

การสลายตัวด้วยแสงของ โพลีเอทิลีนความหนาแน่นสูงชนิดจัดเข้าแบบ



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PHOTODEGRADATION OF INJECTION HIGH DENSITY POLYETHYLENE

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ศึกษาการสลายตัวของโพลีเอทิลีนความหนาแน่นสูงชนิดจัดเข้าแบบ โดยการใส่ และ ไม้ใส่สารไวแสง 2 ชนิด คือ แอนทราควิโนน และ เบนโซฟีโนน นำไปให้ได้รับแสงอุลตราไวโอเล็ตจากแสงอาทิตย์ นาน 6 เดือน และ ทำการทดลองฉายแสงเร่งการสลายในห้องปฏิบัติการด้วย โดยใช้หลอดไฟ-ฟลูออเรสเซนท์ฉายแสงนาน 33 วัน และใช้หลอดไฟจากปรอทฉายแสงนาน 240 ชั่วโมง.

ศึกษาอิทธิพลของสารไวแสง และ ติดตามกระบวนการสลายตัวด้วยแสง โดยสังเกต การเปลี่ยนแปลงของ ค่าความต้านทานแรงดึงเสียรูป ค่าความต้านทานแรงดึงขาด น้ำหนักโมเลกุล และการดูดกลืนแสงอินฟราเรด. จากผลการทดลอง ได้เสนอกกลไกการสลายตัวด้วยแสงของโพลีเอทิลีนทั้งชนิดที่ใส่ และ ไม้ใส่สารไวแสง. นอกจากนี้ ยังได้ทำการเปรียบเทียบการสลายตัวของโพลีเอทิลีนชนิดที่ใส่ และ ไม้ใส่สารไวแสง จากข้อมูล การทดลองในภาคสนาม และ ในห้องปฏิบัติการ ที่ใช้หลอดไฟฟลูออเรสเซนท์ด้วย โดยทำการเปรียบเทียบจาก ค่าแฟกเตอร์ของการเร่งการสลาย.

จากผลการทดลองพบว่า สารไวแสงจะช่วยเร่งอัตราการสลายตัวด้วยแสงให้เร็วขึ้น. เมื่อพิจารณาในแง่ความเข้มข้น ของสารไวแสงแล้ว ค่าความเข้มข้นของสารไวแสงที่สูงขึ้น จะมีอัตราการสลายตัวด้วยแสง ที่เร็วกว่า. อย่างไรก็ตาม ความแตกต่างของ อัตราการสลายตัวด้วยแสง อันเนื่องมาจากความเข้มข้นของสารไวแสง ก็มีเพียงเล็กน้อยเท่านั้น. จากการเปรียบเทียบ แหล่งกำเนิดแสง พบว่า การใช้หลอดไฟจากปรอท จะให้อัตราการสลายตัว ที่เร็วกว่า การใช้หลอดไฟฟลูออเรสเซนท์เป็นแหล่งกำเนิดแสง.



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CHEERANEE THEERANUWAT : PHOTODEGRADATION OF INJECTION HIGH DENSITY
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Injection high density polyethylene (HDPE) sheets with and without 2 photosensitizers , Anthraquinone and Benzophenone , in a ratio of 1 : 1 at various concentrations , were exposed to UV light through sunshine , through a fluorescent lamp and through a medium pressure mercury lamp. HDPE sheets were place under outdoor exposure for six months. In an accelerated test , HDPE sheets were irradiated with a fluorescent lamp for 33 days and with a medium pressure mercury lamp for 240 hours.

The progress of the photodegradation and the effect of 2 photosensitizers were studied by observing the change in molecular weight , tensile strength , elongation at break and fourier transform infrared absorption. The detailed photodegradation mechanisms for undoped and doped HDPE are proposed on the basis of the experimental results and an accelerating factor was obtained from the comparison of the data between outdoor exposure tests and fluorescent lamp tests.

From the results , it was found that the photosensitizers accelerated the rate of the photodegradation process. With regards to the concentration of photosensitizers , the higher the concentration the higher the rate of photodegradation. However , the difference in the rate of photodegradation was found to be very small. Comparing the effects of the light source, the medium pressure mercury lamp tests resulted in a higher degradation rate than the fluorescent lamp tests.

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