



Comparative study on release of two drugs in fixed dose combination using zero order and first derivative spectrophotometry

AnisYohana Chaerunisaa^{1*}, Muhaimin²

¹Faculty of Pharmacy, Padjadjaran University, Jatinangor, 45363, Indonesia

²Department of Chemistry, Faculty of Education, University of Jambi, Jambi 36361, Indonesia

Abstract : Fixed dose combination (FDC) is a formulation of two or more active ingredients combined in a single dosage form. Development and validation of an analytical UV using derivative has been increasingly used. This method offer sensitive, simple and robust method for analyzing active ingredient in pharmaceutical dosage forms, especially when it contains more than one drug. Drug assays can also be calculated by using mathematical equation from zero derivative or absorbance spectrophotometry. This current study aimed to compare release of drugs from fixed dose combination dosage forms (pellets and microparticles) calculated by first derivative with that by zero order spectrophotometry method. As drug models, propranolol HCl and carbamazepine were used as sample of highly and poorly soluble drugs mixed in a single dosage form. Propranolol HCl and carbamazepine were mixed and loaded into sugar cores, and the drug beads were coated with 10% w/w coating level of ethylcellulose containing 20-40% w/w HPC. As microparticles, propranolol HCl was used first primary emulsion while the second primary oil phase was carbamazepine. Other type of microparticles used the opposite system. Drug release either of propranolol HCl or carbamazepine measured by zero order spectrophotometry were smoother compared to those measured by first derivative method. The validation parameter including linearity, and accuracy, have been validated statistically and recovery studies confirmed the accuracy of the proposed method. In conclusion, drug release calculated by mathematical equation from zero order spectrophotometry offered simple, cheap and robust but accurate, sensitive, and precise method for the determination of drugs in fixed dose combination.

Keywords : Zero order, first derivative, spectrophotometry, drug release, fixed dose combination.

Introduction

Fixed-combination medicinal products have been increasingly used either to improve compliance or to benefit from the added effects of the two medicinal products given together. A fixed dose combination (FDC) is a formulation of two or more active ingredients combined in a single dosage form available in certain fixed doses. Fixed dose combination drug products may improve medication compliance of patients^(1,2). If the determination of the two drugs in the formulation containing two or more drugs, is required, the derivative spectrophotometric technique is suitable, particularly when the spectra of the two drugs overlap^(3,4,5). Derivative spectrophotometry has been used due to its capacity to separate shoulders and weak signals^(6,7,8), improving the