

Effect of UV exposure on bimodal HDPE floats for floating solar application

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A B S T R A C T

Keeping in view the conservation of natural resources, the power generation from the solar photovoltaic system is increasing day by day to meet the demand of energy worldwide. There are constraints of availability of space for ground mounted solar PV system for large installations. In some countries water bodies are being utilized to install solar PV system to reduce land use. Few floating systems using plastics have been developed to install a solar panel on it. After extensive literature studies on properties of polyolefins, High-density poly ethylene (HDPE) is found to be better material for this purpose.

In order to measure its sustainability, annotation of mechanical properties using bimodal poly ethylene under accelerated weathering condition has been carried out in different intervals till 1152 h, to perceive the lifespan of HDPE material. The change in its mechanical properties like tensile strength, elongation at break, maximum load bearing capacity, impact resistance and hardness were evaluated. It was observed that the tensile strength was reduced from 23.22 MPa to 14.64 MPa after accelerated UV exposure. It was observed that after 1000 h of exposure to accelerated weathering the material still has the tendency to hold a constant load of 637.81 N without rupture, compared to non-weathered sample (955.16 N). The elongation at break was reduced but elongation of 6.24% was maintained after 1152 h of accelerated exposure, which depicts the elasticity of the material, is still maintained. The impact resistance did not show a significant change during this period, the value varies in the range of 13.54–10.06 kJ/m². However, the hardness was increased from 61 to 66 (Shore D) due to deterioration of low molecular weight polymer present in bimodal PE. It is concluded that the mechanical properties of Biomodal HDPE material after accelerated UV exposure does not have much effect and is safe to bear the load of solar panels and other accessories mounted over it. Further studies can be done using UV stabilized biomodal HDPE.