CHAPTER 5
CONCLUSION AND FUTURE PROSPECTS

5. General outline of the Chapter

This chapter describes the details of our findings on the polyaniline and poly(m–toluidine) synthesised by miceller and reverse miceller routes, and the conclusions thereof.

5.1 Conclusion

The aim of the work presented here was to synthesise nanostructured polyaniline and poly(m–toluidine) by miceller and reverse miceller pathways. We have successfully synthesized and characterized polyaniline and poly(m–toluidine) nanoparticles in both miceller and reverse miceller systems. In the process several surfactants viz. sodium dodecylsulphate (SDS), dodecylsulphuric acid (DSA), cetyltrimethylammonium bromide (CTAB), nonylphenolpolyethylene glycol ether (Tergitol NP–9) and sodium bis(2–ethylhexyl)sulfosuccinate (AOT) were investigated and their concentrations were changed to find out the optimum condition for the formation of nanostructured polyaniline and poly(m–toluidine) dispersions. The cosurfactants used were isopropanol, n–butanol, n–octanol, isoctanol and n–heptanol and it has been found that cosurfactants played a very important role in the formation of stable, green coloured polyaniline and poly(m–toluidine) dispersions in miceller and reverse miceller mediums and also controlled the shape of micelles. This aspect was also investigated successfully. UV–Vis and FTIR–spectroscopic investigations revealed the presence of polaronic structures as well as the presence of benzenoid and quinoid segments in nanostructured polyaniline as in the bulk polyaniline. The use of SEM and TEM demonstrated the dependence of the morphology and size of the polyaniline and poly(m–toluidine) nanoparticles on the presence of cosurfactant in the synthetic procedure. The dynamic light scattering (DLS) studies revealed not only the average size and distribution but also the extent of heterogeneity in the polyaniline and poly(m–toluidine) nanoparticles. The DLS studies revealed that the heterogeneity was dependent on the nature of the surfactant system. The least heterogeneous polyaniline nanoparticles were formed with DSA & CTAB in the miceller and SDS & DSA in the
reverse micelle systems. The conductivities of the polyaniline and poly(m–toluidine) dispersions were successfully measured in the thin film forms and the conductivities were observed in the range of $4.204 \times 10^{-1}$ to $7.435 \times 10^{-1}$ Scm$^{-1}$.

Polyaniline nanoparticles were synthesised successfully both by reverse micelle and micelle pathways using a variety of surfactants. From the experimental findings following conclusions could be drawn:

(i) Three surfactants viz. SDS, DSA and CTAB give better performance. The particle size and heterogeneity could be controlled by the use of cosurfactants $n$–butanol and isopropanol.

(ii) The best molar ratio of aniline to APS was found to be 1.0 and 1.5

(iii) The concentration of the doping acid which gives best results in terms of formation of nanoparticles and conductivity were found to be 0.8 and 1.0M.

Further, it could be concluded that of the two systems reverse micelle system is more advantageous.

In the case of substituted polyanilines, polymerization of $m$–toluidine was successfully accomplished in reverse micelle and micelle systems based on SDS and DSA respectively.

5.2 Future Prospects

The applications of the stable green coloured Polyaniline and substituted polyaniline dispersions synthesized could be investigated as anti corrosion and anti static protective layer.

5.3 List of Publications

(A) In Peer Reviewed Journals : Published


**B) In Seminars/ Conferences**


