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DEGRADABILITY IN GARDEN SOIL OF BACTERIAL
POLYHYDROXYALKANOATES (PHA) PRODUCED FROM SAPONIFIED
PALM KERNEL OIL

BY

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ABSTRACT

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Polyhydroxyalkanoates (PHA) was tested for its biodegradability in garden soil under natural and enclosed environment. The moisture content in soil was found to be around 20% in both environments at day 0 and day 90. The pH of the soil in both environments was found to be 6.5 at day 0 and 6.0 at day 90 which gave an indication of the hydroxyalkanoic acids accumulation due to degradation of PHA. Under natural and enclosed environment the PHA was found to decrease in its gross weight. Carbon dioxide evolution was measured for the PHA under enclosed environment and approximately 15.7% of the test material was evolved as CO_2 at day 90. Studies of surface morphology using phase contrast microscope and electron microscope showed that the surface of the polymer after being buried differed from the PHA before the degradation process. The fractured and rough surface with cracks and holes could be seen under electron microscope. These conditions were probably due to the activities of the microbes in the soil as well as to some environmental factor such as hydrolysis. The infrared spectrophotometry showed that overall structure of the repeating units of the PHA remained after degradation. As for the gas chromatography analysis, there appeared a trend whereby with time the longer monomers (C10, C12 and C14) decreased with a corresponding increased in the shorter monomers (C6 and C8).

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LIST OF ABBREVIATIONS

ASTM	= American Society of Testing and Materials
Ba(OH) ₂	= Barium hydroxide
BaCO ₃	= Barium carbonate
BOD	= Biochemical oxygen demand
CO ₂	= Carbon dioxide
CH ₄	= Methane
DIN	= Deutsches Institut für Normung
DOC	= Dissolved organic carbon
EM	= Electron microscope
EU	= European Union
<i>et al</i>	= <i>et alia</i> (and others)
GC	= Gas chromatography
ISO	= International Standards Organization
IR	= Infrared spectrophotometry
O ₂	= Oxygen
OECD	= Organization for Economic Cooperation and Development
PHA	= Polyhydroxyalkanoates
PHB	= Polyhydroxybutyrate
PKO	= Palm kernel oil
PORIM	= Palm Oil Research Industry Malaysia
PE	= Polyethylene

PP	= Polypropylene	34
PVC	= Polyvinyl chloride	35
RT	= Retention time	36
R_f	= Reference factor	37
SEM	= Scanning electron microscopy	38
SPKO	= Saponified palm kernel oil	39

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