

UNIVERSITI TEKNOLOGI MARA

**INFLUENCE OF MICROWAVE ON
DISSOLUTION MEDIUM AND ITS EFFECTS ON
SULPHANILAMIDE AND SULPHATHIAZOLE
DISSOLUTION**

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ABSTRACT

The potential use of microwave irradiation as an approach for designing dissolution medium for poorly water soluble drugs was investigated. In order to make the drugs dissolve in the water, the microwave irradiation was used to modify the physicochemical properties of deionized water. Sulphanilamide and sulphathiazole were selected as the model poorly water soluble drugs. The deionized water was subjected to microwave irradiation at 80 W for 37.5 min and at 300 W for 10 min. The profiles of drug dissolution, drug solubility, media pH, temperature, conductivity and mobility were determined. In order to increase the dissolution rate of low aqueous solubility drugs, deionized water molecules were made more mobile through subjecting them to treatment by microwave irradiation. The energy absorbed by the water molecules can break the bond interaction between the molecules and thus make the water molecules more accessible to interact with poor water-soluble drug and aid to disperse and dissolve the drug molecules in the dissolution medium.

CHAPTER ONE

INTRODUCTION

Sulfanilamide and sulfathiazole are antibacterial drugs that have different dissolution rate upon contact with water. Sulfanilamide has the highest dissolution rate among all. Many factors can influence the dissolution rate of these drugs and one of them is the dissolution medium. In this study, the deionized water will be used to dissolve the drugs. However, according to British Pharmacopoeia (BP) and United State Pharmacopoeia (USP), several of these drugs have low solubility in water.

In order to make the drugs dissolve in the water, the microwave irradiation will be used to give influence on the physicochemical properties of deionized water. Microwave works by a process called dielectric heating. Many molecules such as water have electric dipoles. Once microwaves are introduced, the molecules of water will try to rotate and align themselves with the alternating electric field induced by the microwaves. Stuerger and Gaillard, 1996, reported that the electromagnetic field induces structuring and orienting effects within the irradiated medium. This changes the physicochemical profiles dissolution medium and the water molecules now become more freely to get involve in the drug dissolution. When using microwaves, appropriate power and time must be chosen so that it can give changes to the physicochemical properties of the deionized water.