3.1 Scope of the work

Generally, most of the research work on chitosan was carried out to improve the antibacterial activity of chitosan by modifying the structure of chitosan using suitable chemicals or preparation of chitosan-metal complexes using chelating metals and its oxides. Zinc is one among such metals most frequently used for preparation of chitosan-Zn composite/ chitosan-ZnO complex because of its high chelating ability [210-212]. Review of literature indicates that the complex/ composite are prepared using commercial chitosan and ZnO nano particles [141-142].

Chitosan are used for antibacterial finishing on cotton fabric with various crosslinking agents [184-186], zinc nitrate and sodium hydroxide has been used as raw materials for preparation of ZnO nano particles [213]. But, there is no report on the preparation of chitosan-ZnO composite using chitosan with direct addition of zinc nitrate and sodium hydroxide, and application of chitosan / chitosan-ZnO complex on cotton fabric using acrylonitrile monomer.
3.2 Aim of the work

The aim of the present work were confined to

- prepare chitosan-ZnO composites by direct precipitation method
- study the effect of acrylonitrile and solvents on modification of bioscoured fabric
- apply chitosan and Chitosan-ZnO composites on bioscoured fabric using acrylonitrile
- characterization of prepared composites and modified fabrics
- testing for antibacterial activity and durability

3.3 Methodology of the work

- The commercial chitosan was treated with different ratios of zinc nitrate and sodium hydroxide
- Pretreatment of grey cotton fabric using desizing and scouring enzymes
- Modification of bioscoured cotton fabric using acrylonitrile and acrylonitrile/acetone mixture after swelling with mercerising strength of NaOH
- Application of chitosan and chitosan-ZnO composites on cotton using acrylonitrile and mixture of acrylonitrile/acetone
- Washing of crosslinked fabric using Launder-O-Meter for durability
Characterization of above samples for

- Elemental analysis by Atomic Absorption Spectroscopy (AAS)
- Functional group identification by Fourier Transform Infra-Red Spectroscopy (FTIR)
- Crystallinity size by X-Ray Diffraction (XRD)
- UV absorption by Ultraviolet Visible Spectroscopy (UV-Vis)
- Emission by Photoluminescence Spectroscopy (PL)
- Thermal stability by Thermo Gravimetry and Differential Thermal Analysis (TG/DTA)
- Surface morphology by Scanning Electron Microscopy (SEM)
- Zinc metal content by Energy Dispersive X-ray Analysis (EDAX)
- Antibacterial activity by Disc method

3.4 Experimental investigation on crosslinking of cotton fabric

A lot of research has been carried out on modification of chitosan and modification of cotton. In particular, most of the researchers have dealt with antibacterial finishing of cotton fabric using chitosan and chitosan-metal composite and their reports have been limited upto its properties. A search of literature revealed that only a considerable amount of work has been reported on preparation of chitosan-ZnO composite by various methods and its antibacterial activity. There are no reports on preparation of chitosan-ZnO composite by simple precipitation method and its application on bioscour ed and modified cotton fabric. An experimental investigation of preparation of chitosan-ZnO
composite by simple precipitation method using zinc nitrate and sodium hydroxide in different concentration; pretreatments given to the cotton fabric; chemical modification of cotton fabric using acrylonitrile and acetone has been undertaken. The crosslinking of chitosan and chitosan-ZnO composite on modified cotton fabric was carried out and their properties are analysed and presented. The crosslinked fabric was tested for antibacterial activity and washing durability.