ABSTRACT

With the increasing use of plastics, disposal is becoming a major issue. The degree and rate of aerobic biodegradability of a plastic material in the disposal environment determine to what extent and how fast that plastic may be eliminated from the environment. The degradation of polyhydroxyalkanoate (PHA) produced by *Pseudomonas putida* PGA1 from saponified palm kernel oil (SPKO) was studied at 28°C under aerobic conditions in a sterile reactor containing 200-225ml natural water from the river Kayu Ara (Selangor, Malaysia). The time-dependent changes in the weight, surface morphology, monomer compositions and chemical groups of the PHA, CO_2 evolved, dissolved organic carbon, microbial count, pH and released monomers in the test solutions were monitored.

A weight loss of 71.3% of a PHA film was achieved in 86 days. Biodegradation, which was indicated by the amount of CO_2 evolved, contributed 52.4% or more of the total CO_2 from PHA degradation dependent on the incubation period of the film. The rate of monomer hydrolysis was related to the side-chain length of the monomer, and decreased in the following order: C8 > C10 > C12 >C14. Scanning electron micrographs showed that physically, the degradation started with surface lesions and proceeded side ways and inward to form holes and tunnels. By 86 days, the PHA film disintegrated completely into suspended particles in the river water.