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**CONTROLLED RELEASE OF NIFEDIPINE FROM COMBINED
CARRIERS BETWEEN EUDRAGIT AND POVIDONE K30
PREPARED BY SPRAY DRYING TECHNIQUE**

Miss Chutima Sinsuebpol

A Thesis Submitted in Partial Fulfillment of the Requirements

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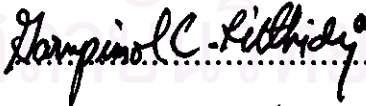
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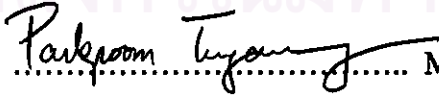

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**สุคิมา ตินตึบผล : การควบคุมการปลดปล่อยของนิเฟดิพินจากตัวพาร่วมระหว่างยูดราจิดและ
โพลีโคโนเค30 เตรียมโดยเทคนิคการพ่นแห้ง (CONTROLLED RELEASE OF NIFEDIPINE
FROM COMBINED CARRIERS BETWEEN EUDRAGIT AND POVIDONE K30
PREPARED BY SPRAY DRYING TECHNIQUE)**

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การควบคุมการปลดปล่อยของนิเฟดิพินจากตัวพาร่วม ได้แก่ ยูดราจิดอาร์เอต 100, ยูดราจิด
อาร์แอล 100 และโพลีโคโนเค30 (พีวีทีเค30) สามารถเตรียมได้โดยเทคนิคการพ่นแห้ง เมื่อใช้อัตราส่วน
ของยาต่อตัวพาร่วมเป็น 1:10 ได้เปลี่ยนแปลงปริมาณพีวีทีเค30 เพื่อให้มีอัตราส่วนผสมนิเฟดิพิน-ยูดราจิด
อาร์เอต 100หรือยูดราจิด อาร์แอล 100-พีวีทีเค30เป็น 1:10:0, 1:8:2, 1:5:5, 1:2:8, และ 1:0:10 ได้ศึกษา
อิทธิพลของอุณหภูมิของลมเข้า, ความเข้มข้นของสารละลายที่พ่น, ชนิดและอัตราส่วนของตัวพาร่วมที่
มีต่อคุณสมบัติของผงพ่นแห้งและลักษณะการปลดปล่อยของตัวยาจากไมโครสเฟียร์ที่เตรียมได้ จากรูป
แบบของเอกซเรย์ดิฟแฟรกชัน เทอร์โมแกรมจากดิฟเฟอเรนเชียลสแกนนิ่งแคลอริเมตรีพบผลสอดคล้อง
กันว่านิเฟดิพินในแมทริกซ์ของพอลิเมอร์เปลี่ยนแปลงจากรูปผลึกเป็นรูปอสัณฐาน จากไฟเรีย
ทรานฟอร์มอินฟราเรดสเปกตราได้แสดงว่ามีปฏิกริยาระหว่างไมเลกุลของนิเฟดิพินและพอลิเมอร์ใน
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ไมโครสเฟียร์ซึ่งใช้ค่าประสิทธิภาพการละลายและค่าคงที่อัตราการละลายของฮิกูชิ พบว่าปริมาณ
พีวีทีเค30 ควบคุมการปลดปล่อยตัวยาจากยูดราจิดแมทริกซ์ซึ่งไม่ละลายน้ำ การใช้อุณหภูมิของลมเข้าค่า
ความเข้มข้นของสารละลายที่พ่นสูงและยูดราจิดอาร์แอล 100ซึ่งมีความชอบน้ำมากกว่าเป็นปัจจัยเสริม
ให้ประสิทธิภาพการละลายและค่าคงที่อัตราการละลายสูงขึ้น

ภาควิชาเภสัชกรรม.....
สาขาวิชาเภสัชกรรม.....
ปีการศึกษา 2542

ลายมือชื่อนิสิต
ลายมือชื่ออาจารย์ที่ปรึกษา
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม

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CHUTIMA SINSUEBPOL : CONTROLLED RELEASE OF NIFEDIPINE FROM
COMBINED CARRIERS BETWEEN EUDRAGIT AND POVIDONE K30 PREPARED
BY SPRAY DRYING TECHNIQUE.

THESIS ADVISOR : ASSOC.PROF. SUCHADA CHUTIMAWORAPAN, M.Sc.in Pharm.

THESIS CO-ADVISOR : ASSOC.PROF.GARNPIMOL C.RITTHIDEG, Ph.D.

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Controlled release of nifedipine from combined carriers namely, Eudragit RS 100, Eudragit RL 100 and povidone K30 were attained by spray drying technique. The drug-combined carriers ratio of 1:10 with the mixing ratios of nifedipine:Eudragit RS 100 or Eudragit RL 100:PVP K30 as 1:10:0, 1:8:2, 1:5:5, 1:2:8 and 1:0:10 were investigated. The effects of inlet air temperature, the spray concentration, types and the ratios of combined carriers on physicochemical properties of the spray dried powders and on the release characteristics of the resultant microspheres were investigated. As shown by the powder X-ray diffraction patterns, differential scanning calorimetric thermograms, nifedipine was consistently transformed from crystalline form to amorphous form in the polymer matrices. The Fourier transform infrared spectra demonstrated intermolecular interaction between nifedipine and the polymers in the microspheres. The kinetics of nifedipine release from microspheres were evidenced to follow the Higuchi diffusion-controlled mechanism. The dissolution characteristics of nifedipine microspheres were evaluated in the terms of dissolution efficiency and Higuchi rate constant. It was found that PVP K30 content controlled the drug release from Eudragit insoluble matrix. Low inlet temperature, high spray concentration and more hydrophilic Eudragit RL100 were promoting factors for higher dissolution efficiency and release rate constant.

ภาควิชาเภสัชกรรม.....
สาขาวิชาเภสัชกรรม.....
ปีการศึกษา2542.....

ลายมือชื่อนิสิต
ลายมือชื่ออาจารย์ที่ปรึกษา
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม

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LIST OF ABBREVIATIONS

ANOVA	=	analysis of variance
°C	=	Degree Celsius
cps	=	count per seconds
DE	=	dissolution efficiency
DSC	=	differential scanning calorimetry
GI	=	gastrointestinal
h	=	hour
IR	=	infrared
k	=	release rate constant
LSD	=	least significant different
mcg	=	microgram
mg	=	milligram
min	=	minute
ml	=	milliliter
µm	=	micrometer
nm	=	nanometer
psi	=	pound per square inch
PVP K30	=	Povidone K30
R ²	=	coefficient of determination
SEM	=	scanning electron microscopy
UV	=	ultraviolet
XRD	=	X-ray diffraction