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CONTROLLED RELEASE OF SODIUM DICLOFENAC FROM
CHITOSAN/POLYETHYLENE GLYCOL BEADS CROSSLINKED WITH
TRIPOLYPHOSPHATE

Miss Thawachinee Buranachai

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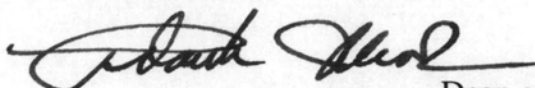
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งานวิจัยนี้ศึกษาการควบคุมการปลดปล่อยยาโซเดียมไคโคลฟีแนคจากพอลิอิลเลคโตรไลต์
คอมเพลกซ์ในรูปแบบของบีดที่เตรียมจากไคโตซานและพอลิเอทิลีนไกลคอลในระบบทางเดิน
อาหาร เพื่อหาอัตราส่วนที่ดีที่สุดระหว่างพอลิเมอร์และยา จึงปรับปรุงบีดที่เตรียมจากไคโตซาน
โดยวิธีการเชื่อมขวางด้วยพันธะไอออนิก ที่ผันแปรค่าความเข้มข้นและความเป็นกรดเบสของไตร
พอลิฟอสเฟต (TPP) รวมถึงผันแปรระยะเวลาที่ใช้สำหรับเกิดการเชื่อมขวาง บีดที่เตรียมจากไคโต
ซาน/พอลิเอทิลีนไกลคอล/ไคโคลฟีแนคโซเดียม ด้วยอัตราส่วนโดยมวล 1/0.5/0.5 และ 10% ของ
ไตรพอลิฟอสเฟต (TPP) ที่สภาวะ pH 6.0 เป็นเวลา 30 นาที ให้ความสามารถในการกักเก็บยาได้
สูงถึง 95% และให้ผลในการควบคุมการปลดปล่อยยาด้านานถึง 5 ชั่วโมง นอกจากนี้ ยังใช้
กลูตารัลดีไฮด์ (GD) เป็นสารเชื่อมขวางเพื่อยืดระยะเวลาการปลดปล่อยยา บีดที่เตรียมจากไคโต
ซาน/พอลิเอทิลีนไกลคอล/ไคโคลฟีแนคโซเดียม โดยมีไตรพอลิฟอสเฟต (TPP) และกลูตารัลดีไฮด์
(GD) เป็นสารเชื่อมขวาง สามารถควบคุมการปลดปล่อยยาในระบบทางเดินอาหาร ได้นานที่สุดที่
pH 1.2 และปริมาณยาที่เหลืออยู่ถูกปลดปล่อยออกมาที่ pH 7.4 ภายในเวลา 24 ชั่วโมง ซึ่งงาน
ทั้งหมดนี้เป็นทางเลือกใหม่ที่สามารถนำมาใช้ประโยชน์สำหรับการปลดปล่อยยาในระบบทางเดิน
อาหาร

สาขาวิชา.....ปีโทรเคมีและวิทยาศาสตร์พอลิเมอร์.....ลายมือชื่อนิสิต ทวชินี บูรณชัย

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THAWACHINEE BURANACHAI: CONTROLLED RELEASE OF
 SODIUM DICLOFENAC FROM CHITOSAN/POLYETHYLENE GLYCOL
 BEADS CROSSLINKED WITH TRIPOLYPHOSPHATE. THESIS
 ADVISOR: ASST.PROF. NONGNUJ MUNGSIN, Ph.D., THESIS
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The controlled release of diclofenac sodium (DS) from chitosan (CS)/polyethylene glycol (PEG) polyelectrolyte complex hydrogel beads were investigated in simulated gastrointestinal fluid. Following the optimization of the polymer to drug ratio, the chitosan beads were modified by the ionic cross-linking method with varying concentrations and pH of tripolyphosphate (TPP) coagulant solution as well as cross-linking time. The CS/PEG/DS bead obtained with the weight proportion of 1/0.5/0.5 and 10% TPP at pH 6.0 and 30 minutes of cross-linking time was found optimal yielding an excellent encapsulation of over 95% drug loading efficiency. The dissolution profile of DS from CS/PEG beads exhibited that a good slow release profile was achieved after the 5th hour. The drug prolonged release was far more superior upon further cross-linking the hydrogel with glutaraldehyde (GD). The CS/PEG/DS beads cross-linked with both TPP and GD were able to provide the best delayed release in the gastric simulated fluid (pH 1.2). The remaining drug content was gradually released within 24 hours in the intestinal simulated fluid (pH 7.4). In all, the CS/PEG beads, cross-linked with TPP and GD, have been proven very useful as a novel alternative for gastrointestinal drug release system.

Field of Study...Petrochemistry and Polymer Science..Student's Signature.....*Thamee Buranachai*

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LIST OF ABBREVIATIONS

CS	Chitosan
PEG	Polyethylene glycol
°C	degree Celsius (centigrade)
cm ⁻¹	Unit of wave number
DFNa	Sodium diclofenac
DSC	Differential scanning calorimeter
DTG	The derivative thermogravimetric
EE	The encapsulation efficiency
FT-IR	Fourier transform infrared spectrometer
GA	Glutaric acid
GD	Glutaraldehyde
LE	The loading efficiency
PEC	Polyelectrolyte complex
pH	The negative logarithm of the hydrogen ion concentration
pKa	The negative logarithm of the acid dissociation constant
ppm	Part per million
r ²	The correlation coefficient
S.D.	Standard deviation
SEM	Scanning electron microscope
S _w	The swelling ratio
UV	Ultraviolet
w/v	Weight by volume
w/w	Weight by weight