CHAPTER 34

MICROBIOLOGY

Doctoral Theses

298. BANSAL (Lata) nee LATA AGARWAL
Production of Succinic Acid from Escherichia Coli M87049 and Enterococcus Flavescens by Anaerobic Fermentation : Process Development, Purification and Important Applications.
Supervisor : Prof. R. K. Saxena
Th 14831

Abstract

Succinic acid, and organic acid of tremendous industirial impact which is at present commercially produced by chemical processes, may be produced by fermentation using anaerobic microorganisms. It is known that few anaerobic and facultative anaerobic microorganisms produce and accumulate succinic acid as a product of their energy metabolism. However, a lot of effort is still needed for the cost effective production and downstream processing for its successful commerical production. Thus in the present investigation, screening, selection and indentification of potent succinic acid producers and process engineering of various factors affecting succinic acid production was carried out. Subsequently, whole cell immobilization and scale up was also attempted followed by purification and extraction of succinic acid and its important applications.

Contents

1. Introduction and current status of research. 2. Materials and methods. 3. Observations and results. 4. Discussion. 5. Summary and conclusions. 6. Future prospects. Bibliography and Appendixes.

299. GUPTA (Namita)
Production, Biochemical Properties and Molecular Characterization of an Alkaline Thermoactive Lipase from Burkbolderia Multivorans.
Supervisor : Prof. Rani Gupta
Th 14830

Abstract

Studies the confirmation of the selected bacterium and its lipolytic potential. Medium optimization for maximum lipase production by Burkholderia multivorans under: Submerged fermentation - 'one-at-a time' strategy and Plackett Burman and Response surface methodology solid-state fermentation downstream processing and purification of the lipase purifciation by- cloumn chromatography and sorption and de-sorption method SDS and Native PAGE analysis and determination of N-terminal sequence biochemical characterization of the purified lipase. Characterization of the enzyme with reference to industrially useful properties- Regioselectivity, Detergent compatibility and Esterification potential. Immobilization of the enzyme and its charaacterization. Cloning of lipase gene operon Cloning of lipase gene- Genomic library construction and PCR amplification. Colining of foldase gene- PCR amplifiaction, Homologous recombination and Southern hybridization expression of the cloned gene in Escherichia coli.

Contents

300. ISAR (Jasmine)
Development and Optimization of an Anaerobic Fermentative Process for Succinic Acid Production from Escherichia Coli W3110 and Bacteroides Fragilis, its Purification and Important Applications.
Supervisor : Prof. R. K. Saxena
Th 14833

Abstract

Attempts to develop microbial routes for the production of succinic acid. Moreover, the fermentatively derived succinic acids is pure stereo isomers and are optically active therefore has niche applications in pharmaceuticals and polymers industries. Thus, for the rapidly growing polymer industries, microbially derived succinic acid is in demand. Realizing the importance of succinic acid, the present investigation was undertaken. A series of experiments were planned, initially for screening, selection and indentification of potential succinic acid producing microbes. Attmpts were made for optimization of the production of succinic acid from the selected isolates, whole

cell immobilization and scale up. This was followed by purification, extraction of the succinic acid thus produced and its applications.

Contents

1. Introduction. 2. Review of literature. 3. Materials and methods. 4. Observations and results. 5. Discussion. 6. Summary, Conclusions, Bibliography and Appendixes.

301. SHARMA (Deepak Chand)
Thermostable and Alkalistable Pectinase of Bacillus Pumilus: Production Characterization and its Applicability in Fibre Processing.
Supervisor : Prof. T. Satyanarayana
Th 14832

Abstract

D-Galacturonic acid forms the backbone of pectins that are complex colloidal acid polysaccharides in plant tissues. The carboxy1 groups of pectins are partially esterified by methy1 groups and neutralized by sodium, potasium, magnesium or ammonium ions. Additionally, rhamnose constitutes a minor component of the backbone, while other neutral sugars such as arabinose, galactose and xylose are present in the side chains. It is a structural polysaccharide interlinked with other structural polysaccharides or proteins present in the tissues. The enzymes that hydrolyse pecticsubstances are called pectolytic/pectinolytic enzymes or pectinases. Pectin degrading enzymes can be distinguished in to pectin esterases, which remove the methoxy1 group of pectin to form pectic acid, and depolumerases)hydrolases and lyases), which split the backbone chain in both pectin and pectate. Based on the pH optima for activity, they can be grouped in as acidic or alkaline pectinases. Microbial alkaline pectinases are useful in the fabric industry, retting of plant fibers such as flax, hemp and jute, ad in the treatment of pulp and paper mill effluents. A thermo-alkali-tolerant bacterium, Bacillus pumilus was selected for the detailed investigation based on its ability to secrete highly alkali- and thermo- active solid state fermentations. An attempt was made to purify and characterize the thermostable and alkaline pectinase and assess its utility in te treatment of ramie fibre, and as an additive to xylanase in biobleaching of paper pulps.

Contents

1. Introduction. 2. Materials and methods. 3. Results. 4. Discussion. 5. Summary, Conclusions and Bibliography.