



CHAPTER 5

Conclusion

5. Conclusion and future Prospective

In conclusion, we synthesized two types of hydrogel system using chitosan lactate, chitosan oligosaccharide and PVA. One hydrogel system is developed from PVA and Chitosan lactate. Whereas, another hydrogel system was developed using PVA and chitosan oligosaccharide (PCO). Chitosan lactate and Chitosan oligosaccharide both are soluble in water. Both hydrogels system were cross-linked by glutaraldehyde. These hydrogels were characterized by XRD, FTIR, DSC, TGA, SEM and AFM. XRD study of both hydrogel system displayed a decrease in the crystallinity upon cross-linking. Two antimicrobials drugs (Ciprofloxacin and Lomefloxacin) were used as a model drug to study the drug release profile of hydrogels. Based on the % stress relaxation, it can be concluded that all hydrogels were viscoelastic. Apart from this, kinetic modelling of the selected hydrogel sample of this PCO series provided us with different hydrogels parameters such as activation energy, frequency factor and order of the reaction. Besides this, the porous nature of hydrogel was displayed by all hydrogels. But porosity of hydrogel decreases with an increase in compactness of hydrogels. All the hydrogels exhibited good biocompatibility with L 929 fibroblast cell line.

Scope for Further Work:

In the present research work, we reported polyvinyl alcohol and water-soluble chitosan (Chitosan lactate and chitosan oligosaccharide) based hydrogel for controlled drug delivery applications. Still, further research efforts need to be investigated to explore several other polymers, with better control on their cross-linking ability. The major thrust areas related to this work can be as follows:

- Development of new composite hydrogels using water soluble chitosan for hydrophilic/hydrophobic drug delivery
- Synthesis of hydrogels using different chemical cross-linkers
- Development of hydrogel composite using water soluble chitosan for other bioengineering applications
- Development of water soluble chitosan based hydrogel reinforced with different nanomaterials for better mechanical and optical properties.
- Kinetic modeling may be applied for higher heating rate temperatures during TGA