CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Fe-, Mo-, and Ti-SBA-15 were successfully synthesized via the novel room temperature route using silatrane precursor as a silica source and $PEO_{20}PPO_{70}PEO_{20}$ as a structure-directing agent in an acidic media at room temperature. Ferric chloride, molybdenum glycolate and titanium glycolate were used as iron, molybdenum and titanium sources, respectively. All materials still maintain well order mesostructure, high surface area (upto 700 m^2/g) and large pore size ($\geq$5 nm). The extra-framework of iron or iron oxide cluster of Fe_2O_3 was observed at Fe content upper than 10%. Different molybdenum species (mono, dioxo, and oligomeric molybdenum species) were detected on to the final Mo-SBA-15 samples with no sign of aggregated MoO_3 at the molybdenum content upto 1% Titanium species were incorporated into the silica framework upto 7% without any extra framework. Moreover, Ti-SBA-15 materials show higher activity in the oxidation reaction of styrene monomers than the pure SBA-15 due to the presence of titanium species in the SBA-15 framework. The optimum condition for styrene oxidation is at 80 °C reaction temperature for 4 h using 0.1 g of catalyst containing 7.0 % of titanium, giving only benzaldehyde and styrene oxide products.

5.2 Recommendations

According to this work, it is recommended that the parameters (aging time, ratio of reactants, etc.) used to synthesize these materials should be varied to obtain the optimum condition for each materials. Besides, other catalytic reactions should be used for activity testing in order to obtain the most appropiate reaction for each catalysts.