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ABSTRACT

METHYL GLUCOSIDE POLYESTER (MGPE) IS A NON-CALORIE FAT SUBSTITUTE. THE FOUR HYDROXYL GROUPS IN METHYL GLUCOSIDE CAN BE SUBSTITUTED WITH FATTY ACIDS. RESPONSE SURFACE METHODOLOGY (RSM) AND 3-LEVEL-3- FACTOR FRACTIONAL DESIGN WERE USED TO EVALUATE THE EFFECT OF SYNTHESIS PARAMETERS, INCLUDING REACTION TIME (4 TO 8 H), TEMPERATURE (110 TO 130 ° C), AND SUBSTRATE MOLAR RATIO OF FATTY ACID METHYL ESTER (FAME) FROM SOYBEAN OIL TO METHYL GLUCOSIDE (4:1 TO 6:1) ON THE PERCENT MOLAR CONVERSION TO MGPE, UTILIZING 15G OF METHYL GLUCOSIDE AS THE REACTANT IN A SOLVENT-FREE SYSTEM. ALL SYNTHESIS VARIABLES EXHIBITED SIGNIFICANT EFFECTS ON PERCENT MOLAR CONVERSION TO MGPE IN THE EXPERIMENTAL RANGE. BASED ON THE RIDGE MAX ANALYSIS, OPTIMUM CONDITION WERE: REACTION TIME 6.3 H, SYNTHESIS TEMPERATURE 123.8 ° C, AND SUBSTRATE MOLAR RATIO 5.9:1. THE PREDICTED MOLAR CONVERSION WAS 55.68% AT THE OPTIMUM POINT. A MIXTURE DESIGN WAS USED TO OPTIMIZE THE PHYSICAL PROPERTIES (MELTING POINT AND VISCOSITY) OF MGPE PREPARED FROM DIFFERENT COMPOSITE BLENDS OF FAME. THE PHYSICAL PROPERTIES CORRELATED SIGNIFICANTLY WITH THE DEGREE OF SATURATION OF THEIR COMPOSITE FATTY ACIDS. RESULTS INDICATED THAT MGPE PREPARED FROM FAME MIXTURE OF SAFFLOWER OIL AND SOYBEAN OIL (MOLAR RATIO 1:1) WAS SIMILAR TO PHYSICAL PROPERTIES OF SOYBEAN OIL.

Keywords : METHYL GLUCOSIDE POLYESTER, RESPONSE SURFACE, OPTIMIZATION, PHYSICAL PROPERTIES, CONTOUR PLOT

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