Paper No: PU-SOE – Mech- 21

Study on Mechanical Testing of Various Nanoclay Reinforced with High Density Polyethylene Nanocomposites

N Venkatesan[1], G B Bhaskar[2]
1. School of Engineering, Department of Mechanical Engineering, Presidency University, Bengaluru, Karnataka, India 560 064
2. Department of Production Technology, MIT Campus – Anna University, Chennai, India.

Abstract

The Polymer nanocomposites materials are comprising of polymer as matrix material and reinforcement material as filler that has particles of nanometer in size. These materials have different physical and chemical properties and are mixed together to yield unique properties of nanocomposites. The High Density Poly Ethylene (HDPE) has been chosen as polymer matrix material. The reinforcement materials used are different nanoclay such as Montmorillonite (MMT), Cloisite 30B, Cloisite 25A and hybriding of Cloisite 30B with Rice Husk Ash (RHA). These nanoclay materials are reinforced with HDPE with different wt % (0 - 4 wt %). Compatibilizer of 3 wt% of HDPE grafted with Maleic Anhydride (HDPE-g-MA) was added to provide superior adhesion between the HDPE and nanoclay. The nanocomposite materials were fabricated by melt blending in a twin screw extruder with the spindle speed of 50rpm with different zone temperatures. The melt blending is one of the best methods for the preparation of nanocomposites. This method makes it easy to blend the nanoclay and the matrix materials for preparing specimens for different tests. The ASTM standard specimens were prepared for various mechanical tests like flexural, tensile, hardness and impact using respective dies in injection moulding machine. In flexural test, the specimens were subjected to different cyclic loads before conducting three point bent test. In bend test, maximum load that could withstand by the material was used to examine the flexural strength and modulus of the composite materials. In tensile test, different nanoclay specimens were tested in tensometer machine which had a capacity of 20KN. Tensile strengths of different nanoclay with different wt% of nanocomposites were compared. The results of D shore hardness number and Izod impact strength of different nanoclay with HDPE were also compared.

Keywords:
HDPE, Nanoclay, Cloisite 30B, Tensile, Bending, Hardness and Impact.

Publication Details:

Journal Name	Vol.	Month & Year	Page No.	Publisher	Scimago Ranking
International Journal of Applied Engineering Research	16(3)	2021	220-227	Research India Publications	Q2