ABSTRACT

STRUCTURED LIPIDS (SL) ARE DESIGNER TRIGLYCERIDES WITH DESIRED FATTY ACIDS AT SPECIFIC
POSITION IN ONE TRIGLYCERIDE MOLECULES AS “NUTRACEUTICALS, FUNCTIONAL FOODS, AND MEDICAL
OR PHARMAFOODS” TO TARGET SPECIFIC DISEASES, METABOLIC CONDITIONS AND FOR OPTIMAL
NUTRITION. AT PRESENT, ALL THE COMMERCIAL SL PRODUCTS ARE PRODUCED BY CHEMICAL
SYNTHESIS. HOWEVER, THE PROCESS REQUIRES HIGH TEMPERATURE AND LONG TIME. IT MAY CAUSE
LIPIDS DETERIORATION AND OBTAIN UNWANTED PRODUCTS. LIPASE CAN SYNTHESIZE SL UNDER MILD
REACTION CONDITIONS, AND SPECIFICITY OF THE LIPASE CAN OBTAIN DESIRED PRODUCTS. SL IS
SYNTHESIZED BY COMMERCIALLY IMMOBILIZED LIPASES IN ORGANIC SOLVENTS. HOWEVER, THE DIRECT
CONTACT WITH THE SOLVENT AND FATTY ACIDS MAY CAUSE LIPASE INACTIVITY. REVERSE MICELLES
CAN PROTECT LIPASE FROM DIRECT CONTACT WITH THE SOLVENT AND FATTY ACIDS. IN THIS STUDY,
THE ABILITY OF AN IMMOBILIZED LIPOZYME IM77 TO MODIFY TRIOLEIN BY INCORPORATION OF
CAPRYLIC ACID (C8) TO FORM SL IN HEXANE OR REVERSE MICELLAR SYSTEM WAS STUDIED. RESPONSE
SURFACE METHODOLOGY (RSM) WAS USED TO EVALUATE THE EFFECTS OF SYNTHESIS VARIABLES ON
PERCENT MOLAR CONVERSION OF SL BY TRANSESTERIFICATION AND EXPECT THE OPTIMUM
CONDITIONS. THE RESULT WAS THAT ENZYMATIC SYNTHESIS OF SL BY LIPASE IM77 WOULD REACH
HIGHER YIELD UNDER LESS WATER CONDITION. THE ABILITY OF LIPASE IM77 WOULD BE INHIBITED BY
WATER. THE REACTION OF HIGH TEMPERATURE AND SHORT TIME OR LOW TEMPERATURE AND LONG
TIME COULD INCREASE THE YIELD OF SL. FURTHERMORE LIPASE IM77 WAS MORE ACTIVE IN ORGANIC
SYSTEM THAN REVERSE MICELLAR SYSTEM. BASED ON CONTOUR PLOTS, OPTIMUM SYNTHESIS
CONDITIONS WERE: REACTION TIME, 15 H; TEMPERATURE, 25 ℃; ENZYME AMOUNT, 20%; SUBSTRATE
MOLAR RATIO, 1:4; AND ADDED WATER, 0%.


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