UNIVERSITI TEKNOLOGI MARA

CHARACTERIZATION OF TRANSDERMAL DRUG DELIVERY USING NONDESTRUCTIVE VISIBLE SPECTROPHOTOMETRY AND ARTIFICIAL NEURAL NETWORK

AZNIDA BINTI ALIAS

Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Electrical Engineering

March 2017

ABSTRACT

Assessment of drug content and matric characteristics, such as state of polymer-polymer and drug-polymer interaction are utmost important with respect the therapeutic effectiveness of transdermal drug delivery system. Conventional methods for analysis result in sample being unrecoverable from test, disposal of a large amount of solvents, reagents and accessories, as well as, restrict the analysis to statistically selected samples. This thesis present a new technique in drug content and drug concentration assessment of nifedipine and hyroxypropylmethyl cellulose films with 25%, 50% and 75% relative humidity using nondestructive testing technique of Visible Spectrophotometry. The crossed study of the polymeric films by Differential Scanning Calorimetry, Fourier Transform Infrared Spectroscopy, Ultraviolet Spectrophotometry and Visible Spectrophotometry indicated physicochemical changes as the drug and polymer varied. The significant wavelength and intensity of visible spectrophotometry associated with different polymeric films and relative humidity were determined. Correlation study of drug concentration from visible spectrophotometry and drug content were done using artificial neural network. This intelligent technique have presented the reliability of Visible Spectrophotometry in detecting drug content and identifying drug concentration at minimum and maximum of 0 to 20mg and 0 to 32.11 %w/w respectively.

ACKNOWLEDGEMENT

Alhamdulillah, all praises belongs to Allah the Almighty, the Mercifulness and Salam to Nabi Muhammad S.A.W.

Immeasurable appreciation and deepest gratitude for the help and support extended to the following persons who in one way or another have contributed in making this study possible.

Prof. Dr. Haji Mohd. Nasir Bin Haji Taib, my supervisor for his guidance and invaluable advice,
Assoc. Prof. Dr. Wong Tin Wui, my co-supervisor for his discussions and helpful in pharmaceutical part,
Members of Advanced Signal Processing Research Group (ASPRG), *Particle Design Research Group* (PDRG) and *Nondestructive Biomedical and Pharmaceutical Research Centre* for tremendous helps and being supportive,
Kementerian Sains, Teknologi & Alam Sekitar for giving me a scholarship throughout of my first 2 years study,
Ahmad Riduan Bin Dahron, my lovely and understanding husband that helps me in managing the housework and kids,
Alias Bin Abdul Samad (Abah) and *(Mak)*, my dear parents for their thoughtful as this research take more years than we have expected,
My kids (Danish, Darwisy and Firas), *siblings* and *best friends* for being with me in the best and worst condition,
And last but not least *people who have directly or indirectly contributed* to the completion of the thesis.

May Allah bless all of you. InsyaAllah, Ameen.

Aznida binti Alias
March 2017

TABLE OF CONTENTS