

Exploiting moist PVC waste to create insulating light weight ethylene-propylene diene monomers rubber composite panels

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The hazardous practice of landfilling the end of life (EoL) rigid crosslinked interpenetrated network polyvinyl chloride (PVC) foam urgently requires development of effective recycling methods. In this work, PVC waste obtained from a local company was used to create expanded ethylene-propylene diene monomers (EPDM) rubber. The waste naturally contained water content (up to 35%) which was exploited for the expansion of EPDM rubber. For this, various amounts of recycled polyvinyl chloride (PVC) (10%-40%) were melt compounded with ethylene-propylene diene monomer (EPDM) rubber at 60 °C for 15 min. The obtained mixtures were compression molded at 160 °C for 20 min under varied pressure to create square sheets of expanded EPDM/PVC composites. The insertion of wet PVC particles resulted in creation of total porosity up to 40% in EPDM rubber meanwhile geometrical density was decreased by 33% by the expansion of the rubber. Tensile tests revealed that the expanded EPDM/PVC composites showed remarkable elongation at break values (up to 700%) even with the added rigid PVC particles. Scanning electron microscopy analysis showed various pores of different dimensions confirming the expansion of the EPDM-CB-PVC composites. A steady increase of compression set was observed in the rubber composites due to the presence of rigid PVC filler. Hardness tests revealed an increased shore A values with the increasing PVC content in EPDM-CB matrix. In particular, all expanded composites showed low thermal conductivity values reaching a minimum value of 0.07 W/mK.

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