Abstract

Polymer pyrolysis offers an attractractive alternative to the typical high temperature powder processing approach in the fabrication of fibres, coatings and composites. During last few years attempts have been made to develop preceramic polymers and explore their conversion to solid-state materials. The conversion of polymeric precursors in to non-oxide ceramic materials e.g., boron nitride via thermal treatment is an interesting work to polymer chemist.

In the present study a class of boron containing oligomeric precursors have been designed and synthesized by the condensation reaction between boric acid and different nitrogen containing multifunctional compounds. Pyrolysis of these oligomers at 400°C and above leads to boron nitride carbonitride. This method is a unique example of in-situ formation of boron nitride composites.

The synthesis is devided into eight chapters. The first chapter gives an introduction of the present work. It cintains the reviews on the conventional methods of synthesis for ceramic materials, its advantages and disadvantages in general and polymeric precursor route in particular. The second chapter describes the aims and scope of work. The third chapter is concerned with the experimental techniques, mode of measurement and characterization methods. The fourth chapter deals with the synthesis and characterization of triethanolamine- boric acid condensate. Synthesis and characterization of the urea- boric acid condensate is described in the fifth chapter and the same of the melamine- boric acid condensate has been described in the sixth chapter. The seventh chapter describes the synthesis and characterization of the oligomer coated glass fiber mats and its application as a filter during molten metal filtration. The eighth chapter summerizes some major conclusions derived on the basis of present investigations.