

**PREPARATION OF CHITIN WHISKER/PLURONIC THERMAL
RESPONSIVE GEL FOR INJECTABLE DRUG DELIVERY SYSTEM**

Kullakarn Lertrattanakul

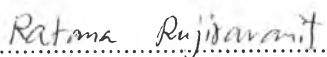
A Thesis Submitted in Partial Fulfilment of the Requirements
for the Degree of Master of Science
The Petroleum and Petrochemical College, Chulalongkorn University
in Academic Partnership with
The University of Michigan, The University of Oklahoma,
and Case Western Reserve University
2013

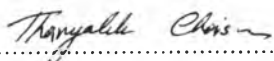
Thesis Title: Preparation of Chitin Whisker/Pluronic Thermal Responsive Gel for Injectable Drug Delivery System
By: Kullakarn Lertrattanakul
Program: Polymer Science
Thesis Advisors: Assoc. Prof. Ratana Rujiravanit

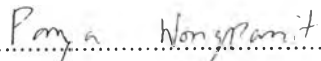
Accepted by The Petroleum and Petrochemical College, Chulalongkorn University, in partial fulfilment of the requirements for the Degree of Master of Science.


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ABSTRACT

5372020063: Polymer Science Program
Kullakarn Lertrattanakul: Preparation of Chitin Whisker/Pluronic
Thermal Responsive Gel for Injectabel Drug Delivery System
Thesis Advisor: Assoc. Prof. Ratana Rujiravanit 118 pp.
Keywords: Pluronic/Chitin whisker/Thermal responsive/Injectable gel/Drug
release

Pluronic F-127 (PF-127), a triblock copolymer of polyethylene oxide-polypropylene oxide-polyethylene oxide, is a temperature-responsive polymer that can transform sol to gel at an elevated temperature. Moreover, it is known that PF-127 gel can become soluble under physiological conditions. Regarding to these properties, PF-127 has been investigated as a carrier for an injectable drug delivery system, however, the stability of PF-127 gel under the physiological conditions is poor. Chitin whisker, a nanofibrillar form of chitin, with content varying from 0.4 % to 7 %, was added to PF-127 solution at room temperature and then incubated at 37 °C to allow gel formation. The stability of PF-127 gel was determined by measuring weight loss. The result show that the pluronic gel exhibited higher stability when adding more chitin whisker content. The increase in gel stability might be due to the physical interactions between the pluronic micelles and chitin whisker. The release characteristic of methylene blue, methyl orange and insulin used as a model drug for the chitin whisker-incorporated PF-127 gel, having different chitin whisker ratios was investigated for the purpose of drug carrier applications.

บทคัดย่อ

กุลกานต์ เลิศรัตนากุล : การเตรียมคอมโพสิตระหว่างพลูโรนิคเจลและเส้นใยไคตินระดับนาโนที่ตอบสนองต่อความร้อนเพื่อนำไปใช้ในระบบนำส่งยาโดยการฉีด (Preparation of Chitin Whisker/Pluronic Thermal Responsive Gel for Injectable Drug Delivery System) อ. ที่ปรึกษา : รศ. ดร. รัตนา รุจิรวนิช 118 หน้า

พลูโรนิคเอฟ-127 (Pluronic F-127) คือบล็อกโคพอลิเมอร์ของพอลิเอทิลีนออกไซด์และพอลิโพรพิลีนออกไซด์ซึ่งเป็นพอลิเมอร์ที่ตอบสนองต่อความร้อนและสามารถเปลี่ยนแปลงจากสมบัติความเป็นของเหลวกลายเป็นเจลได้เมื่ออุณหภูมิสูงขึ้น

นอกจากนี้ พลูโรนิคเอฟ-127 ยังสามารถละลายได้ภายใต้สภาวะร่างกาย จากคุณสมบัติเหล่านี้ พลูโรนิคเอฟ-127 จึงถูกนำมาใช้เป็นตัวพาเพื่อใช้ในระบบนำส่งยา อย่างไรก็ตาม ความคงตัวของพลูโรนิคเอฟ-127 ภายใต้สภาวะร่างกายยังคงไม่ดีเท่าที่ควร ไคตินวิสเกอร์หรือเส้นใยไคตินระดับนาโนสังเคราะห์มาจากไคตินจากเปลือกกุ้ง ถูกนำมาผสมกับสารละลายพลูโรนิคเอฟ-127 ที่อัตราส่วนต่างๆ ตั้งแต่ 0.4% ถึง 7% โดยน้ำหนักที่อุณหภูมิห้อง หลังจากนั้นนำไปบ่มที่อุณหภูมิ 37 °C เพื่อทำให้มีการเกิดเจลขึ้นของสารตัวอย่าง

ความคงตัวของคอมโพสิตเจลถูกทดสอบโดยการวัดน้ำหนักที่หายไปของคอมโพสิต หลังจากบ่ม จากผลการทดลองพบว่าพลูโรนิคเอฟ-127 ที่ใส่เส้นใยไคตินระดับนาโนเข้าไปด้วยนั้น มีความคงตัวเพิ่มขึ้น การเพิ่มขึ้นของความคงตัวนี้อาจจะมาจากอัตรากิริยาทางกายภาพระหว่างพลูโรนิคเอฟ-127 ไมเซลส์และไคตินเส้นใยระดับนาโน ลักษณะการปลดปล่อยของซีเมทีลินบลู, เมทิลออเรนจ์และยาอินซูลินใช้เพื่อเป็นโมเดลยาในระบบคอมโพสิตระหว่างพลูโรนิคเจลและเส้นใยไคตินระดับนาโน ที่อัตราส่วนของเส้นใยไคตินระดับนาโนที่ต่าง ๆ กัน ถูกทดสอบเพื่อนำไปประยุกต์ใช้ในระบบตัวพาเพื่อนำส่งยา

ACKNOWLEDGEMENTS

This research would have been achievement due to many people and departments which the author has a sincere thank you for sharing the knowledge, advice and others. The author takes this opportunity to appreciatively acknowledge the assistance and contributions of many people in laboratory group.

The author acknowledges her advisor, Assoc. Prof. Ratana Rujiravanit for the useful guidance, continuous attention and motivation her during work.

The author wishes to thank the committee, Asst. Prof. Thanyalak Chaisuwan and Dr. Panya Wongpanit for the worth suggestions and contribution the practical experiences.

Special thanks extend to Dr. Orathai Pornsunthorntawee, Dr. Chutima Vanichvattanadecha, Mr. Thus La-ongnuan, Ms. Chanikarn Saelim, Ms. Maneekarn Kantakanun, Ms. Supaporn Hansapaiboon and Ms. Sureerat Jampa for their generous support and being helpful in this research.

The author is grateful for the scholarship and funding of the thesis work provided by the Petroleum and Petrochemicals College and by the Center of Excellence on Petrochemical and Materials Technology, Chulalongkorn University. Furthermore, the author wishes to acknowledge Surapon Food Co. Ltd. for supplying shrimp shells.

Last but not least, the author would like to thank her parent who gave their love, understanding, encouragement, and financial support during her studies.

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