CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

MES was successfully synthesized by using UV and O_3 as an initiator, and O_2 and SO_2 as a reactant. The reaction was carried out at 40 °C in a photochemical reactor under atmospheric pressure. After the synthesis step, product outlet was separated and purified by using liquid-liquid extraction techniques, such as a separatory funnel and a liquid-liquid extractor for solvents lighter than water. In this work, we have investigated two effects on synthesizing MES.

For the first effect, the influence of different reactants and initiators was studied. FT-IR confirmed the presence of sulfonate groups and ESI-MS showed that there were both mono- and disulfonates of C18 in MES solution. Conversion was calculated based on mass balance of methyl ester. Conversion was increased as follows: $UV/O_3/O_2 > UV/O_2 > O_3/O_2 > UV/O_3$. The highest conversion was~ 13.5 %w/w when the combination of UV, O_3 and O_2 was used as an initiator and a reactant. In addition, it was also found that O_2 is one of the important reactant, which is required for the MES synthesis.

For the second part, the $UV/O_3/O_2$ system was chosen to study the effect of reaction time. When reaction time increased, conversion also increased and it was up to 14.7 %w/w for 6 hours. Moreover, ratio of mono- to disufonates decreased with reaction time.

5.2 Recommendations

Since the flow rate of ozone was directly controlled by an ozone generator, the possibility of the lowest flow rate that can be controlled was 0.5 l/min. In order to study the effect of the amount of ozone, the system must be adapted. A flow rate meter and a needle valve should be connected to the ozone generator before ozone is fed to the photochemical reactor.