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ของแปงพรีเจลาตินส์ ซึ่งเตรียมจากแปงข้าวโพด แปงข้าวเหนียว
และแปงมันสำปะหลังที่ทำปฏิกิริยากับกรดไฮโดรคลอริก**



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**TABLET FILLER/BINDER PROPERTIES
OF PREGELATINIZED STARCH PREPARED FROM
HYDROCHLORIC ACID TREATED CORN,
GLUTINOUS RICE AND TAPIOCA STARCH**



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นිරนาถ จินะไชย : คุณสมบัติการเป็นสารเพิ่มปริมาณ/สารยึดเกาะในสูตรตำรับยาเม็ด ของ แป้งพรีเจลาดีโนส ซึ่งเตรียมจากแป้งข้าวโพด แป้งข้าวเหนียว และแป้งมันสำปะหลัง ที่ทำ ปฏิกริยากับกรดไฮโดรคลอริก (TABLET FILLER/BINDER PROPERTIES OF PREGELATINIZED STARCH PREPARED FROM HYDROCHLORIC ACID TREATED CORN, GLUTINOUS RICE AND TAPIOCA STARCH) อ. ที่ปรึกษา : รศ. ดร. พงษ์ กุลวานิช อ. ที่ปรึกษาร่วม : อ. รมณี สงวนดีกุล, 276 หน้า. ISBN 974-334-453-5

การเตรียมแป้งพรีเจลาดีโนสโดยใช้เครื่องทำแห้งชนิดลูกกลิ้งจากแป้งข้าวโพด แป้งข้าวเหนียว และแป้งมันสำปะหลังซึ่งทำปฏิกริยากับกรดไฮโดรคลอริก ทั้งนี้ในขั้นตอนการทำปฏิกริยากับกรด ได้มีการศึกษาสภาวะของการทำปฏิกริยา เช่น ความเข้มข้นของกรด, อุณหภูมิ, ระยะเวลาในการทำปฏิกริยาที่เหมาะสมเพื่อให้ได้มาซึ่งแป้งที่มีความหนืดลดลงจากแป้งธรรมชาติ 2 ระดับ จากการทดลองพบว่าสภาวะของการทำปฏิกริยาที่เพิ่มขึ้นจะส่งผลให้ความหนืดของแป้งลดลง อย่างไรก็ตามพบว่าเมื่อนำแป้งที่ผ่านการทำปฏิกริยากับกรดทั้งสองระดับดังกล่าวไปเตรียมเป็นแป้งพรีเจลาดีโนสไม่พบความแตกต่างของความหนืดของแป้งพรีเจลาดีโนสที่เตรียมได้ ยกเว้นแป้งพรีเจลาดีโนสของแป้งข้าวเหนียว

เมื่อนำแป้งพรีเจลาดีโนสที่เตรียมได้มาศึกษาถึงคุณสมบัติของผงแป้ง, ศึกษาคุณสมบัติของแกรนูลและเม็ดยาที่เตรียมโดยใช้แป้งดังกล่าวเป็นสารเพิ่มปริมาณ/สารยึดเกาะ โดยทำการศึกษาเปรียบเทียบกับแป้งพรีเจลาดีโนสที่มีจำหน่ายในท้องตลาด 3 ชนิดคือ Era-Gel[®], National 1551[®] และ Starch 1500[®] ในการศึกษาคุณสมบัติทางเคมีและกายภาพของผงแป้งเบื้องต้นพบว่า ลักษณะทางกายภาพของแป้งทั้งสามชนิด (แป้งข้าวโพด, แป้งข้าวเหนียว และแป้งมันสำปะหลัง) ที่ผ่านการทำปฏิกริยากับกรดไม่มีความแตกต่างไปจากแป้งธรรมชาติอย่างชัดเจน ในขณะที่แป้งพรีเจลาดีโนสที่เตรียมได้ทั้งจากแป้งธรรมชาติและแป้งที่ผ่านการทำปฏิกริยากับกรดทั้งสองระดับจะให้คุณสมบัติทางกายภาพเปลี่ยนไปโดยสิ้นเชิง แป้งพรีเจลาดีโนสที่เตรียมได้เป็นแป้งชนิดพรีเจลาดีโนสทั้งหมด และไม่พบการเปลี่ยนแปลงกลุ่มฟังก์ชันขององค์ประกอบของแป้งตลอดกระบวนการทดลอง แป้งพรีเจลาดีโนสที่เตรียมได้มีคุณสมบัติในการพองตัว (swelling capacity) และปริมาณสารที่ละลายน้ำได้ (amount of soluble substances) เพิ่มขึ้นและมีการไหลที่ดี

ในการศึกษาเปรียบเทียบคุณสมบัติการเป็นสารเพิ่มปริมาณ/สารยึดเกาะของแป้งพรีเจลาดีโนสที่เตรียมได้พบว่า แป้งพรีเจลาดีโนสที่เตรียมจากแป้งข้าวโพดทั้งจากแป้งธรรมชาติและจากแป้งข้าวโพดที่ผ่านการทำปฏิกริยากับกรดทั้งสองระดับ และ แป้งพรีเจลาดีโนสที่เตรียมจากแป้งมันสำปะหลังที่ผ่านการทำปฏิกริยากับกรดทั้งสองระดับให้คุณสมบัติการเป็นสารเพิ่มปริมาณ/สารยึดเกาะที่ดีในสูตรตำรับยาเม็ดอะเซตามิโนเฟนทั้งในด้านลักษณะทางกายภาพ คุณสมบัติในการแตกตัว (แตกตัวภายในเวลา 0.78-5.29 นาที) และการละลายตัวของยา(เวลาที่ใช้ในการละลายตัวยาแปดสิบเปอร์เซ็นต์อยู่ระหว่าง 2.92-7.00 นาที) ส่วนแป้งพรีเจลาดีโนสที่เตรียมจากแป้งมันสำปะหลังที่ไม่ได้ผ่านการทำปฏิกริยากับกรด และ แป้งพรีเจลาดีโนสที่เตรียมจากแป้งข้าวเหนียวทั้งจากแป้งธรรมชาติและแป้งที่ผ่านการทำปฏิกริยากับกรดทั้งสองระดับมาแล้วให้านีตอะเซตามิโนเฟนที่มีคุณสมบัติทางกายภาพที่ดี แต่เวลาการแตกตัวของยาเม็ดช้ามาก (เวลาในการแตกกระจายตัวมากกว่า 80 นาที)

ภาควิชาเภสัชอุตสาหกรรม.....ลายมือชื่อนิติศ 

สาขาวิชาเภสัชอุตสาหกรรม.....ลายมือชื่ออาจารย์ที่ปรึกษา 

ปีการศึกษา 2542.....ลายมือชื่ออาจารย์ที่ปรึกษาร่วม 

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KEY WORD: MODIFIED STARCH, TABLET FILLER/BINDER, PREGELATINIZED ACID TREATED STARCH

NEERANARD JINACHAI: TABLET FILLER/BINDER PROPERTIES OF PREGELATINIZED STARCH PREPARED FROM HYDROCHLORIC ACID TREATED CORN, GLUTINOUS RICE AND TAPIOCA STARCH.
THESIS ADVISOR: ASSO. PROF. POJ KULVANISH, PH.D. THESIS CO-ADVISOR: ROMANEE SANGUANDEEKUL, PH.D. 276 pp, ISBN 974-334-453-5

Pregelatinized starches were produced from hydrochloric acid treated: corn, glutinous rice and tapioca starch using double drum dryer. The reaction of acid treated conditions i.e. hydrochloric acid concentration, temperature and time of treatment were varied to obtain the acid modified starches having two lower levels of viscosity when compared with their native forms. It was found that the higher levels of treatment conditions, the lower viscosity of acid treated starches were attained. However, when both levels of acid treated were prepared into pregelatinized starches, their viscosities became similar, except that of glutinous rice starches.

Pregelatinized starches obtained were evaluated in term of their powder properties, granule properties and tableting characteristics when they were used as filler/binder in acetaminophen formulations comparing with three of commercial pregelatinized starches (Era-Gel[®], National 1551[®] and Starch 1500[®]). In the study of powder properties, it was found that the physical properties of acid treated corn, glutinous rice and tapioca starch at both levels of viscosity appeared virtually unchanged from their native starches while the pregelatinized of all starches exhibited the entire differences. All pregelatinized starches obtained were completely gelatinized and there were no changes of chemical functional groups during their processing. The swelling capacity and amount of soluble substances of pregelatinized starches obtained were increased, also the flowability of the powders.

When all pregelatinized starches prepared were evaluated as filler/binder in acetaminophen tablets, it was found that the pregelatinized native corn starches, pregelatinized starch of both levels of acid treated corn starches and tapioca starches exhibited the satisfactory fillers/binders in acetaminophen tablets in term of physical properties, disintegration (within 0.78-5.23 mins) and dissolution time ($T_{80\%}$ between 2.92-7.00 mins), while the tablets contained pregelatinized of native tapioca starch, pregelatinized of native glutinous rice starch and pregelatinized starch of both levels of acid treated glutinous rice starches gave good tablets physical properties but having very slow disintegration time (> 60.00 mins).

ภาควิชาเภสัชอุตสาหกรรม.....ลายมือชื่อนิติศ.....

สาขาวิชาเภสัชอุตสาหกรรม.....ลายมือชื่ออาจารย์ที่ปรึกษา.....

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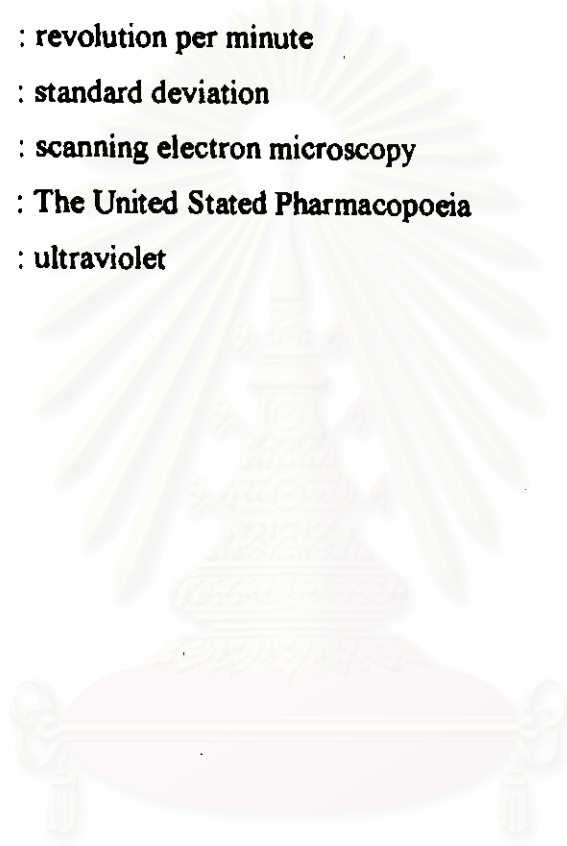
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ABBREVIATIONS

- BU : brabender unit
DSC : differential scanning calorimetry
Kp : kilopound
Psi : pound / inch²
rpm : revolution per minute
SD : standard deviation
SEM : scanning electron microscopy
USP : The United States Pharmacopoeia
UV : ultraviolet



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