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Cloning, characterization and saccharification analysis of GH12 endo-1, 4-β-glucanase from *Thermotoga petrophila* in a mesophilic host

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Production of bioethanol has received much attention in recent years and many countries have made large investments in infrastructure, process development and production facilities. Energy crisis are the leading economic constrains in developed as well as in developing countries. With the exhaustion of nonrenewable resources at an exponential rate, the need to develop alternative renewable sources which can be both cost effective, environmental friendly and high in yield is the need of time. Recently, the increasing demand of energy has strongly stimulated the research on conversion of lignocellulosic plant biomass by the action of cellulases enzymes into reducing sugars, for the subsequent production of bioethanol. Endoglucanases are mainly responsible for hydrolyzing the internal glycosidic bond to decrease the length of the cellulose chains. Obtaining efficient and thermostable endoglucanase has become the goal of much research worldwide. Therefore, our research work was focused to search for new resources of endoglucanases, which was thermostable and with high catalytic efficiency. The article focuses on the thermotolerant endo-1,4-β-glucanase gene, of *Thermotoga petrophila RKU-1*, was cloned and over-expressed in *E. coli* strain BL21 codon plus for its potential usage for the hydrolysis of lignocellulosic biomass and in different industrial applications. Thermostable endoglucanase can be used simultaneously and directly in the saccharification procedure without a pre-cooling process of biomass. Purified enzyme was optimally active with 530 Umg-1 of specific activity against CMC at pH 6.0 and 95 °C, which has exhibited a half- life ($t_{1/2}$) of 6.6 min even at temperature as high as 97 °C and stable up to 8 hours at 80 °C. The recombinant enzyme saccharified pre-treated wheat straw and baggase to 3.32% and 3.2%, respectively after 6 h incubation at 85 °C. Its thermostability, resistance to heavy metal ions and high specific activity make endoglucanase a potential and promising candidate for various industrial applications such as in textile industry (in bio stoning and bio finishing), in animal feed production, in processing of beer and fruit juice, in biomass hydrolysis (bioethanol production) and in plant oil, detergent, pulp and paper industry.

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Color gradation of substituted polyacetylenes: Molecular design, synthesis and characterization of their helical structures

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Main-chains in substituted polyacetylenes (SPAs) are twisted into a helical structure in order to avoid steric hindrances between neighboring side-chains. We have previously demonstrated that the color of SPAs having phenyl rings, called poly(arylacetylenes) (PAAs) strongly depended on molecular structure of the side-chains in their aromatic ring and on solvents used by the polymerization reaction. In this work, we focused on relationship between color of PAAs and their helical structures. Designed PAAs having phenyl or naphthyl rings were synthesized and characterized to elucidate precise helical structures containing degree of twist and distance of aromatic rings in side-chains.

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