

**REDUCTION OF REACTION TIME OF PMMA CASTED SHEET
BY USING HEATING OVEN**



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นายพีธี ตันติเวสส: การใช้ตู้อบเพื่อลดเวลาในการขึ้นรูปแผ่นพอลิเมทริลเมธาไครเลต (Reduction of Reaction Time of PMMA Casted Sheet by Using Heating Oven) อ.ที่ปรึกษา: อาจารย์ ดร.รัตนวรรณ มกรพันธุ์ อาจารย์ ดร.พิชญ์ สุภผล และ นายโยชิน วานิชวรากิจ 59 หน้า ISBN 974-13-0737-3

การผลิตแผ่นพลาสติกพอลิเมทริลเมธาไครเลตในระดับอุตสาหกรรมนั้น มีการให้ความร้อนกับปฏิกิริยาด้วยการใช้อ่างน้ำร้อนหรือตู้อบลมร้อน แต่กระบวนการที่ใช้อ่างน้ำร้อน มีเวลาที่จะต้องเสียไปในการปรับเปลี่ยนอุณหภูมิและการเปลี่ยนกระบวนการต่างๆ การลดเวลาที่สูญเสียไปสามารถทำได้โดยการเปลี่ยนมาใช้ตู้อบลมร้อนซึ่งสามารถควบคุมอุณหภูมิเป็นโปรแกรมได้ เนื่องจากการปรับเปลี่ยนระบบในการผลิต จึงมีความจำเป็นต้องศึกษาเปอร์เซ็นต์การเปลี่ยนจากเมทริลเมธาไครเลตมอนอเมอร์ไปเป็นพอลิเมทริลเมธาไครเลตในเวลาต่างๆ คุณสมบัติทางกายภาพบางประการ น้ำหนักโมเลกุลและการกระจายของน้ำหนักโมเลกุลของแผ่นพลาสติกที่ผลิตจากตู้อบลมร้อน เพื่อเปรียบเทียบกับค่าที่ได้จากกระบวนการเดิม การใช้การควบคุมอุณหภูมิแบบไม่คงที่สามารถผลิตแผ่นพลาสติกที่มีค่าการเปลี่ยนแปลงของมอนอเมอร์ไปเป็นพอลิเมอร์ที่มากขึ้นในเวลาเท่ากัน คุณสมบัติทางกายภาพและน้ำหนักโมเลกุลใกล้เคียงกับแผ่นที่ผลิตจากกระบวนการเดิมแต่สามารถใช้เวลาในการผลิตลดลงได้ประมาณ 20 เปอร์เซ็นต์

ABSTRACT

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Commercially, the cell-casting process of poly(methyl methacrylate) (PMMA) sheets is carried out by using either a water bath or a hot-air heating oven as the source of heat. For a system that uses a water bath, temperature change is inflexible. In order to overcome this problem, replacement of the water bath with a new self-designed heating oven was considered. With the heating oven, the temperature profiling is adjustable. In this work, the casting of the PMMA sheet was carried out by using the self-designed heating oven. The extension of reaction was observed by determination of MMA conversion. Some of the mechanical properties of the final product were determined. Molecular weight average and molecular weight distribution (MWD) were determined using gel permeable chromatography (GPC). Then, all of the observed properties were compared to the commercial PMMA casted sheet, which is produced by using water bath. By using the non-isothermal temperature profile, the monomer conversion was increased to nearly 100 percent. The mechanical properties were shown to be near the values of commercial PMMA sheets. Determined molecular weight average values were very high and MWD were very broad because of the uncontrolled batch reaction in the cell casting process.

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