

DAI Process Enzymes

DAI Process Enzymes is a leading producer of process enzymes. Our product list includes amidases, esterases, lipases, aldolases and nitrilases. In close cooperation with several DSM business groups and third parties, more than 10 years of valuable knowledge and experience on the production and application of specialty enzymes for the pharmaceutical, fine chemicals and vitamin markets has been built up. This has resulted in DAI Process Enzymes gaining proficiency in developing and implementing new specialty enzymes within short and well predictable lead-times, produced according to cGMP guidelines and offered at competitive prices.

The expertise is built on three main strengths:

1. Highly innovative and efficient R&D and manufacturing.
2. Short and well predictable lead-times.
3. Strong product knowledge.

Highly innovative and efficient R&D and manufacturing

The success is based on the combined effort of both a highly innovative R&D organization and a highly efficient production facility. DAI Process Enzymes offers both a standardized program and tailor-made solutions:

Standardized program

Our standard program consists of both our unique Plugbug™ concept and a standard production protocol, which consists of fermentation, downstream processing and formulation. The standard production protocol ensures our customers short and well predictable lead-times for the development and implementation of the required enzyme.

Tailor-made solutions

If a new process enzyme cannot be produced via our standardized program we can offer tailor-made solutions in order to develop a production process for an enzyme that exactly fits your application.

Plugbug™

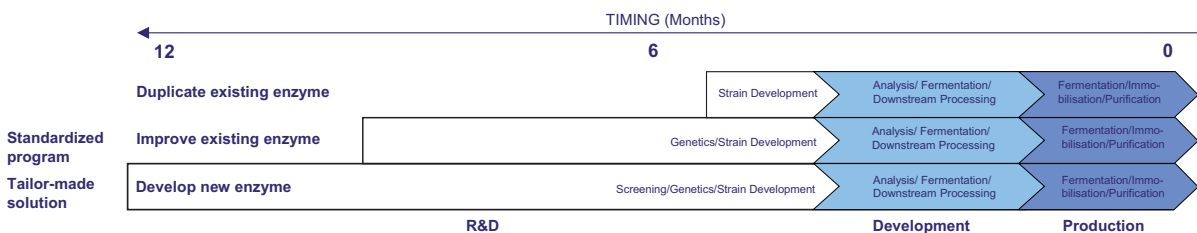
The Plugbug™ concept is a standardized program exploiting established processes for the production of enzymes. The Plugbug™ concept contains:

- *Molecular biological tools*, available to quickly transfer new genes into the production strain
- *A robust strain* that can attain high productivity levels
- *A scaleable and well-known fermentation process*

Solutions offered by DAI Industrial Enzymes

Duplicate existing enzyme	Supply enzyme at competitive prices and safeguard your future supplies.
Improve existing enzyme	Develop and produce second-generation (intrinsically improved) enzyme. Provide immobilized enzyme to reduce enzyme costs and prevent contamination of the product stream. Develop improved product formulation suitable for your application.
Develop new enzyme	Facilitate research and development of an enzyme and of the process based on an enzyme. Development of a process for the production of a new enzyme.

Short and well predictable lead-times



DAI Process Enzymes

Strong product knowledge

Our current products:

Our current product portfolio consists out of various enzymes used in the pharmaceutical, the fine chemical and the vitamin industries. We are also specialized in enzymes for manufacturing of SSPs, SSCs and intermediates like 6 APA and 7 ACA.

A selection of the enzymes produced by DAI Process Enzymes includes:

- amidases
- hydroxynitrile lyases
- nitrilases
- esterases
- aldolases

Several of these enzymes have been improved in-house by means of protein engineering.

Class	Reaction scheme	Industrial application
Amidase		Resolution of chiral amines, formation of peptide bonds
Hydroxynitrile lyase		Stereospecific addition of cyanide
Nitrilase		Regiospecific hydrolysis of nitril
Esterase		Resolution of chiral esters
Aldolase		Aldol condensation

Our formulation knowledge:

We can offer our customers both an *enzyme solution* as well as an *immobilized product formulation*. The main advantage of immobilization of the enzyme is that it gives our customers the possibility for multiple-use of the enzymes as well as easy separation of the biocatalyst. Besides, DAI Process Enzymes has built up strong know-how on stabilization of products up to several years.

Our next products:

Together with our customers we are in a constant process of improving existing enzymes and developing new enzymes. Please contact us to discuss in person the possible solutions we could offer your organization.

DSM Anti-Infectives

We would be pleased to discuss in person how DAI Process Enzymes can accommodate your organization with our solutions. For more information, please contact us at:

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