Experimental Investigation of Mechanical Properties of ABS/PP/Al2O3 Hybrid Polymer Composites

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ABSTRACT

In the present work, to study the mechanical properties of the ABS/PP/Al203 nanoparticles, added to at various volume fractions to ABS/PP polymer matrix material. The composite stirred continuously to maintain the homogeneity of the mixture in injection molding. Tensile test and hardness tests are conducted for specimens to study the influence of the filler content, the mechanical properties, such as tensile strength, flexural strength, and impact resistance. The result shows there is an influence of the filler material, and ABS/PP/Al203 nanoparticles shows high bonding ability. The results of this study will provide valuable insights into the feasibility of utilizing ABS and PP as matrix materials with Al203 reinforcement through injection molding, offering potential applications in industries requiring improved mechanical properties in their plastic components.

CONCLUSIONS

Conclusions from the present study following observations have been made:

The injection molding of hybrid polymers using ABS (Acrylonitrile Butadiene Styrene), PP Polypropylene), and Al203 (alumina) offers several advantages and unique properties. From Tensile Test results, it can be observed that the 70% PP, 15% ABS and 15%Al203 has the highest tensile strength than that of in any respective variety of compositions by reinforcing other components like poly propelene and Aluminium oxide.

The Rockwell Hardness test results showcases that the hardness value of the specimen formed varies with varying the composition of the components, ABS, polypropylene and Aluminium oxide.

The specimen consisting of 70%ABS/15%PP/15%AL203 has the highest hardness value than the remaining composition of mixtures.

The Charpy Impact test results show that there is only a slight change in the impact values with the change is composition of the specimen. However the specimen with 70%ABS/15%PP/15%AL203 has the highest impact strength than the remaining composition of mixtures and the minimum impact strength is recorded for 50%ABS /45%PP /5% Al203.

From the above observations we can conclude that after injection molding process that there is a huge improvement in hardness and mechanical properties of the polymers.

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