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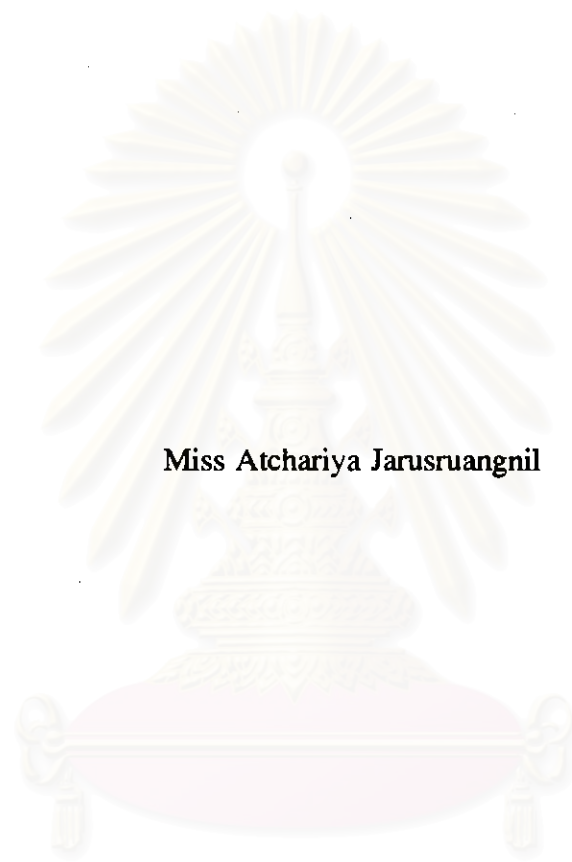
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**Microencapsulation of Indomethacin by Complex Coacervation of  
Chitosan-Carboxymethylcellulose and Chitosan-Pectin**



**Miss Atchariya Jarusruangnil**

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พิมพ์ต้นฉบับบทความวิจัยวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

อัจฉริยา จรัสเรืองนิล : ไมโครเอนแคปซูลซึ่งผลิตด้วยวิธีโคอาเซอร์เวชันเชิงซ้อนของไคโตแซน-คาร์บอกซีเมธิลเซลลูโลสและไคโตแซน-เพคติน (MICROENCAPSULATION OF INDOMETHACIN BY COMPLEX COACERVATION OF CHITOSAN-CARBOXYMETHYLCELLULOSE AND CHITOSAN-PECTIN) อ. ที่ปรึกษา : รศ. ดร. กาญจน์พิมล ฤทธิเดช, 177 หน้า. ISBN 974-634-122-5

รูปแบบยารับประทานไมโครแคปซูลซึ่งผลิตด้วยวิธีโคอาเซอร์เวชันเชิงซ้อนโดยใช้น้ำเป็นตัวทำละลายได้พัฒนาขึ้นเพื่อควบคุมการปลดปล่อยตัวยา ไมโครแคปซูลเกิดจากการทำปฏิกิริยาระหว่างประจุบวกของไคโตแซนและประจุลบของคาร์บอกซีเมธิลเซลลูโลสหรือเพคติน ไมโครแคปซูลห่อหุ้มตัวยาด้านแบบคืออินโดเมทาซิน ได้ทำการศึกษาคุณสมบัติของไมโครแคปซูลในด้านลักษณะพื้นผิว รูปร่างขนาดและการกระจายขนาดอนุภาค ความสามารถในการห่อหุ้มตัวยา รูปแบบการปลดปล่อยตัวยา แผนภูมิของ IR spectra และ DSC thermograms และตรวจสอบความสามารถในการผลิตซ้ำของตำรับที่เหมาะสม ผลการศึกษาพบว่า ความเข้มข้นของโพลีเมอร์จะมีผลต่อการเกิดเป็นไมโครแคปซูล การเกิดเป็นไมโครแคปซูลที่เตรียมจากไคโตแซน-เพคตินต้องเติมแคลเซียมคลอไรด์ เพื่อป้องกันการเกาะกลุ่มของไมโครแคปซูล ชนิดของโพลีเมอร์มีผลต่อลักษณะพื้นผิวของไมโครแคปซูล ผงไมโครแคปซูลที่เตรียมจากไคโตแซน-คาร์บอกซีเมธิลเซลลูโลสมีลักษณะเรียบ มีคลื่นเล็กน้อย ขณะที่ไคโตแซน-เพคตินมีลักษณะขรุขระ มีรอยขุ่นมาก นอกจากนี้การทำให้แห้งจะมีผลต่อขนาดเฉลี่ยและการกระจายขนาดอนุภาคของไมโครแคปซูล โดยไคโตแซน-คาร์บอกซีเมธิลเซลลูโลสและไคโตแซน-เพคตินไมโครแคปซูล มีการกระจายขนาดอนุภาคในช่วง 40-291 และ 40-459 ไมครอน ตามลำดับ รูปแบบการปลดปล่อยตัวยาแสดงให้เห็นว่าทั้งไคโตแซน-คาร์บอกซีเมธิลเซลลูโลส และไคโตแซน-เพคตินไมโครแคปซูลมีการปลดปล่อยตัวยาตามแบบฮิกูชิ และได้มากถึง 24 ชั่วโมง ขึ้นกับความเข้มข้นของโพลีเมอร์ ปริมาณกลูตาราลดีไฮด์ และระยะเวลาที่ทำให้แห้งแข็งแรง ทั้งไคโตแซน-คาร์บอกซีเมธิลเซลลูโลสและไคโตแซน-เพคตินสามารถผลิตซ้ำเป็นอินโดเมทาซินไมโครแคปซูลได้

สถาบันวิทยบริการ  
จุฬาลงกรณ์มหาวิทยาลัย

ภาควิชา ..... เกษียณต่อสหกรรม .....  
สาขาวิชา ..... เกษียณต่อสหกรรม .....  
ปีการศึกษา ..... 2539 .....

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KEY WORD: CHITOSAN/ CARBOXYMETHYLCELLULOSE/ PECTIN/ INDOMETHACIN/  
MICROENCAPSULATION

ATCHARIYA JARUSRUANGNIL : MICROENCAPSULATION OF INDOMETHACIN BY  
COMPLEX COACERVATION OF CHITOSAN-CARBOXYMETHYLCELLULOSE AND  
CHITOSAN-PECTIN. THESIS ADVISOR : ASSOC. PROF. GARNPIMOL C.  
RITTHIDEJ, Ph.D. 177 pp. ISBN 974-634-122-5

Microcapsule peroral dosage form prepared by complex coacervation technique using aqueous vehicle was developed in order to control drug release. Microcapsules were formed by interaction between positive charge of chitosan and negative charge of carboxymethylcellulose or pectin. Indomethacin, as a model drug, was entrapped in microcapsules. The physicochemical properties of microcapsules such as morphology, shape, size and size distribution, drug entrapment, drug release profiles, infrared spectra and differential scanning calorimetric thermograms were studied, and reproducibility of satisfactory preparations was also investigated. The results showed that polymer concentration affected the formation of microcapsules. In chitosan-pectin microencapsulation, calcium chloride was added to chitosan solution in order to prevent agglomeration of microcapsule droplets. Surface topography of microcapsules was affected by type of polymer. Microcapsule wall prepared from chitosan-carboxymethylcellulose was smooth and a little wavy while that prepared from chitosan-pectin was rough and heavily wrinkled. Moreover, drying process could affect the mean size and size distribution of microcapsules. Size distribution of chitosan-carboxymethylcellulose and chitosan-pectin microcapsules ranged between 40-291 and 40-459 microns, respectively. The drug release profiles showed that the release from both chitosan-carboxymethylcellulose and chitosan-pectin microcapsules followed Higuchi's model and could be sustained up to 24 hours depending on concentration of polymer, glutaraldehyde content, and hardening time. Both chitosan-carboxymethylcellulose and chitosan-pectin indomethacin microcapsules could be reproduced.

สถาบันวิทยบริการ

จุฬาลงกรณ์มหาวิทยาลัย

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## Abbreviations

CMC	carboxymethylcellulose
cm	centimetre
cps	centipoises
CS	chitosan
°c	degree celcius
glu, glutaral	glutaraldehyde
gm	gram
hr	hour
IPA	isopropyl alcohol
kg	kilogram
L	litre
mg	miligram
ml	mililitre
min	minute
nm	nanometre
N	normal
Prep.	Preparation
rpm	revolution per minute
SD	standard deviation
soln	solution
vol.	volume
w/v	weight by volume
µg	microgram
µm	micrometre, micron