STUDY ON ENZYMATIC SYNTHESIS OF ESTERS

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ABSTRACT

THE MAJOR OBJECTIVE OF THIS PROJECT IS TO SYNTHESIZE THE PRIMARY ALCOHOL ESTERS AND SECOND ALCOHOL ESTERS IN THE ORGANIC SOLVENT BY IMMOBILIZED LIPASE (LIPASE IM-77 AND LIPASE PS) TO OBTAIN THE HIGHER CONVERSION YIELD. THE ENZYMATIC SYNTHESIS OF TERPENE ESTERS WILL BENEFIT THE FOOD MANUFACTURERS AND BE MORE APPEALING TO CONSUMERS. TERPENE ESTERS ARE ESSENTIAL OILS WIDELY USED IN THE FOOD, BEVERAGE, COSMETIC, AND PHARMACEUTICAL INDUSTRIES AS FLAVOR AND FRAGRANCE COMPOUNDS. TRADITIONALLY, THEY HAVE BEEN ISOLATED FROM NATURAL SOURCES OR PRODUCED BY CHEMICALS SYNTHESIS. TERPENE ESTERS ARE SYNTHESIZED BY LIPASE IN ORGANIC SOLVENTS BY DIRECT DIRECTION AND TRANSESTERIFICATION. KOJIC ACID 【5-HYDROXY-2-(HYDROXYMETHYL)1,4-PYRONE】, A FUNGAL METABOLITE PRODUCED BY MANY SPECIES OF ASPERGILLUS AND PENICILLIUM. KOJIC ACID IS AN INHIBIOR OF BACTERIA, VIRUSES, AND FUNGI. IT IS USED TO INHIBITE THE BROWNING EFFECT OF TYROSMASE IN THE FOOD AND COSMETIC INDUSTRIES. BECAUSE KOJIC ACID IS WATER-SOLUBLE, IT'S INSTABILITY IS A PROBLEM INS COSMETIC USE. SYNTHESIS OF KOJIC ACID ESTER BY CHEMICAL METHODS, E.G., ESTERIFICATION OF KOJIC ACID WITH FATTY ACID IN THE PRESENCE OF ACID OR ALKALINE CATALYSTS, USUALLY RESULTS IN A COMPLEX MIXTURE. ENZYMATIC SYNTHESEIS OF KOJIC ACID ESTER IN ORGANIC SOLVENT IS STILL AN UNEXPLORED AREA OF RESEARCH. OPTIMAL SYNTHETIC CONDITIONS WAS OBTAINED USING 5-FACTOR5-LEVEL CCRD EXPERIMENTAL DESIGN AND RESPONSE SURFACE METHODOLOGY. PRIMARY ALCOHOL OPTIMUM CONDITIONS WERE: REACTION TIME 24H, TEMPERATURE 60 ℃, ENZYME AMOUNT 20%, SUBSTRATE MOLAR RATIO 1:1.5, AND ADDED WATER 0%. THE PREDICTED VALUE WAS 100% AND ACTUAL EXPERIMENTAL VALUE WAS 98% MOLAR CONVERSION. SECOND ALCOHOL OPTIMUM CONDITIONS WERE: REACTION TIME 20H, TEMPERATURE 45 ℃, ENZYME ENZYME AMOUNT 45%, SUBSTRATE MOLAR RATIO 1:2, AND ADDED WATER 10%. THE PREDICTED VALUE WAS 82% AND ACTUAL EXPERIMENTAL VALUE WAS 82% MOLAR CONVERSION.

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