Assessment on the Degradation of Expanded Polystyrene by the Action of Orange Peel and Recovery of Polystyrene Using D-limonene

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The project aims to use an available organic waste, the orange peel, for the degradation and reuse of expanded polystyrene, a plastic that takes more than 500 years to degrade and generates a lot of damage to the environment and people's health. The orange peel collected will be dried with solar energy, crushed to a size of 1mm and placed on the surface of the expanded polystyrene, being the latter degraded in 90 minutes, leaving at the end a translucent sheet. It was obtained by steam distillation, the essential oil of the skin rich in D-limonene with which the test of dissolution of polystyrene bits was performed, being degraded within a few seconds. The obtained residue was analyzed, and characteristic elements of a natural fertilizer were obtained, being packaged for that use. The mixture obtained from dissolution in oil was applied as an anticorrosive, preventing the metal from oxidizing. To verify this, oxidation tests of metals with and without oil coating were performed. Infrared Spectroscopy determines that the residue is a mixture of D-Limonene with polystyrene. The reaction kinetics shows that the greater the amount of orange peel, the faster the decomposition process. The chemical modeling of the D-limonene and expanded polystyrene interaction shows us that the degradation process is only a physical and non-chemical phenomenon. The orange peel with its high content of D-Limonene can degrade and dissolve the expanded polystyrene for its next reuse and application as a natural and anticorrosive fertilizer.

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