ACCELLERASE® BG
Accessory Beta-Glucosidase for Biomass Hydrolysis

Product Information

DESCRIPTION
ACCELLERASE® BG beta-glucosidase is designed as an accessory product to supplement whole cellulases deficient in beta-glucosidase and work synergistically to achieve high glucan conversion for the lignocellulosic biomass processing industry. ACCELLERASE® BG enzyme can effectively convert cellobiose into fermentable mono-saccharides like glucose. Cellobiose is also an inhibitor of cellulase enzymes, so low levels are desirable. Supplementation with ACCELLERASE® BG enzyme can result in faster and higher ethanol production.

ACCELLERASE® BG is a beta-glucosidase produced from a genetically modified strain of *Trichoderma reesei*. The production host is removed at the end of the controlled fermentation and the product is concentrated and formulated.

TYPICAL CHARACTERISTICS
Activity: 3000 pNPG U/g (minimum)
Appearance: Clear amber liquid
pH: 5.0 - 6.0

The activity of ACCELLERASE® BG enzyme is expressed in pNPG units. One pNPG unit denotes 1 μmol of Nitrophenol liberated from para-nitrophenyl-β-D-glucopyranoside per minute at 50°C (122°F) and pH 4.8. Detailed assay method is available upon request.

APPLICATION RECOMMENDATIONS
ACCELLERASE® BG accessory enzyme, when added to other cellulase products deficient in beta-glucosidase, will enhance saccharification of glucan in lignocellulosic biomass and increase the yield of fermentable glucose by alleviating product inhibition to the cellulolytic enzymes. ACCELLERASE® BG enzyme can be used with whole cellulases in hydrolysis of various feedstocks, including paper pulp, corn stover and cob, sugarcane bagasse, wheat straw, wood chips, waste paper and many others obtained from different pretreatment technologies such as dilute acid, ammonia fiber-expansion (AFEX) and steam expansion. ACCELLERASE® BG enzyme can be used in simultaneous saccharification and fermentation (SSF), two step sequential hydrolysis and fermentation (SHF), or hybrid saccharification and fermentation (HSF) configurations.

Please be aware that the pH and temperature stability optima and limits of the enzyme in use will depend upon the other operating parameters and your process configuration. Saccharification performance may be enhanced by the addition of other Genencor® enzymes depending on the composition of the pretreated feedstock.

DOSAGE GUIDELINES
ACCELLERASE® BG enzyme is generally added to other cellulase products to improve hydrolysis performance. The optimum dosage levels of ACCELLERASE® BG enzyme will vary considerably with different substrates and their associated pretreatment technologies and conditions, and other enzyme additions, if applicable. Operating conditions such as pH, temperature and reaction time may also affect enzyme performance. ACCELLERASE® BG enzyme dosage rate of 0.009 to 0.18 mL per gram cellulose or roughly 0.0045 to 0.09 mL per gram of biomass (depending on biomass composition), in addition to, or in partial substitution of, total enzyme, is recommended as a starting point for enzyme blending optimization. Small-scale experiments are recommended to determine optimum enzyme dosage and blends in each system. See Figures 1-3 for examples of such experiments.

Figure 1: Cellobiose concentration profiles for a washed acid-pretreated sugarcane bagasse (APB) at 7% cellulase loading using SPEZYME® CP whole cellulase and ACCELLERASE® BG enzyme at 50°C and pH 5.0. Experiments were performed in 100g batch-scale experiments in 500ml shake-flasks. Final total protein loading is the same in every case.

Together we can fuel the future with biomass.
EFFECT OF pH AND TEMPERATURE
ACCELLERASE® BG enzyme has the best operational stability in the following ranges:
Temperature: 30 - 55°C (122 - 167°F)

pH: 4.0 – 6.0

Whereas long operational times are possible at the low end of this temperature range, the higher temperatures will limit the effective periods of operation.

ACCELLERASE® BG enzyme is easily inactivated at temperatures above 70°C (158°F) or at pH levels above 7.0 or below 4.0.

PACKAGING
ACCELLERASE® BG enzyme is available in various package sizes. Please consult your Genencor® representative for detailed information.

STORAGE
It is advisable to store ACCELLERASE® BG enzyme under refrigerated conditions of 4 - 10°C (39 - 50°F), sheltered against direct sunlight. Storage above 20°C (70°F) should be avoided.

SAFETY & ENZYME HANDLING
Inhalation of enzyme dust and mists should be avoided. In case of contact with the skin or eyes, promptly rinse with water for at least 15 minutes.

For detailed handling information, please refer to the appropriate Material Safety Data Sheet, the Enzyme Technical Association (ETA) handbook Working Safely With Enzymes, and the Association of Manufacturers and Formulators of Enzyme Products (Amfep) handbook Guide to the Safe Handling of Microbial Enzyme Preparations. All are available from Genencor®.

TECHNICAL SERVICE
Information covering specific applications of this product is available. Genencor® will work with customers to enhance processes and solve problems. Let us know what you need and we will assist you.

Contact information:
USA and Canada
Rochester, New York
Telephone: 1-800-847-5311
Telefax: +1-585-244-4544

Europe, Africa and Middle East
Leiden, The Netherlands
Telephone: +31-71-5686-168
Telefax: +31-71-5686-169

Latin America
Buenos Aires, Argentina
Telephone: +54-11-5199-9550
Telefax: +54-11-5199-9559

Asia/Pacific
Singapore
Telephone: +65-6511-5600
Telefax: +65-6511-5666

Shanghai, P.R. China
Telephone: +86-21-2307-9588
Telefax: +86-21-2307-9599

Mumbai, India
Telephone: +91-22-2825-8713
Telefax: +91-22-2825-8733

Web Address
www.genencor.com

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