

ABSTRACT

The installation of photovoltaic panels has grown through the decades, and with a useful life of 25 to 30 years, the first solar panels are being discarded. Improper handling of these wastes could have a high environmental impact. That is why processes for the recycling of solar panels have been created. The type of recycling will depend on the material to be obtained: the solar cell or the silicon. For both processes it is necessary to separate the polymer that encapsulates the cell: EVA (Ethyl Vinyl Acetate).

The present work was carried out with the purpose of evaluating the chemical method to separate the EVA in the solar panel recycling process, evaluating the toxicity of the solvents used for this method to know its environmental impact.

The aluminum frame and junction box have been previously dismantled from the solar panel, then this was cut into 5x5 cm samples, subsequently, the glass and Backsheet were mechanically removed. Solar cell + EVA samples were placed in a water bath on a closed container with solvent. Three solvents (Hexane, Benzene and Toluene), two temperatures (50 and 70 ° C), and three times (1, 15 and 30 minutes) were evaluated. The efficiency of each solvent was compared and the process was optimized with the one with the best results: Toluene. For this, the temperature was increased to 80 ° C and the time to 120 minutes. It was found that the sample size influences in the separation, evaluating the process with 4 different grain sizes, having the best results with particles smaller than 0.086mm.

The residues of the solvents used were taken to gas chromatography, identifying the toxicity of the compounds formed after the chemical treatment. The solvent with the highest number of compounds formed was Hexane, and the one with the lowest number, Toluene. None of the toxicities of these exceeded the allowed limits.

The chemical method used, it was capable to separate 72% of the EVA, the rest can be eliminated by calcination, minimizing the environmental impact produced by the thermal method.