

การแยกแบคทีเรียจากดินที่สามารถย่อยสลายทางชีวภาพของพอลิสไตรีนโฟม

Isolation of polystyrene foam biodegradable bacteria from soil

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บทคัดย่อ : การทดลองนี้เพื่อแยกแบคทีเรียจากดินที่มีการปนเปื้อนด้วยน้ำมันที่สามารถเจริญได้ในอาหารเลี้ยงเชื้อ Minimal salt medium ที่ใช้พอลิสไตรีนโฟมเป็นแหล่งคาร์บอนเพียงอย่างเดียว โดยศึกษาลักษณะการเปลี่ยนแปลงของพื้นผิวพอลิสไตรีน โฟมโฟมหลังการเลี้ยงเชื้อนานเป็นเวลา 4 เดือน เปรียบเทียบกับชุดควบคุมที่เดิมดินจากแหล่งเดียวกันที่ผ่านการฆ่าเชื้อแล้ว พบว่ามีการเปลี่ยนแปลงที่แตกต่างของพื้นผิวของเม็ดพอลิสไตรีน โฟม นั่นคือของชุดทดลองมีลักษณะขรุขระขรุขระกว่าชุดควบคุม จากการแยกเชื้อในชุดทดลองพบแบคทีเรียแกรมบวก จำนวน 24 ชนิด ซึ่งมีรูปร่างเป็นท่อน (bacilli) 19 ชนิด และรูปร่างกลม (cocci) 5 ชนิด

Abstract: The purpose of this study was to isolate polystyrene foam biodegradable bacteria from petrol contaminated soil. Mineral salt medium with polystyrene foam as the only carbon source was used in this experiment. After 4 months of incubation, surface of polystyrene foam was observed compared with the control group. The result showed that there were some traces of degradation on the surface of polystyrene foam when compared to the control group which the same source of soil was used as inoculum but had been sterilized before inoculation. Twenty-four isolates of Gram-positive bacteria were isolated from polystyrene foam degraded flasks, 19 isolates were bacilli and 5 were cocci shape.

Introduction. Polystyrene foam is a type of plastic produced from styrene. It is a lightweight, moisture-resistant material with exceptional insulation properties. Products made from foamed polystyrene are nearly ubiquitous, for example packing materials, insulation, and foam drink cups. Polystyrene takes hundreds of years to decompose and is often abundant as a form of pollution in the outdoor environment.

Methodology. Soil samples were collected from sources that were contaminated by petrol. One gram of contaminated soil sample was inoculated into 100 ml of Mineral salt medium (K₂HPO₄, 2.0g; KH₂PO₄, 0.2g; (NH₄)₂SO₄, 0.5g; MgSO₄, 0.05g; EDTA, 0.5mg; FeSO₄.2H₂O, 0.25mg; MnCl₂.4H₂O, 0.003mg; CoCl₂.6H₂O, 0.012mg; CuCl₂.2H₂O, 0.001mg; NiCl₂.6H₂O, 0.002mg; Na₂MoO₄.2H₂O, 0.003mg; ZnSO₄.7H₂O, 0.008mg, H₃BO₃, 0.02mg with 1000 ml distilled water, pH 7.3) in 250 ml flask. Small pieces of 0.1 g of polystyrene foam were added as carbon source. Prior to use, polystyrene foam was soaked in 70% alcohol and washed two times with distilled water and dried in desiccator for two days. In the control group, 1 gram of sterilized petrol contaminated soil sample was used. All experiment was carried out in triplicate. All flasks were incubated in shaker at 150 rpm, 30°C for 2 months. After 2 months of incubation 1 ml of cell suspension was inoculated into a new flask and incubated in the same condition for 2 months. Surface of polystyrene foam was observed under stereo zoom microscope and taken photograph. Culture broth was diluted and spread onto glucose yeast extract agar (4 gram of glucose and yeast extract in 1,000 ml of distilled water, pH 7.3) and incubated at 30°C for two weeks, colonies of bacteria were

picked, purified and morphological studied by Gram-staining and observed under microscope.

Result, Discussion and conclusion: The results showed that bacteria from petrol contaminated soil could grow in mineral medium that polystyrene foam was the only carbon source and 24 isolates of Gram-positive bacteria were isolated; 19 isolates were rod and 5 isolates were round shape. Furthermore, some traces of degradation were found on the surface of polystyrene foam from the experiment flasks rather than the control group. These results indicated that there are polystyrene foam degradable bacteria from petrol contaminated soil and used polystyrene foam as carbon and energy sources. However, further investigation need to be done for confirmation the results of these experiments and that is our future study.

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Reference :

Keywords: Polystyrene foam, bacteria, degradation, contaminated soil