Abstract

Plastic bags, mostly made of polyethylene, cause pollution as solid waste due to their nondegradable nature. Accelerated degradation, as a solution to mitigate the menace, can be achieved through moisture enhanced photolysis. This study evaluated the effect of three relative humidity environments, i.e., 25%, 40%, and 60% RH, at a constant temperature of 55°C. The effect was studied for ultraviolet (UV) irradiated and nonirradiated samples of polyethylene (PE) films processed under conventional ways. Photodegradation was initiated using ultraviolet irradiation in the ranges (200–300) nm and (300–400) nm for two hours and the effects of subsequent humidity treatment analyzed. Dynamic mechanical analysis was used to measure the dynamic storage modulus to monitor degradation. For nonirradiated samples, there was essentially no change in storage modulus at the three relative humidity environments after 550 hrs. Irradiation in the (300–400) nm range showed faster degradation than for the (200–300)nm range with the highest drop in storage modulus being 67% after 550 hrs. Raising the humidity from 25% to 40% and 60% RH resulted in 41%, 62%, and 67% drop of storage modulus, respectively, at the 550 hrs.