CHAPTER V
CONCLUSION AND RECOMMENDATION

In this work, two types of metalatrane were synthesized directly from inexpensive starting materials, $Al(OH)_3$ and SiO_2, through the one step process, called "OOPS" process. Mass spectra revealed that products were oligomers. The main product of alumatrane was pentamer plus one morpholine (m/e 1250), for silatrane was dimer plus one EG (m/e 409). From TGA data, the %ceramic yields of the metalatrane from reaction were 29.3% and 27.1% for alumatrane and silatrane, respectively. The montmorillonite clay was organically modified by octadecylamine. TGA, FTIR and WAXD indicated the incorporation of OC into MMT structure. The WAXD diffractograms were correlated with TEM and SEM results showing the incorporation between inorganic additives and polymer matrix. The exfoliated Nylon 12 and PVC/clay nanocomposites films are found at low OC-MMT loading and the nanocomposites become partially intercalated with the layer aggregates at high OC-MMT content (>5wt%). The Nylon 12/silatrane composites found aggregation of silatrane when loading up to 10wt%. The flammability properties, viz. the LOI and gross heat calorific values, of Nylon 12/silatrane, alumatrane composites are better than Nylon 12, PVC/clay nanocomposites. The general mechanism of those composites is a high performance carbonaceous silicate char built up on the surface during burning; this insulates the underlying polymer material because of the char has low thermal conductivity. These composite structures appear to enhance the performance of the char through reinforcement of this char layer. Tensile strength and modulus are improved with the organophilic clay content up to 5wt% while unchanged with metalatrane composites. However, adding these clay induced brittle materials due to the rigidity of the clay layer.