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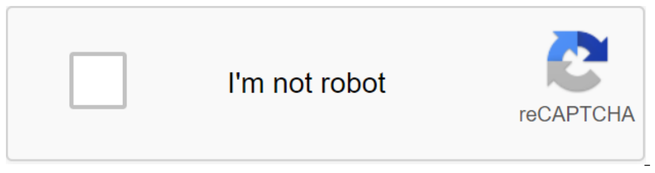

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Microbial enzymes involved in the catabolic amino acids include deaminase, decarboxyase and transaminase, which catalyze deamine, respectively, deamine, decarboxylation and transamination of amino acids for the production of, respectively, α-keto acids, amines and other amino acids, which are then converted into aldehyde, alcohol and acid. From: Encyclopedia of Food Microbiology (Second Edition), 2014Haiquan Yang, ... Long Liu, in biotechnology of microbial enzymes, 2017 microbial enzymes find applications in many areas, including chemical, fermentation, agriculture, pharmaceuticals and food production. Choosing appropriate expression systems is essential for the rate of enzyme production, and bacteria, filaine fungi and yeast have been used to express recombinant enzymes. Biotechnical applications have increased in numbers due to the benefits of these species. However, physiological effects make high levels of recombinant enzyme expression difficult to achieve. Natural enzymes, especially in industrial settings, have limitations such as low catalytic efficiency, activity and stability. Strategies such as mutagenes, rooting and terminal synthesis are used to remove these limitations. In this chapter, widely used strategies for the production of microbial enzymes and molecular engineering are systematically summarized, and we hope that this review can contribute to the research and development of the microbial enzyme field.G. Molina, ... G.M. Pastore, in new and future developments in microbial biotechnology and bioengineering, 2016 Microbial enzymes are very interesting biocatalins that have been extensively studied because of their advantages over chemical catalysts, since the former present is better than selectivity and can be used in mild response conditions. In addition, a number of industrial sectors require enzymes with special characteristics for their use in the processing of different substrates and raw materials. In this sense, β of glucosides derived from Aspergillus strains play an important role due to their specificity for a wide range of glycoside substrates. Because of its potential and very broad activity, β-glucosidase is also explained by several important industrial applications, despite the numerous problems associated with production and cleaning that have yet to be overcome to obtain these enzymes on an industrial scale. From this point of view, this chapter presented the importance of β-glucoside and their production of the Aspergillus strains, showing the basic conditions of the process, the substrates used, and the yields achieved both by underwater and solid fermentation. In addition, this chapter presents methods related to the purification, characterization and immobilization of β-glucoside, becoming enzymes that are of great importance and potential for several Sector sectors food, chemical, pharmaceutical and biofuel industries. Reinhard Renneberg, ... Vanya Lorokh, in Biotechnology for Beginners (Second Edition), 2017 Microbial enzyme production focuses on simple hydrolytic enzymes (proteases, amylase, pectinases) that degrade natural polymers such as proteins, starches, or pectin. Microorganisms release enzymes into their nutrient environment to make better use of it. These extracellular enzymes break down giant substrate molecules into smaller ones that microorganisms can feed. Similar processes are known in the animal kingdom, in spiders, for example, where they are called extra-intestinal digestion (Figure 2.12). Figure 2.12. Dad longlegs spider Pholcus phalanx bites into the leg of the midge caught in its net to inject digestive juices. Thus, the victim is digested from within. The leg of the midge serves as a straw through which the entire body of the medium midge is slurped, takes up to 16 hours! It takes so long because the digestive enzyme has to reach the furthest ends of the midge body before the food is ready... Unsurprisingly, the industry is still largely focused on extracellular enzymes, as they can be easily and cheaply extracted from the environment and do not require cost and time-consuming cell breakdown and cleaning procedures. The bacterial cell contains more than a thousand different enzymes, and any intracellular enzyme must be separated from other enzymes and cellular structures. There are two different properties in proteins that can be used for separation purposes - molecular mass and electrical charge. All methods of protein separation, known today, use these methods: salt precipitation, movement through the electric field (electrophoresis), binding with charged or unloaded carriers (chromatography), mass spectrometry and other methods. Sergio Sanchez, Arnold L. Demaine, in biotechnology of microbial enzymes, 2017 microbial enzymes have long been used by manufacturers of industrial products as the main catalysts for converting raw materials into end products. More than 500 commercial products are produced using enzymes. They are economically produced by various microorganisms and break down quickly when they have done their job. New technical tools for using enzymes as crystal catalysts, for the ability to process cofactors, and engineering enzymes to work in different solvents with multiple activities are important technological developments that will steadily create new applications. The market for industrial enzymes will grow steadily mainly due to increased production efficiency, which will lead to cheaper enzymes, new applications, new enzymes from screening programs and the engineering properties of traditional Tailor enzymes for specific applications will be a future trend with constantly improving tools, further understanding of structure-function structure-function and increased search for enzymes from exotic environments. New applications in textiles and new animal nutrition, such as animal and fish feed, are to be expected. Breakthroughs in pulp and paper use can be expected to materialize. The use of cellulose to convert cellulose waste into sugar and further into ethanol or butanol by enzymatic organisms has been a major study topic for years. Increased environmental pressures and energy prices will make this application a real opportunity in the future. Enzymes should never be seen alone, but rather as part of biocatalistics technology. Recent developments in genetic engineering and protein chemistry are bringing increasingly powerful analysis tools to bear on the study of enzyme structure and function, which will undoubtedly lead to rational modification of enzymes to meet specific requirements, as well as the design of new enzymes with new properties. Techniques such as protein engineering, gene shuffling and directional evolution will allow the development of enzymes that are better suited to the industrial environment. These tools will also enable the synthesis of new biocatalots for brand new applications, resulting in the production and commercialization of new enzymes, thereby sowing the second explosive expansion of the current multibillion-dollar enzyme industry.H. Taniguchi, Y. Honnda, in the Encyclopedia of Microbiology (Third Edition), 2009 Microbial enzymes that are classified as amylase are shown in table 1 with their number This classification is based on the catalytic properties of enzymes such as substrate and product specificity. These enzymes break down into three EU classes: transferase (EC 2), hydrolase (EC 3) and isomerase (EC 5), and most of these enzymes belong to ec 3 class. Table 1. Enzymes belonging to the name amylaseEnzymeECGH familyGH 13 subfamilyMechanismModeBaseBaseAcid-Amylase3.1.1131, (2), 5, 7, (19), 27, 28, 32Reteningendo (β/α)8AspGluz-asilase3.2.1.214InversionExo (β/α)8GluGluGlucoamylase3 .2.1.315InversionExo (α/α)6GluGluOligo-1.6-glucosidase3.3. 2.1.101331ReteningEndo (β/α)8Aspglu-Glucosideze3.2.1.201321, 29RetainyingExo (β/α)8AspGlu31AspAspAmylo-1.6-glucosidase3.2.1.331325RetainingExo? (β/α)8AspGluPullulanase3.2.1.411312, 13, 14RetningEndo (β/α)8AspGgluCyclodextrinase3.2.1.5413 (20)ConservationAndo (β α <3> <2>/α)8AspGluGlucan-1.4-α-maltototraohydrolase3.2.1.6013NCRetainingExo? (β/α)8AspGluIsoamylase3.2.1.681311RetainingEndo (β/α)8AspGluGlucan-1,4-α-maltohexaohydrolase3.2.1.9813/19)RetainingExo? (β/α)8AspGluGlucan-1.4-α-maltotriohydrolase3.2.116NCRetainingEndoNKNKGlucan-1.4-α-maltohydrolase3.2.1.1331 PreservationEndo (β/α)8AspGluNeopulanase3.2.1.13513 (20)SavingAndo (β/α)8AspGlu4-α-d-glucanotregalosa enzyme2.4.18139RetningAndo (β/α)8AsspGluCyclodextrin glucanotransferase2.4.19132RetningAnddo (β/α)8AspGlu4-α-gluck anotransferase2.4.1.2577RetainingEndo (β/α)8AspGlu4-α-glukan 1-α-d-glucosylmutase5.4.99.151326RetainingExo? (β/α)8AspGluNC, is not classified; NK, it is not known. Based on their mechanism of action enzymes can be divided into two groups: preserving and inverting. The anometric configuration in the substrate is maintained after catalytic action in the preservation of enzymes, while it is inverted after the catalytic action of enzyme inverting. β amylase (EC 3.2.1.2) and glucomylasse (EC 3.2.1.3) are enzyme inverting, while all other enzymes containing α-amylase (EC 3.2.1.1) retain enzymes. The third criterion used to classify enzymes belonging to the amylas group is their specificity of action α-glucan chains. Enzymes can be classified as exo-action or endo-action. β-amylase and glucoamilases are exo-acting enzymes because they release maltose or glucose, consistently from the non-rare end of α-glucans. By contrast, α-amylase is an endo-acting enzyme because it attacks internal glucose bonds α-glucans to produce oligosaccharides with various DPs.Based on a huge amount of information about primary and tertiary enzyme structures, Henrissat has proposed a new classification method for carbohydrate active enzymes. Currently, all glycoside hydrolases (GHs) are classified into 110 GH families (CA'y database for October 2007), and all microbial amylase is classified into 5 GH families: GH 13, 14, 15, 31 and 77. As shown in Table 1, enzymes with different catalytic specificity, and therefore different EU numbers, belong to the GH 13 family. The common structural features of enzymes belonging to the GH 13 family are the presence of four preserved amino acid sequences and the structure of the trunk (β/α)8. Recently, the GH 13 family was additionally divided into 35 sub-familys based on detailed structural differences. This allows approximately correlated enzymes with specific EU numbers with those with specific families of GH or subfamy, as summarized in Table 1.Goutam Brahmachari, in the biotechnology of microbial enzymes, 2017Enzymes, in particular, microbial enzymes are of great use in fundamental and applied research, both in scientific circles and in industry. The use of enzymes as biocatholots in organic conversions provides an approach to solving certain specific problems in synthetic biology. Molecular recognition and selective catalysis are key chemical processes in life, and these processes are embodied in enzymes. Enzymes are thus able to easily synthesize many complex with specific structural features. In the recent past, lipase has become one of the most promising enzymes for extensive practical use in organic synthesis. Synthesis. controllability, broad tolerance to substrate, high resistance to temperatures and solvents, high enantioelectibility, convenient commercial availability and reuse are key advantages of choosing lipase as a biocatalist in a huge number of organic transformations. This chapter offers a recent update on the lipase-catalysis organic transformations reported between 2013 and mid-2015. This review reflects the biocatalytic effectiveness of the enzyme in various types of organic reactions, including esterification, transesterification, supplementation, ring closure, oxidation, reduction, amideation and many others. To expand the use of lipase, there is an urgent need to understand the mechanisms behind the lipase-catalyzed reactions more deeply. Protein engineering lipase and further improvement of lipase drugs and reaction methodology are likely to enrich lipase chemistry in the near future. Xiangyang Liu, Chandrakant Kokare, in biotechnology of microbial enzymes, 2017 there are two types of growing methods for all microbial enzymes: immersed fermentation (SmF) and solid fermentation (SSF). Underwater fermentation involves the education of microorganisms in a high oxygen concentrated liquid nutrient environment. The viscosity of the broth is the main problem associated with fungal immersed fermentation. When fungal cells grow and mycelium is produced, it prevents the action of impeller, due to this limitation occurring in oxygen and mass transmission. SSF is suitable for the production of enzymes using natural substrates, such as agricultural residues, because they mimic the conditions under which fungi grow naturally. Since the SSF includes relatively little liquid compared to SmF, downstream processing from SSF is theoretically easier and cheaper. Over the past 10 years, interest in SSF has resumed, in part because of the recognition that many microorganisms, including genetically modified organisms (GMOs), can produce their products more efficiently with SSF (Singh et al., 2008). SSF has three main advantages: (1) high volume performance, (2) relatively higher food concentration and (3) less runoff, the need for simple fermentation equipment, etc. Availability of SSF technology for use up to 20-30% substrate, Unlike the 5% high in the SmF process, was documented (Pamment et al., 1978).A.L. Demain, P. Vaishnav, in Comprehensive Biotechnology (Second Edition), the 2011 Fermentation Industry flourished in the 1980s and 1990s, when microbial enzymes came on the scene. In the 1970s, most enzymes have traditionally been sourced from plant and animal sources, leading to low levels high prices, and slowed the growth of the enzyme industry. Microbial enzymes were economically beneficial, as the cultivation of microbes was much easier and faster than in plants and animals, and producing organisms could be easily manipulated genetically to obtain the desired qualities and amounts of enzymes. Some of the main industrial uses of enzymes in production include (1) Escherichia coli amidase for the production of 6-aminepenic acid (6-APA) per 40,000 tons a year-1; (2) Streptomyces xylose isomerase for isomerization of d-glucose to d-fructose per 100,000 tons a year-1; and (3) Pseudomonas chlorapis nitril hydrate to produce acrylamide from acrylonitril for 30,000 tons of yr'1 . Amilasers are produced annually at a rate of 95,000 tons per year. The total market for industrial enzymes reached $2 billion in 2000 and has grown to $2.5 billion today. The leading enzyme is protease, which accounts for 57% of the market. Others include amylase, glucoamylase, xylosic isomeras, lactase, lipase, cellulose, pululanas and xylanase. The food and feed industry are the largest consumers of industrial enzymes. More than half of industrial enzymes are made from yeast and mold, with bacteria producing about 30%. Beasts provide 8% and plants 4%. Enzymes also play a key role in catalysing reactions that lead to microbial formation of antibiotics and other secondary metabolites. Over the years, higher enzyme titers have been obtained using brute force mutagenes and random microbial screening. Recombinant DNA technology has acted as a boon for the enzyme industry as follows: (1) plant and animal enzymes can be made by microbial fermentation, such as chimosine; (2) Enzymes from organisms that are difficult to grow or process genetically are now produced by industrial organisms, such as the species Aspergillus and Trichoderma, and Kluyveromyces lactis, Saccharomyces cerevisiae, Yarrowia lipolytica and Bacillus licheniformis (e.g., thermophilic lipases were produced by Asgillperus oryzae and Thermoanaerobacter cyclodextrinozil transfera Bacus); (3) Enzyme performance has been increased by the use of multiple copies of genes, strong promoters and effective signal sequences; (4) The production of a useful enzyme from pathogenic or toxin-producing species can now be done in a safe place; and (5) protein engineering has been used to improve the stability, activity and/or specificity of the enzyme. By the 1990s, many enzymes were produced by recombinant methods. In 1993, more than 50 per cent of the industrial enzyme market was provided by recombinant processes; sales totaled $140 million. Factory fitaza produced in the recombinant Aspergillus niger was used as a 50% of all pigs in Holland. A 1,000-fold increase in the production of physase was achieved in A. niger through the use of recombinant technologies. Industrial lipases were in Humicola and industrially produced by A. oryzae. They are used to clean laundry, percentages of lipids and esteration of glucosides, the production of glycolides, which are used as biodegradable non-ionic surfactants for detergents, skin care products and contact lenses, as well as as food emulsifiers. Mammal chimosine was cloned and produced by A. niger or E. coli, while recombinant chimosin was approved in United Status; its price was twice that of a natural calf chimosin. More than 60% of enzymes used in detergents, food processing and starch processing were recombinant products as early as the mid-1990s. Today, with recombinant DNA technology and protein engineering, enzymes can be specifically developed to meet user or process requirements. There is no longer any need to be content with the natural properties of the enzyme. The highest quality enzymes were obtained by protein engineering, in particular, on the basis of mutagenes directed to the site. Single changes in amino acid sequences have made changes in optimal pH, thermostathes, feedback inhibition, carbon source inhibition, substrate specificity, Vmax, Km and Ki. A new and important method for improving enzymes has been directed by evolution (also known as applied molecular evolution or directed molecular evolution). Unlike mutagenes directed to the site, this method of combining and recombining parts of similar genes of different species or strains yields significant enzyme improvements in a very short period of time. The procedure actually mimics nature in that mutations, selection and recombination are used to develop highly adapted proteins, but it is much faster than nature. This method can be used to improve protein pharmaceuticals, low-molecular pharmaceuticals, gene therapy, DNA vaccines, recombinant protein vaccines and viral vaccines, as well as for the development of viruses. Proteins from directed evolutionary work were already on the market in 2000. Many enzymes are used as therapeutic treatments for gastrointestinal and rheumatic diseases, thrombosis, cystic fibrosis, metabolic diseases and cancer. Sales of therapeutic enzymes totaled $2.3 billion in 1996, while in 1998 the therapeutic enzyme markets were as follows: Pulmozyme (DNase) for cystic fibrosis, acute myocardial infarction and ischemic stroke, $350 million; Ceredase® and Cerezyme® (r-DNA version) for Gosh disease, $387 million By 2007 the market cerezyme ® $1.1 billion Therapeutic market in addition to the industrial enzyme market discussed above. Jj Jun, in Comprehensive Biotechnology (Second Edition), 2011Bioreactor is the core of biological processes. Biological systems include microorganisms, animal cells, plant cells and tissues. To develop an appropriate bioreactor for a specific bioprocess intensive research study such as cell growth, metabolism, genetic manipulation, and protein or other product expression, are needed to understand the requirements of cells to their physical and chemical environment. It is also necessary to monitor and optimize the bioreactor environment with the help of operating variables to favor the desired functions of cells and achieve cost-effective large-scale production. This article explores the fundamental principles of design and different types of bioreactors, including a mixed tank, pneumatic, membrane, fixed and liquid-bed, and wave bioreactors. The effect of process variables on biological characteristics such as temperature, pH, mixing, oxygen transfer and haircut strength are discussed. Bioreactor's strategies include fed, continuous, semi-continental and perfusion cultures. For the industrial application of bioreactors, scaling bioreactors, multi-scale research and monitoring of bioprocessors, modeling and modeling are very important. Finally, the trends in bioreactor engineering, including a microbioreactor, a cell as a super bioreactor, and plants and animals as powerful bioreactors producing proteins, are summarized briefly. Anil Kumar Patel, ... Ashok Pandey, in the biotechnology of microbial enzymes, 2017Use starch degrading enzymes was the first large-scale application of microbial enzymes in the food industry. There are two main enzymes that convert starch into glucose: alpha amylase and glucomylas (Pandey, 1995; Pandey, et al., 2000). Sometimes additional degranation enzymes, such as pullulans, are added to increase glucose yields. Beta-amilase is made commercially from barley grains and is used for the production of neacharid maltose (Selvakumar et al., 1996). Studies have been carried out on the use of transglutaminase as a text agent in the processing of sausages, noodles and yogurt, where the cross-binding of proteins provides improved viscous-viscous-viscous properties of products (Kuraishi et al., 2001). In the United States, large amounts of glucose syrup are converted by isomerase glucose after the removal of Ca2 (alpha amylase needs Ca2 for activity, but it suppresses isomerase glucose) into fructose containing syrup. This is done by bacterial enzymes that need Mg2 ions for activity. Fructose is separated from glucose by large-scale chromatographic separation and crystallized. In addition, fructose concentrates up to 55% and is used as a high fructose corn syrup in the soft drinks industry. Industry. wow bfa survival hunter pvp guide. wow wotlk survival hunter pvp guide. wow 3.3 5 survival hunter pvp guide. wow mop survival hunter pvp guide. wow 5.4.8 survival hunter pvp guide. wow bfa 8.3 survival hunter pvp guide. wow cata survival hunter pvp guide. wow 4.3.4 survival hunter pvp guide