Recycling against Radiation: A Comparison between Recycled and Non-Recycled HDPE for Radiation Shielding

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Safety is the key to successful space exploration. Away from the surface of the Earth’s magnetosphere, astronauts require artificial shields, both physical and electromagnetic, to protect them from harmful forms of radiation present in the cosmos. Current methods of radiation shielding are only effective when still somewhat within the Earth’s magnetosphere and some are not cost effective. Should astronauts attempt to venture farther from the protective magnetosphere of their home planet, they would be bombarded by high-energy forms of radiation called gamma rays. This radiation can increase the risk of cancer and, under prolonged exposure, cause radiation sickness. However, simple household objects comprised of a certain hydrogen-rich plastic, known as polyethylene, can be recycled to ensure astronauts’ safety against radiation, as well as a cleaner, non-polluted environment to welcome them home. The experiment requires five 6 inch by 6 inch, 0.5 inch thick sheets of recycled high density polyethylene (r-HDPE) and five non-recycled, or virgin, high density polyethylene (v-HDPE) sheets of the same dimensions. In the procedure, a geiger counter was used to test the dosage of the radiation that penetrates a horizontal stack of 1 to 5 of two types of HDPE: r-HDPE and v-HDPE. The outcome of this experiment was that r-HDPE had a lower transmissivity, or radiation permeability, to v-HDPE, indicating better performance as a radiation shield.

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