Supplementary information of

An innovative auto-catalytic esterification for production of phytosterol esters: experiment and kinetics

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1.The phytosterol derivatization for GC testing

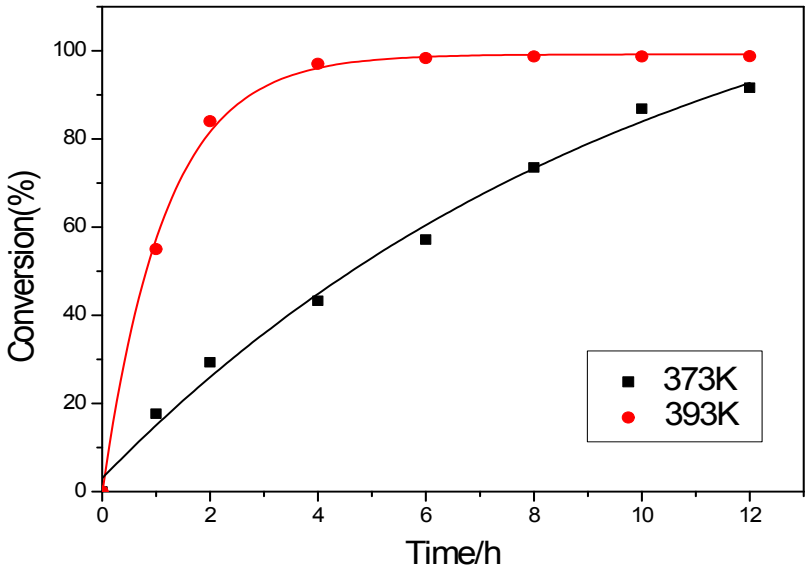
In order to determine the content of phytosterol in sample by GC, the phytosterol samples need to derive to phytosterol acetate. The derivatization process is described as follows. 100.0-200.0 mg sample and 30.0 mg cholesterol were mixed and added into 9 ml pyridine and 3ml acetic anhydride. The mixture was heated under reflux to 130^{o}C. After reaction for 15 min, the reactant was stopped heating to end the reaction. The reaction mixture was reserved for GC testing.

2. The esterification of phytosterol with oleic under anion exchange resin:

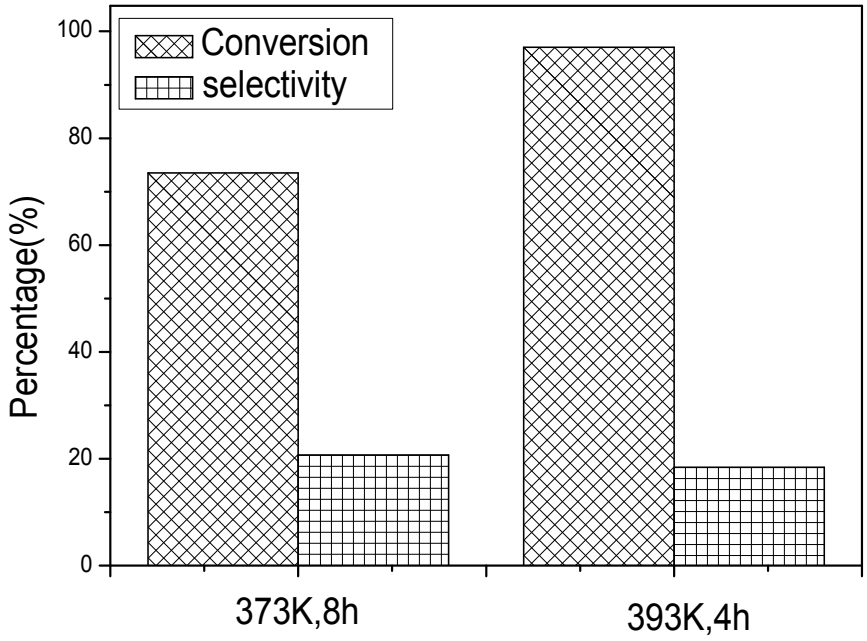
The anion exchange resin is NKC-9 (containing sulfonic groups) in H^{+} form. The H-ion exchange content of NKC-9 is 4.7 mmol/g (dry state). The average pore diameter of NKC-9 is 56 nm. And bead size is 0.4-12.5μm.

The reaction conditions are as follows: oleic acid/phytosterol molar ratio of 1.5:1, the amount of 18wt.% related to phytosterol weight. The reaction was carried out under a pressure of 1.33 kPa.

The relationship between the conversion of phytosterol with the reaction time was shown in S-Fig. 1. And the conversions and selectivities at 373K for 8h and 393K for 4 h were shown S-Fig.2



S-Fig.1 The relationship between the conversion of phytosterol with the reaction time



S-Fig.2 the conversions and selectivities under different condition