, *sec*-butylamine, methylbenzylamine, *iso*-propylamine. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing,** please contact enzymes@enzysource.com.

Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-ATA-101	ω -transaminase	broad substrate spectrum	50 mg \$315; 1 g \$1,050
ES-ATA-102	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-103	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-104	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-105	ω -transaminase	broad substrate spectrum, thermostable	50 mg \$315; 1 g \$1,050
ES-ATA-106	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-107	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-108	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-109	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-110	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-111	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-112	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-113	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-114	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-115	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-116	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-117	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-118	ω -transaminase	ketones, ketoacids and aldehydes	50 mg \$315; 1 g \$1,050
ES-ATA-1800	ω -transaminase	a set of eighteen ω-transaminases, 50 mg each	\$2,800

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Nitro Reductases

This library of nitro reductases (ES-NTR) is able to catalyze **synthesis of amides and their derivatives from a variety of aromatic nitro compounds**. For example, 2,4-Dinitrotoluene[121-4-2]; 2,6-Dinitrotoluene[606-20-2]; 4-nitroacetophenone[100-19-6]; 2-nitrotoluene[88-72-2]; 3-nitrotoluene[99-08-1]. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing, please contact enzymes@enzymsource.com.**

Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-NTR-101	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-102	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-103	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-104	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-105	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-106	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-107	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-108	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-109	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-110	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-111	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-112	nitro reductase	aromatic nitro compounds	50 mg \$315; 1 g \$1,050
ES-NTR-1200	nitro reductase	a set of twelve nitro reductases, 50 mg each	\$1,900

Amidases

This library of amidases (ES-AMD) is able to catalyze regio- and stereoselective **synthesis of chiral carboxylic acids and their derivatives from a variety of aliphatic and aromatic amides**. For example, nicotinamide [98-92-0], N-methylacetamide [79-16-3], acrylamide [79-06-1], formamide [75-12-7], (L)-asparagine [5794-13-8]. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing, please contact enzymes@enzymsource.com.**

Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-AMD-101	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-102	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-103	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-104	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-105	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-106	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-107	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-108	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-109	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-110	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-111	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-112	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-113	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050

ES-AMD-114	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-115	amidase	aliphatic and aromatic amides	50 mg \$315; 1 g \$1,050
ES-AMD-1500	amidase	a set of fifteen amidases, 50 mg each	\$2,350

Glucose Dehydrogenases

This library of glucose dehydrogenases is used for recycling NADP⁺ with glucose as the reductant. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing, please contact enzymes@enzysource.com.**

Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-GDH-101	Glucose dehydrogenase	glucose	50 mg \$315; 1 g \$1,050
ES-GDH-102	glucose dehydrogenase	glucose	50 mg \$315; 1 g \$1,050
ES-GDH-103	glucose dehydrogenase	glucose	50 mg \$315; 1 g \$1,050
ES-GDH-104	glucose dehydrogenase	glucose	50 mg \$315; 1 g \$1,050
ES-GDH-400	glucose dehydrogenase	a set of four glucose dehydrogenases, 50 mg each	\$630

Formate Dehydrogenases

This library of formate dehydrogenases is used for recycling NAD⁺ with formic acid as the reductant. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing, please contact enzymes@enzysource.com.**

Catalog No.	Product Name	Substrate Spectrum	Prices (US Dollars)
ES-FDH-101	formate dehydrogenase	formic acid	50 mg \$315; 1 g \$1,050
ES-FDH-102	formate dehydrogenase	formic acid	50 mg \$315; 1 g \$1,050
ES-FDH-200	formate dehydrogenase	a set of two formate dehydrogenases, 50 mg each	\$420

Alcohol Oxidase

This library of alcohol oxidase (EC-AOX) is able to catalyze fatty alcohol or aryl-alcohol synthesis of fatty aldehyde or aldehyde. For example, 1-dodecanol, 1-tetradecanol, benzyl alcohol. **For information on individual enzyme's activity, purity and other specifications, as well as bulk pricing, please contact enzymes@enzysource.com.**

ES-AOX-101	alcohol oxidase	fatty alcohol and aryl-alcohol	50 mg \$315; 1 g \$1,050
ES-AOX -102	alcohol oxidase	fatty alcohol and aryl-alcohol	50 mg \$315; 1 g \$1,050
ES-AOX -103	alcohol oxidase	fatty alcohol and aryl-alcohol	50 mg \$315; 1 g \$1,050
ES-AOX -104	alcohol oxidase	fatty alcohol and aryl-alcohol	50 mg \$315; 1 g \$1,050
ES-AOX-105	alcohol oxidase	fatty alcohol and aryl-alcohol	50 mg \$315; 1 g \$1,050
ES-AOX-500	alcohol oxidase	a set of five alcohol oxidases, 50 mg each	\$800

Glycosidases			
Catalog No.	Product Name	Sources/Substrates	Prices (US Dollars)
ES-CARH-301	α -amylase	starch, 4000 U/g	250 g \$30
ES-CARH-302	β -amylase	starch, 500 U/mg	25 g \$20
ES-CARH-303	cellulase	cellulose, 400 U/mg	10 g \$20
ES-CARH-304	xylanase	xylan, 60 KU/mg	5 g \$30
ES- CARH-305	β -Glucosidase	such as p-nitrophenyl β -D-glucopyranoside, 600 U/g	50 mg \$105; 1 g \$525

Hydrolases			
Catalog No.	Product Name	Sources	Prices (US Dollars)
ES-HLE-301	lipase	porcine pancreatic	5 g \$42
ES-HLE-302	protease	bovine pancreatic	25 g \$84
ES-HLE-303	protease	porcine gastric	5 g \$52
ES-HLE-304	protease	papain	25 g \$84
ES-HLE-305	protease	from pineapples	5 g \$73
ES-HLE-307	protease	acidic	250 g \$105
ES-HLE-308	protease	neutral	250 g \$105
ES-HLE-309	amidase	penicillin acylase I, immobilized	1 KU \$52
ES-HLE-310	amidase	penicillin acylase II, immobilized	1 KU \$105
ES-HLE-201	lipase	microbial	50 mg \$105; 1 g \$525
ES-HLE-202	lipase	microbial	50 mg \$105; 1 g \$525
ES-HLE-203	lipase	microbial	50 mg \$105; 1 g \$525
ES-HLE-204	lactonase	microbial	50 mg \$105; 1 g \$525
CV-CALBY	lipase	candida antarctica	10 g \$120; 100 g \$400
CV-CALAY	lipase	candida antarctica	1g \$160; 5 g \$400
CV-CRL1	lipase	Candida rugosa	1 g \$320
CV-P6L	protease	bacillus licheniformis	50 ml \$120; 250 ml \$200
CV-P7L	protease	bacillus amyloliquefaciens	50 ml \$120; 250 ml \$200
CV-P13FL	protease	aspergillus niger	50 ml \$120; 250 ml \$200
CV-P14L	protease	geobacillus sp. (thermolysin)	50 ml \$120; 250 ml \$200
CV-P15L	protease	trichoderma reesei	50 ml \$120; 250 ml \$200
CV-P30L	protease	bacillus subtilis	50 ml \$120; 250 ml \$200
CV-P40L	protease	bacillus subtilis	50 ml \$120; 250 ml \$200
CV-P40XL	protease	bacillus subtilis	50 ml \$120; 250 ml \$200
CV-P50FP	protease	aspergillus oryzae var.	50 ml \$120; 250 ml \$200

CV-P51FP	protease	aspergillus oryzae var.	50 ml \$120; 250 ml \$200
CV-P89L	protease	bacillus subtilis	50 ml \$120; 250 ml \$200

Immobilized Lipases

(Particle size = 150-300 µm, T1 = absorbed & dry, T2 = covalent & dry, T3 = covalent & wet)

Catalog No.	Product Name	Sources/Substrates	Prices (US Dollars)
IMMCALA-T2-150	lipase	candida antarctica A	5g \$160; 100 g \$400
IMMCALB-T1-1500	lipase	candida antarctica B	5g \$160; 100 g \$400
IMMCALB-T2-150	lipase	candida Antarctica B	5g \$160; 100 g \$400
IMMCALBY-T1-150	lipase	candida Antarctica B	5g \$160; 100 g \$400
IMMCALBY-T2-150	lipase	candida Antarctica B	5g \$160; 100 g \$400
IMMRML-T2-150	lipase	rhizomucor miehei	5g \$160; 100 g \$400
IMMCRL-T2-150	lipase	candida rugosa	5g \$160; 100 g \$400
IMMTLL-T1-1500	lipase	thermomyces lanuginosa	5g \$160; 100 g \$400
IMMTLL-T2-150	lipase	thermomyces lanuginosa	5g \$160; 100 g \$400
IMMCCL-T2-150	lipase	candida cylindracea	5g \$160; 100 g \$400
IMMABC-T2-150	lipase	pseudomonas cepacia	5g \$160; 100 g \$400
IMMAPF-T2-150	lipase	pseudomonas fluorescens	5g \$160; 100 g \$400
IMMARO-T2-150	lipase	rhizopus oryzae	5g \$160; 100 g \$400
IMMCALAY-T2-150	lipase	candida antarctica A	1g \$160
IMMCRL1-T2-150	lipase	candida rugosa	1g \$160
IMMAMJ-T2-150	lipase	Mucor javanicus	5g \$160; 100 g \$400
IMMANF-T2-150	lipase	Aspergillus niger	1g \$160
IMMANA-T2-150	lipase	Aspergillus niger	1g \$160
IMMRNA-T2-150	lipase	Rhizopus niveus	1g \$160
IMMASMQ-T2-150	lipase	Alcaligenes sp.	1g \$160
IMMASMP-T2-150	lipase	Alcaligenes sp.	1g \$160
IMMRES-T2-150	lipase	Resinase HT	1g \$160
IMMLIPX-T2-150	lipase	Lipex 100L	1g \$160
IMML51-T2-150	lipase		1g \$160
IMMCCMO-T2-150	lipase	Candida cylindracea sp.	1g \$160
IMMCCMM-T2-150	lipase	Candida cylindracea sp.	1g \$160
IMMAULI-T2-150	lipase	Bacillus subtilis	5g \$160; 100 g \$400
IMMCALA-T3-150	lipase	candida antarctica A	10g \$160; 200 g \$320
IMMCALB-T3-150	lipase	candida antarctica B	10g \$160; 200 g \$320

IMMCALBY-T3-150	lipase	candida antarctica B	10g \$160; 200 g \$320
IMMRML-T3-150	lipase	rhizomucor miehei	10g \$160; 200 g \$320
IMMCRL-T3-150	lipase	candida rugosa	10g \$160; 200 g \$320
IMMTLL-T3-150	lipase	thermomyces lanuginosa	10g \$160; 200 g \$320
IMMCCL-T3-150	lipase	candida cylindracea	10g \$160; 200 g \$320
IMMABC-T3-150	lipase	pseudomonas cepacia	10g \$160; 200 g \$320
IMMAPF-T3-150	lipase	pseudomonas fluorescens	10g \$160; 200 g \$320
IMMARO-T3-150	lipase	rhizopus oryzae	10g \$160; 200 g \$320

Immobilized Proteases

(Particle size = 150-300 μ m, T1 = absorbed & dry, T2 = covalent & dry, T3 = covalent & wet)

Catalog No.	Product Name	Sources/Substrates	Prices (US Dollars)
IMMALC-T2-150	protease	subtilisin from Bacillus sp.	5g \$160; 100 g \$400
IMMSAV-T2-150	protease	subtilisin from Bacillus sp.	5g \$160; 100 g \$400
IMMEVE-T2-150	protease	subtilisin from Bacillus sp.	5g \$160; 100 g \$400
IMMESP-T2-150	protease	subtilisin from Bacillus sp.	5g \$160; 100 g \$400
IMMP6-T2-150	protease	bacillus licheniformis	5g \$160; 100 g \$400
IMMP30-T2-150	protease	bacillus subtilis	5g \$160; 100 g \$400
IMMP40L-T2-150	protease	bacillus subtilis	5g \$160; 100 g \$400
IMMP51-T2-150	protease	aspergillus oryzae	5g \$160; 100 g \$400
IMMP89-T2-150	protease	bacillus subtilis	5g \$160; 100 g \$400
IMMCAR-T2-150	protease	Mucor miehei	5g \$160; 100 g \$400
IMMP7-T2-150	protease	Bacillus amyloliquefaciens	5g \$160; 100 g \$400
IMMP14-T2-150	protease	Geobacillus sp. (Thermolysin)	5g \$160; 100 g \$400
IMMP15-T2-150	protease	Trichoderma reesei	5g \$160; 100 g \$400
IMMP50-T2-150	protease	Aspergillus oryzae var.	5g \$160; 100 g \$400
IMMAUAC-T2-150	protease	Aspergillus niger	5g \$160; 100 g \$400
IMMAUNE-T2-150	protease	Bacillus subtilis	5g \$160; 100 g \$400
IMMAUAL-T2-150	protease	Bacillus subtilis	5g \$160; 100 g \$400
IMMPAP-T2-150	protease	Carica papaya	5g \$160; 25 g \$320
IMMBRO-T2-150	protease	pineapple stem	5g \$160; 25 g \$320
IMMFIC-T2-150	protease	fig tree latex	5g \$160; 25 g \$320

Immobilized Phospholipases

(Particle size = 150-300 μ m, T1 = absorbed & dry, T2 = covalent & dry, T3 = covalent & wet)

Catalog No.	Product Name	Sources/Substrates	Prices (US Dollars)
IMMLMPL-T2-150	phospholipases	LysoMax	5g \$160; 100 g \$400
IMMGZPL-T2-150	phospholipases	G-Zyme G999	5g \$160; 100 g \$400
IMMLEPL-T2-150	phospholipases	Lecitase ultra	5g \$160; 100 g \$400

Other Immobilized Enzymes

(Particle size = 150-300 μ m, T1 = absorbed & dry, T2 = covalent & dry, T3 = covalent & wet)

Catalog No.	Product Name	Sources/Substrates	Prices (US Dollars)
IMMROXY-T3-150	(R)-oxynitrilase	almonds	Inquire
IMMNeuAc-T3-150	N-acetylneuraminic acid aldolase		Inquire
IMMPenGA-T3-150	Penicillin G amidase	E. coli	Inquire
IMMADH-T3-150	Alcohol dehydrogenase	various	Inquire
IMMKRED-T3-150	ketoreductase	various	Inquire

Notes: We also provide cost-effective and high quality contract R&D services for enzyme discovery, development and production as well as biotransformation services to synthesize chiral molecules and drug metabolites. **For FTE rate and delivery timeline**, please contact enzymes@enzysource.com or visit www.EnzySource.com.