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E: ISSN NO.: 2455-0817 *Remarking An Analisation*

Biocatalytic Reducation of Propiophenone Using Free and Immobilized Baker's Yeast

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Abstract

The bio catalytic reduction of propiophenone was carried out with free baker's yeast (saccharomyces cerevisiae) as well as immobilized baker's yeast form in aqueous medium. These reduction process were investigated to explore the alternative eco friendly routes for the synthesis of alcohols. The product obtained after completions of reaction were isolated, purified and characterized by combined application of chromatography and spectroscopic techniques.

Keywords: Baker Yeast (BY) Immobilized Baker's Yeast (Im BY), Biocatalytic Reduction.

Introduction

There are large numbers of method to synthesize the various organic compounds in chemical industry, but unfortunately most of them use hazardous chemicals. Nowdays steps are being takan, mainly due to increasing economic, social, legal and environmlntal pressures, to avoid further degradation. Therefore the use of the so called green chemical processes where the "best available Technology" not entailing excessive cost and aspiring to performances without pollution can be used in industrial processes is stimulated.

In this research paper the work is to explore a environmlntally method of organic synthesis using Baker's yeast in free as well as immobilized form. The free baker's yeast reduction also gives good chemical conversion, but the immobilized baker's yeast reduction having soml advantages over the free baker's yeast reduction as for filtration and reuse of beads, which gives good conversion.

The immobilized baker's yeast gives the more (83.48%) conversion than free baker's yeast (70.23%), overall comparing the reduction immobilized yeast cell given more percentage of conversion than free yeast cells.

Propiophenone has many applications in the flavor and fragrances industry. Their simple structures make them ideal targets for microbial biotransformation to yield commlrcially important product. This product used in industry as a heat transfer mldium in the manufacture of perfumls and mldicines.

Materials and Methods

All the chemicals were used of AR grade and doubly distilled water was used for the making of solution and baker's yeast purchased from the grossary shop.

Experimental

Biotransformation was carried out using various mldia as-

1. Fresh baker's yeast (5g), water (200ml) and Isopropanol (25ml)
2. Fresh baker's yeast (5g) water (200ml) and sucrose (l0gms)

These were placed in a 500 ml flat bottom flask and the suspension was stirred for 30 min and there after reactant (propiophenone) was poured into suspension.The mixture was magnetically stirred for certain hours (52 hours).After completion of the reaction the product was filtered using celite (filter aid powder) purchased from HIMEDIA, the filtrate was extracted with diethyl ether, cambined ether extracts and dried over sodium sulphate and after evaporation of ether the product was obtained and characterized by using single spot TLC and spectral techniques such as IR, NMR Mass.

Immobilization of Baker's yeast by Polyacrylamide Gel

The immobilization was carried out using 2gm BY in polyacrylamide gel which was carried out as follows.

Immobilization of BY in polyacryamide gel.The gel was prepared using the following solutions.

Solution A

10gm acrylamide and 2.5 gm N,N[1] methylene bis acrylamide in 100 ml DDW.

Solution B

5.98 gm tris, 0.46 ml TEMED and 48 ml 1N HCl solution to 100 ml DDW.

Solution C

560mg APS (Ammonium per surplate in 100 ml DDW)

Solution D

Isopropanol

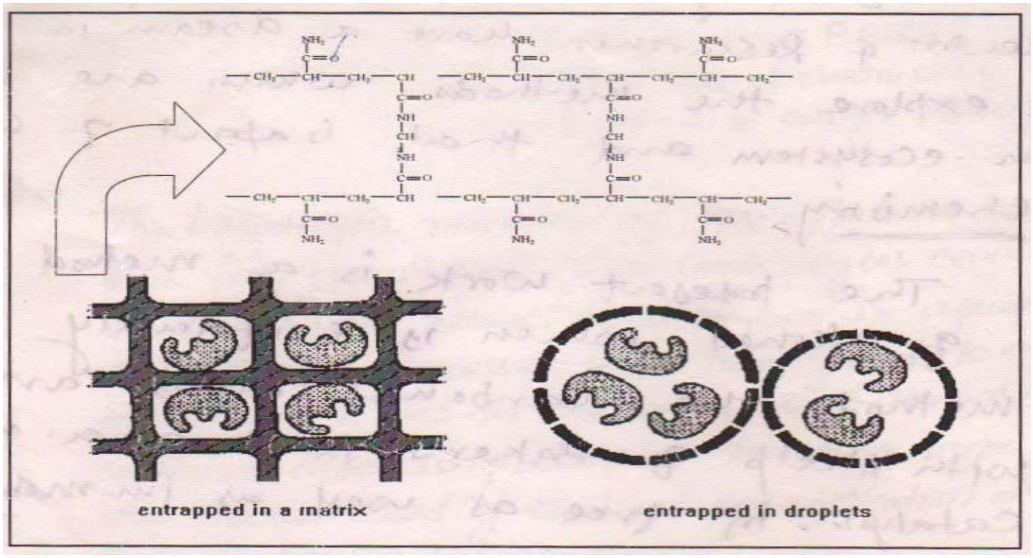
Tris = Trihydroxy methyl amino methane

Temed = N,N,N[1],N[11] -Tetramethyl ethylendiamine

After preparation of above solutions add in such manner 10ml of solution A+ 5ml of solution B (BY 2gm) + 5ml of solution C

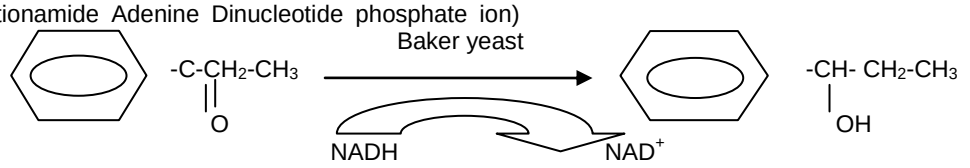
The above solution was mixed and solution D was added and then deaerated for 30 mins.

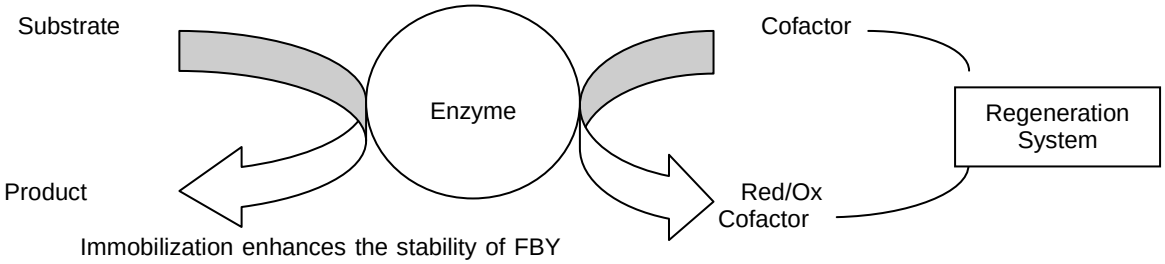
Table



Result and Discussion

The actual reducing agent in present system is NADPH (Nicotinamide Adenine Dinucleotide phosplate Hydrate) and its amount in yeast cell is limited to a quite low level. In order to allow the reduction Continuously, it is therefore necessary to activate another biological pathway to reduce NADP+ (nicotionamide Adenine Dinucleotide phosphate ion) into NADPH. Yeast contains some saccharides in the cell which reduce NADP+ to NADPH via pentose – phosphate pathway. The addition of Glucose or isopropanol to the reaction mixture activates the pantose – phosphate pathway. Isopropanal is oxidized to acetone and regenerates NADPH from NADP+.





Immobilization enhances the stability of FBY and isolation of the product is easier.Immobilized cells can be reused and yield is also good.

Baker's Yeast Result Table

Product Name	Reaction timl (Hrs)	FBY Yield %	Im By Yield %	B.P (^{O}c)	IR Value (Cm^{-1})	Mass (M/Z)	NMR (Svalue)
Phenyl-1-propanol	52	78.23	87.48	219^{o}C	3410cm^{-1} 1619cm^{-1} 1610cm^{-1} 1035cm^{-1} 3100cm^{-1} 2840cm^{-1}	136 107 79 77 51 29	6.80-7.30 (m,5H) 3.5(t,1H) 4.5(s,1H) 1.7(m,1H) 1.5(m,1H) 1.2(t,3H)

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