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TECHNICAL INFORMATION

Catalog Number: 101308, 150583, 150584, 152337
Cellulase
CAS # : 9012-54-8
Physical Description: Off white to tan powder
Description: Cellulase refers to a group of enzymes which, acting together, hydrolyze cellulose. It has been reviewed by Emert, et al.[5] and Whitaker.[10]
The enzymatic mechanism whereby certain microorganisms can quite rapidly and completely degrade cellulose is not yet understood. Reese, et al.[8] proposed that at least two steps are involved: first, a prehydrolytic step wherein anhydroglucose chains are swollen or hydrated and secondly, hydrolytic cleavage of the now susceptible polymers either randomly or endwise. The first step would involve an enzyme designated C_1 and the second, hydrolytic enzymes termed Cc. A third type of enzyme is b-glucosidase.
Multi-enzyme cellulase complexes capable of converting cellulose to glucose contain at least three distinct enzyme components which degrade native cellulose. The action of the C_1 component on cellulose is not well defined. There is no evidence that the component hydrolyzes glucosidic bonds, but rather it appears that the C_1 component disrupts the structure of native cellulose by weakening the hydrogen bonds. The action is required before hydrolysis of highly structured forms of cellulose (cotton, cyrstalline cellulose, wood, etc.) can occur.
The Cc component consist of b-1,4-glucanases, Exo-b-1,4-glucanase successively removes single glucose units from the nonreducing end of the cellulose chain, while endo-b-1,4-glucanases randomly hydrolyze the interior glucosidic bonds of cellulose liberating oligomers of lower molecular weight.
The b-glucosidases, including cellobiose, are primarily active on the smaller molecular weight cellulose hydrolysates. During cellulose breakdown they are active on the dimers and oligomers of cellulose.
Molecular weight: C1, 57,000 (Selby[9]); 42,000 (Berghem, et al.[3]).Endoglucanase (E.C.3.2.1.4), 52,000 (Li, et al.[7]); 23,500 - 58,000 (Beldman, et al.[2]).Exoglucanase (E.C.3.2.1.91), 60,500 - 62,000 (Beldman, et al.[2]); b-Glucosidase (E.C.3.2.1.21), 76,000 (Beldman, et al.[2]).
Optimum pH: Varies with the substrate in the range 4.2 - 5.2.
Unit Definition: One unit will liberate 1.0 umole of glucose from cellulose in one hour at pH 5.0 and 37°C.
CMC Unit Definition: 100 units is sufficient to produce reducing sugar equivalent to 1 mg of glucose per minute at pH 5.0 and 40°C.
Filter Paper Decomposing Activity: One unit is a measure of the decomposing activity on filter paper at pH 4.0, 40°C.
Solubility: Readily soluble in water
Availability:

Catalog Number	Description	Size
101308	Cellulase, from *Aspergillus niger*, approx. 20,000 cmc units/gm	5 g 25 g 100 g
150583	Cellulase, from *Aspergillus niger*, activity > 60,000 unit/gm	5 g 25 g 100 g
150584	Cellulase, from *Trichoderma virde*, activity 1-2 units/mg solid	2 KU 5 KU 25 KU 10^5 U
152337	Cellulase, from *Trichoderma virde*, activity > 16,000 units/gm of filter paper decomposing activity	500 mg 1 g 5 g

References:

– Almin, K., and Eriksson, K., "Influence of Carboxymethyl Cellulose Properties on the Determination of Cellulase Activity in Absolute Terms," *Arch. Biochem. Biophys.*, **v. 124**, 129 (1968).
– Beldman, G., Searle-van Leeuwen, M., Rombouts, F., and Voragen, F., "The Cellulase of Trichoderma viride. Purification, Characterization and Comparison of all Detectable Endoglucanases, Exoglucanases and b-Glucosidases," *Eur. J. Biochem.*, **v. 146**, 301 (1985).
– Berghem, L., Pettersson, L., and Axiö-Fredriksson, U., "The Mechanism of Enzymatic Cellulose Degradation Characterization and Enzymatic Properties of a b-1,4-Glucan Cellobiohydrolase from *Trichoderma viride*," *Eur. J. Biochem.*, **v. 53**, 55 (1975).
– Clarke, A., and Stone, B., "b-Glucan Hydrolases from Aspergillus niger. Isolation of a b-(1 ---> 4)-Glucan Hydrolase from

Aspergillus niger," *Biochem. J.*, **v. 96**, 802 (1965).
– Emert, G., Gum, E., Lang, J., Liu, T., and Brown, R., Cellulases, in *Food Related Enzymes*, (Whitaker, J., ed.), Advances in Chemistry Series 136, Amer. Chem. Soc., Washington, DC (1974).
– King, K., and Smibert, R., "Distinctive Properties of b-Glucosidases and Related Enzymes Derived from a Commercial *Aspergillus niger* Cellulase," *Appl. Microbiol.*, **v. 11**, 315 (1963).
– Li, L., Flora, R., and King, K., "Individual Roles of Cellulase Components Derived from *Trichoderma viride*," *Arch. Biochem. Biophys.*, **v. 111**, 439 (1965).
– Reese, E., Siu, R., and Levinson, H., "The Biological Degradation of Soluble Cellulose Derivatives and Its Relationship to the Mechanism of Cellulose Hydrolysis," *J. Bacteriol.*, **v. 59**, 485 (1950).
– Selby, K., *The Purification and Properties of the C1-Component of the Cellulase Complex*, in Advances in Chemistry, Series No 95, (Gould, R., ed.), Amer. Chem. Soc., Washington, DC, 34 (1969).
– Whitaker, D.: Cellulases, in *The Enzymes*, V, (Boyer, P., ed.), Academic Press, NY, 273 (1971).
– Tomita, Y., et al., *J. Ferment. Technol.*, **v. 46**, 701 (1968).
– Takebe, I., et al., *Plant and Cell Physiol.*, **v. 9**, 115 (1968).
– *Biotechniques*, **v. 10**, 166-171 (1991).