Preface

Synthetic rubbers are extensively used in polymer industry for a wide range of applications because of their excellent properties. Fillers are incorporated into elastomers in order to modify properties, reduce cost and for the easy processing. Commonly used fillers in rubber industry include carbon black, mineral products such as clay, silica and calcium carbonate. Nowadays, rubber nanocomposites are considered as promising candidates of research because they offer exceptional reinforcement at low filler concentration.

The present research work focuses on the utility of various fillers used in the reinforcement of chlorobutyl rubber with special reference to particle size, filler morphology, gallery spacing, organic modification, surfactant concentration etc. The thesis entitled “Polymer nanocomposites based on chlorobutyl rubber” consists of ten chapters. Chapter 1 is a brief introduction on various aspects of nanoscience, nanotechnology and nanocomposites. In this part an updated survey of literature covering nanocomposites with special reference to chlorobutyl rubber is presented. At the end of this chapter the inspiration for this work and the precise objectives of the research topic are explained.

The details of various materials used, preparation of samples, and different experimental techniques adopted are given in Chapter 2. Chapter 3 deals with the comparison of the properties of micro composites as well as nanocomposites prepared using chlorobutyl rubber and different types of fillers. Chapter 4 envisages the effect of solvent parameters on the processing of chlorobutyl rubber nanocomposites. The solubility parameters are correlated with the properties of the chlorobutyl rubber nanocomposites.
Chapter 5 highlights the morphology and mechanical properties of the chlorobutyl rubber nanocomposites as a function of filler loading. Emphasis is put on the fact that nature of surfactant, concentration of the surfactant and d spacing of the organically modified layered silicate plays an important role on the mechanical properties of nanocomposites. The gas permeability analysis of the nanocomposite has been discussed in Chapter 6 using oxygen, nitrogen, helium and carbon dioxide. Chapter 7 deals with the dynamic mechanical analysis of the nanocomposites with reference to filler percentage. In Chapter 8, an attempt has been made to study the thermal changes associated with the addition of fillers. Chapter 9 narrates the variation of dielectric properties of chlorobutyl rubber nanocomposites. Special attention has been paid to analyze the effect of filler loading on the dielectric properties.

The overall conclusions of the research work, future scope and applications are discussed in Chapter 10.

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