061-CHM

Polyvinyl chloride/halloysite nanocomposites: Mechanical properties and thermal stability studies

Abed Alhazmi, Abdulrahman Al-Johani, Yasser Alhaidari, Saeed Alsehli, Khaled Al-Zanbaqi, and Majed Alghamdi
Yanbu Industrial College, Saudi Arabia, aoah1994@hotmail.com, aaljohani36@gmail.com,
Yasser.alhaidari12@gmail.com, ssaeed-2009@hotmail.com, Kmeume@gmail.com, mazeda007@hotmail.com
Supervisor: Dr. Selvin P. Thomas, Head of Laboratory unit, and Engr. Aravinthan Gopanna, Research Engineer cum Lecturer, Yanbu Research Center
Colleges & Institutes Division - Yanbu, Saudi Arabia, thomass@rcyci.edu.sa and gopannaa@rcyci.edu.sa

Polyvinyl chloride (PVC) is an important commercial thermoplastic that is widely used in industry owing to its good balance of properties and low cost. However, the range of applications of PVC is limited by its brittleness, low thermal stability, and poor processability. These shortcomings can be overcome by incorporating nanoparticles into the polymer to obtain a nanocomposite with improved mechanical and thermal properties. For example, organic montmorillonite (MMT), calcium carbonate nanoparticles, and multi-walled carbon nanotubes can all be used to improve properties of PVC such as toughness and processing stability. In this project, we tried to improve the properties of plasticized PVC by incorporating halloysite nanotubes (HNT) powder through a batch mixing process. The composites were prepared by varying the weight percentage of the filler up to 6%. The prepared samples were used for testing in appropriate shapes such as mechanical and thermal properties. The composites showed appreciable improvement in the mechanical and thermal properties which can be correlated to the interaction between the filler and the matrix. Based on the properties we chose 4 wt% as the optimum loading. The composites showed exemplary thermal stability time against Congo Red method. The composites can be utilized for devices in extreme conditions where volatile organic components especially chlorine is released.