Chapter 8
Rice Husk Reinforcement in Polymer Composites

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ABSTRACT

Increasing concern about global warming and depleting petroleum reserves and the high cost of petroleum products had made scientists to focus more on the use of natural fibres such as rice husk, baggase, coconut husk, hemp, sisal, jute, flax, banana etc. Past decade has shown many efforts to develop composites to replace the Petroleum and other non-decaying material products. Reinforcement with natural fibre in composites has recently gained attention due to low cost, easy availability, low density, acceptable, strength full, stiffness, ease of separation, enhanced energy recovery, biodegradability and recyclable in nature. Natural fibre composites are suitable as wood substitutes in the construction sector. All these have excellent physical, thermal and mechanical properties and can be utilized more effectively in the development of composite materials. In this connection, an investigation has been carried using rice husk, a natural fibre abundantly available in India.

INTRODUCTION

The unique and diverse characteristics of composite materials have caused an increase in their utilization worldwide. Composites are a need in the evolution of engineering materials. Composites can be very specific in their properties with their

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unique combination of materials it is possible to overcome many of the limitations of conventional materials for instance, brittleness and poor process ability of stiff and hard polymers. Industry has begun to recognize that the commercial applications of composites promise to offer much larger business opportunities in transportation sector due to the sheer size of the industry. Agricultural wastes can be used to prepare fibre reinforced polymer composites for commercial use and fortunately natural fibres are abundantly available in India. This also gives the chance to explore value-added application avenues of composites. India alone produces more than 400 million tonnes of agricultural waste annually. It has got a very large percentage of the total world production of coconut husk fibre, baggase fibre, rice husk, jute and stalk. These materials have a great potential to be used in composite preparation and also be helpful in conserving the environment as well as lifting the economy.

RICE

Rice or *Oryza Sativa* (as botanists prefer to call it) is not a tropical plant but is still associated with a wet, humid climate. It is generally believed that the domestication of rice began somewhere in the Asia. Rice is the world's second largest cereal crop and produces the largest amount of crop residues. Rice, rice husk and rice straw are the main products of rice cultivation and processing (Binod *et al*., 2010). The average ratio of rice grain: rice husk: rice straw is 1:0.25:1.25 (Haefele *et al*., 2011).

The outermost layer of the paddy grain/rice is the rice husk, also called rice hull. It is separated from the brown rice in rice milling. Burning rice husk produced rice husk ash (RHA), if the burning process is incomplete carbonized rice husk (CRH) is produced. Globally, approximately 600 million tons of paddy is produced each year. On average 20% of the rice paddy is husk, giving an annual total production of 120 million tones. Paddy, on an average, consists of about 72 percent of rice, 5-8 percent of bran, and 20-22 percent of husk. Of all the plant residues, the ash of rice husk contains the highest proportion of silica.

It is estimated that every ton of paddy produces about 0.20 tons of husk and every ton of husk produces about 0.18 to 0.20 tons of ash, depending on the variety, climatic conditions and geographical location.

PRODUCTION OF RICE OVER THE WORLD

The Table 1 shows the production of rice over the world particularly in China and India as there is huge production in comparison to rest of the countries.

Friction Coefficient and Wear Rate of Different Materials Sliding Against Stainless Steel

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