

**MECHANICAL AND FLAMMABILITY PROPERTIES OF
HIGH-DENSITY POLYETHYLENE / CRUMB RUBBER /
RICE HUSK ASH COMPOSITES**

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ABSTRACT

The illegal disposal of plastic and rubber wastes has adversely affected the environment. Recycling these waste materials is a solution to overcome such problems. This study focused on developing composite board (CB) compound using the waste of High-Density Polyethylene (HDPE), Crumb Rubber (CR), and Rice Husk Ash (RHA), which can be used to improve the strength properties of plastic products. Composite Board (CB) compounds were prepared keeping the HDPE to CR to RHA (HDPE/CR/RHA) ratio at 100:0:0, 76:19:5, and 66.5:28.5:5. The CR used in the compounds were 0.5 mm, 1 mm, and 2 mm in size. The properties of compressive strength, flexural strength, tensile strength, density, and flammability were tested. According to the results, the compressive strength of composites was varied from $99.1 \times 10^6 \text{ Nm}^{-2}$ to $109.9 \times 10^6 \text{ Nm}^{-2}$, while the control showed $101.5 \times 10^6 \text{ N m}^{-2}$. The flexural strength of composites was varied between $1.4 \times 10^6 \text{ Nm}^{-2}$ and $13.7 \times 10^6 \text{ Nm}^{-2}$, while the controls showed $6.6 \times 10^6 \text{ Nm}^{-2}$. The tensile strength was varied between $0.4 \times 10^6 \text{ Nm}^{-2}$ and $2.0 \times 10^6 \text{ Nm}^{-2}$ with $0.9 \times 10^6 \text{ Nm}^{-2}$ of control. The density of composites was varied between $1.2 \times 10^3 \text{ kgm}^{-3}$ and $1.5 \times 10^3 \text{ kgm}^{-3}$, while the control showed $1.4 \times 10^3 \text{ kgm}^{-3}$. The maximum compressive strength was shown by 0.5 mm sized CR added composites, maximum flexural strength, and tensile strength was depicted by 1 mm sized CR added composites & minimum density was depicted by 1 mm sized CR added composites. The fire initiation time of flammability was varied from 30 s to 51.3 s and the burning time was varied from 5.7 s to 33.7 s. The composites can be fixed together using a screw and can groove using a grooving machine. Overall, HDPE, CR, and RHA can be used to prepare CB compounds with better mechanical and flammability properties, and with the ability to fix them through grooving and screwing.

Keyword: High-Density Polyethylene, Crumb Rubber, Rice Husk Ash, Composite Board Compound