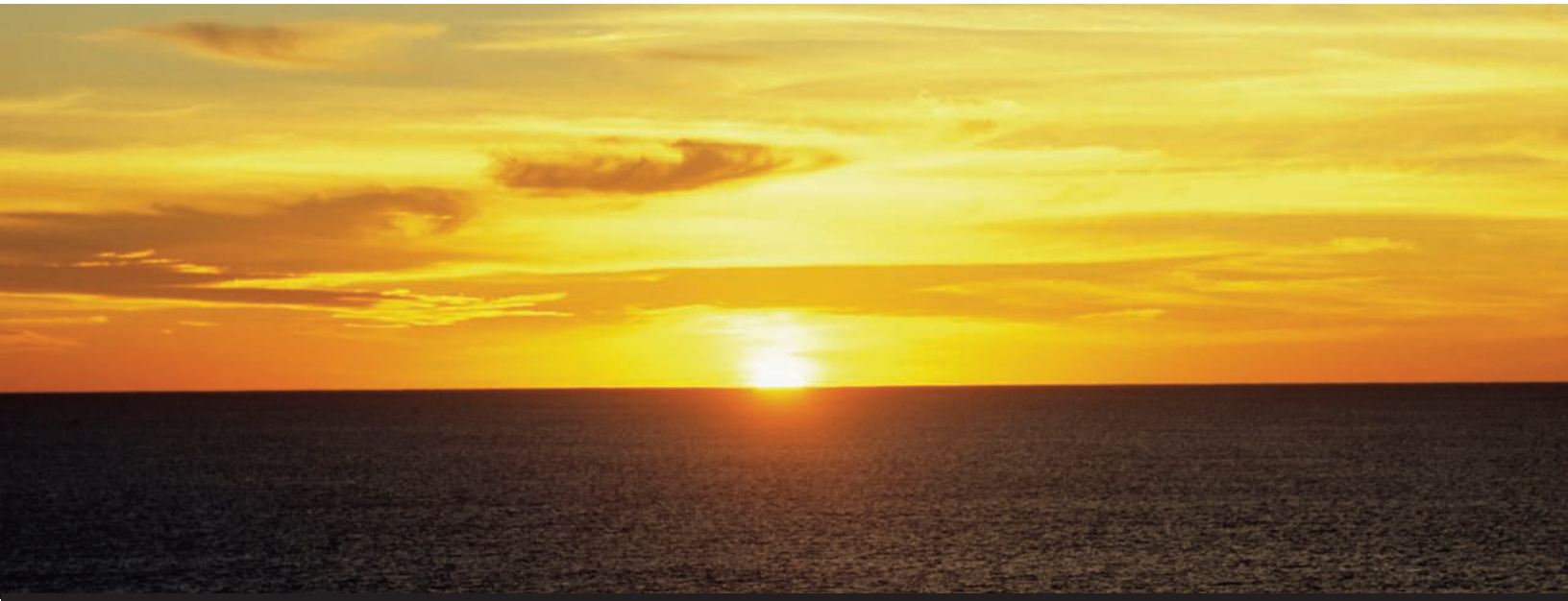
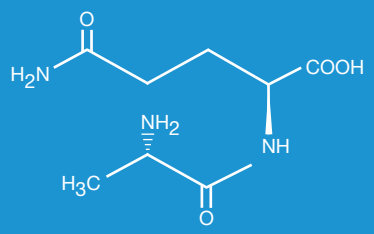
SUSTAMINE™



A new day in dipeptide technology.

Measuring the impact of maximized stability

KYOWA



A breakthrough dipeptide that delivers more for less

Ammonia, a byproduct of glutamine degradation in media, has long been the enemy of healthy cell growth. Historically, glutamine dipeptides that side-step this problem cost more to produce than their perceived value. Until today. Kyowa has produced Sustamine™, L-alanyl-L-glutamine, directly from glucose through its proprietary fermentation process.

At the heart of Sustamine– the science of stability

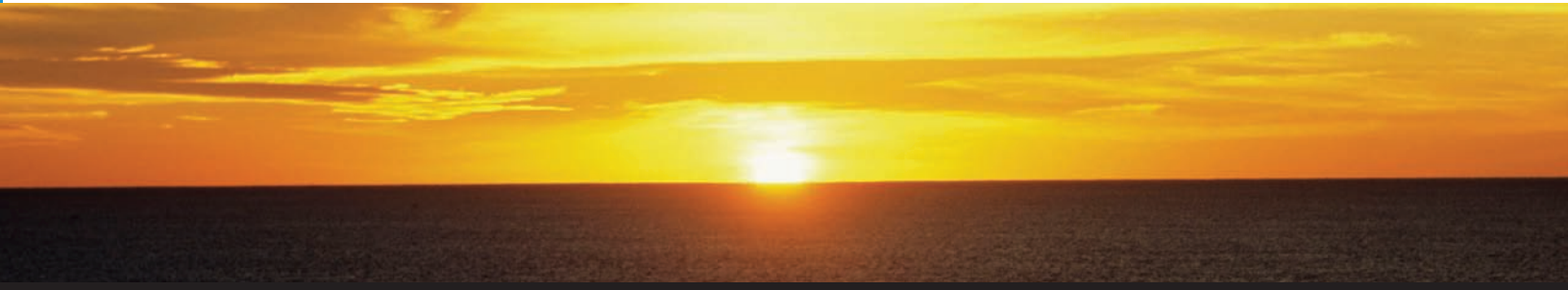
The scientists at Kyowa have discovered a novel enzyme that directly connects amino acids. Through their innovative manufacturing process, Kyowa's scientists can create dipeptides without the necessity of chemical modifications. This proprietary process has unlocked the potential for dramatically improving productivity in cell cultures, particularly of value in antibody production, but with promising applications that span the healthcare industry.

Sustamine delivers striking results in cell culture media

- **Reduced ammonia** – studies demonstrate that Sustamine produces half the level of ammonia associated with ordinary glutamine
- **Maximum stability** – a milder degradation process means a more hospitable and predictable environment for cell growth
- **Greater viable cell growth** – the results of a recent study show an improvement in viable cell yield with Sustamine
- **Increased product yield** – Mab production with Sustamine generates a 100% increase over production with ordinary glutamine
- **Economically scalable** – Sustamine's unique manufacturing process allows us to match your specific need

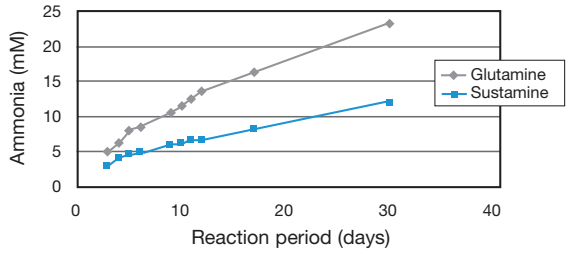
With little to no modification of your current process, Sustamine can enable you to reach your production goals. Sustamine is available for worldwide distribution.

SUSTAMINE™

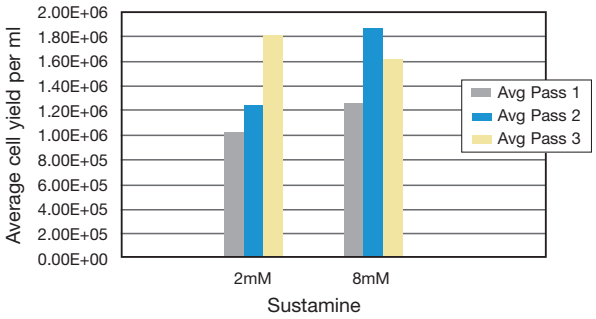


A new day in dipeptide technology.

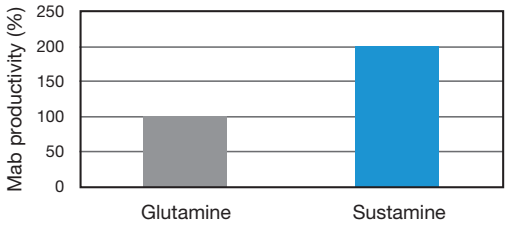
Reduced ammonia levels with Sustamine



Improved viable cell yield with Sustamine



Increased Mab production with Sustamine



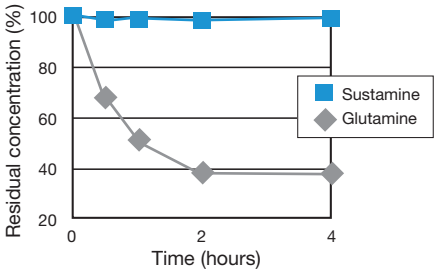
For more information on Kyowa's innovative dipeptide manufacturing process, refer to:

- S. Hashimoto, A novel biocatalyst opens the door to the dipeptide world, *Chemistry Today*, p.14 (July/August 2006).
- S. Hashimoto, Revolutionary process for dipeptide manufacturing, *Specialty Chemicals Magazine* (June 2006).

Scientific advantages create tangible business value

- **Saves money** – increased yield saves millions of dollars in production costs and raises profits dramatically
- **Protects your investment** – less need for supplementation and refeeding of the active bioreactor reduces the risk of contamination
- **Encourages economy of scale** – with Sustamine's long shelf life, companies may produce large lots of liquid media for greater savings and inventory control
- **Available worldwide** – reach your production goals with global distribution
- **Untapped potential** – application possibilities in many liquid product markets, including IV, enteral drugs, nutraceutical health, sports nutrition and more

Maximized stability with Sustamine at 37 °C and pH1



SUSTAMINE™

A new day in dipeptide technology.

Partner with a world-recognized bio-innovator

Kyowa Hakko, an international health ingredients manufacturer, strives to create new value around health-related products through innovations in science. Kyowa Hakko leads the world in producing amino acids through bioprocessing using microorganisms. The company develops products through fermentation processes using agricultural products such as sugars, instead of carbon dioxide-emitting fossil fuels. And, instead of using high-pressure, high-temperature processes to produce synthetic chemicals, Kyowa Hakko employs eco-friendly temperatures and pressure to produce a natural, more stable result.

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KYOWA

Contact us to learn how Sustamine can brighten your horizons.