

การศึกษาความคงตัวของสารละลายโพวิโดน-ไอโอดีน ๑๐%

ว่าที่ร้อยตำรวจเอกหญิง มาลัย ศิริทองถาวร



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญา วิทยาศาสตรมหาบัณฑิต

ภาควิชาเคมี

บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย

พ.ศ. ๒๕๓๔

ISBN 974-581-026-6

ลิขสิทธิ์ของบัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย

018685

117170643

A STUDY OF STABILITY OF 10% POVIDONE-IODINE SOLUTION

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A Thesis Submitted in Fulfillment of the Requirements
for the Degree of Master of Science in Pharmacy

Department of Pharmaceutical Chemistry

Graduate School

Chulalongkorn University

1992

ISBN 974-581-026-6

Thesis Title A Study of Stability of 10% Povidone-I
Solution.

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ว่าที่ ร.ต.อ. (ญ) มาลัย ศิริทองถาวร : การศึกษาความคงตัวของสารละลายโพวิโดน-ไอโอดีน 10% (A STUDY OF STABILITY OF 10% POVIDONE-IODINE) อ.ที่ปรึกษา : ผศ. สมเกียรติ รุจิรัตน์, อ.ที่ปรึกษาร่วม : อ.ดร. มีตร ปทีปะนิช, 183 หน้า, ISBN 974-581-026-6

การศึกษาความคงตัวของสารละลาย 10% น้ำหนักโดยปริมาตรของโพวิโดน-ไอโอดีนในสารละลายบัฟเฟอร์ ได้วางแผนการทดลอง เพื่อศึกษาอิทธิพลของบัฟเฟอร์ที่ใช้ในทางเภสัชกรรม แหล่งน้ำ และภาชนะบรรจุ ต่อสารละลายโพวิโดน-ไอโอดีน การวิเคราะห์หาปริมาณทำได้โดยวิเคราะห์ available iodine ตามวิธีใน USP.XX พบว่า การเตรียมสารละลายโพวิโดน-ไอโอดีนที่ pH เริ่มต้น 5.5 และใช้ความเข้มข้นของบัฟเฟอร์เท่ากัน การเตรียมในฟอสเฟตบัฟเฟอร์ จะมีความคงตัวที่ดีกว่าการเตรียมในอะซีเตท และซิเตรทบัฟเฟอร์ แต่การใช้ซิเตรทบัฟเฟอร์ จะรักษา pH ของสารละลายได้ดีกว่าฟอสเฟต และอะซีเตทบัฟเฟอร์ ในการเตรียมสารละลายของโพวิโดน-ไอโอดีนควรใช้น้ำกลั่น เป็นตัวทำละลาย และบรรจุในขวดโพลีเอธิลีน

ปริมาณ available iodine ที่เหลืออยู่ จะลดลงอย่างรวดเร็วมากในช่วงต้นของการสลายตัว หลังจากนั้น อัตราการสลายตัวที่ปรากฏจะค่อย ๆ ลดลง จนในที่สุดคาดว่า การสลายตัวอาจเป็นแบบปฏิกิริยาอันดับศูนย์ ดังนั้นในการเตรียมสูตรตำรับสารละลาย 10% น้ำหนักโดยปริมาตรของโพวิโดน-ไอโอดีน ในบัฟเฟอร์ควรเติม โพวิโดน-ไอโอดีนเกินไว้ เพื่อรักษาปริมาณ available iodine หลังจากเกิดการสลายตัวอย่างรวดเร็วในช่วงแรก

ภาควิชาเภสัชเคมี
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C075153 : PHARMACEUTICAL CHEMISTRY

KEY WORD : STABILITY/POVIDONE-IODINE

MALAI SIRITONGTHAVORN, POLICE CAPTAIN : A STUDY OF STABILITY 10% POVIDONE-IODINE SOLUTION. THESIS ADVISOR : ASSIST.PROF. SOMKIAT RUJIRAWAT, M.S.(PHARM), THESIS CO-ADVISOR : INSTRUCTOR MITR PATHIPVANICH, Ph.D., 183 PP. ISBN 974-581-026-6.

The stability testing program of 10% w/v buffered solution was designed to assess the influence of pharmaceutical buffers, sources of solvent and packaging materials on the degradation of PVP-I solution. The quantitative analysis was performed by determining of available iodine as official in USP XX.

It was found that, at the same buffer concentration and the initial pH of 5.5, 10% w/v PVP-I solution in phosphate buffer was more stable than in acetate or citrate buffer whereas the solution in citrate buffer could maintain pH better than in the other two. The solvent should be distilled water. The solution of 10% w/v PVP-I buffered solution should be filled in polyethylene bottle.

Available iodine decreased rapidly at the initial state of the degradation. Then, the appearance degradation rate was gradually decreased. Finally, the degradation was postulated to be zero order reaction. Thus, in case of 10% w/v PVP-I solution formulation in buffer, PVP-I should be excessively added to maintain the quantity of available iodine after initial rapid degradation.

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ลายมือชื่อผู้คิดค้น ภาควิชาเภสัชเคมี
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ACKNOWLEDGEMENTS

First, I am very thankful for the pleasure of having Assistant Professor Somkiat Rujirawat and Instructor Mitr Pathipvanich, Ph.D., as my advisor and co-advisor. Their encouragement, constant guidance and helpful advice throughout my graduate study are deeply appreciate.

I would then like to thank all lecturers and staff members of the Pharmaceutical Chemistry Department for their advice and helpful.

I also wish to thank the Graduate School of Chulalongkorn University for the provision of partial financial support.

I am grateful to thank B.J. Pharmaceutical Manufacturer, B.L.Hua Pharmaceutical Manufacturer and Sahabhadh Bhaesaj Pharmaceutical Manufacturer for their generous supply of active ingredient material for this study.

I wish to express my sincere appreciate to all my friends, for their willpower and cheerfulness during my graduate study.

Finally, I would like to express my thanks to all of those, who help me to make this work a reality.

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LIST OF ABBREVIATIONS

Abbreviation	Term
PVP	polyvinylpyrrolidone/povidone
PVP-I	povidone-iodine
g	gram
mg	milligram
ml	milliliter
M	molar
m	mole
ppm	part per million
mm	millimicron
ln	natural logarithm