

IJP 01710

Microwave drying of aqueous tablet film coatings: a study on free films

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(Received 20 July 1988)

(Accepted 12 September 1988)

Key words: Microwave drying; Film coating; Hydroxypropyl methyl cellulose; Methyl cellulose; Tensile strength; Young's modulus; Water vapor permeability

Summary

Experiments were performed on free tablet coating films to evaluate microwave energy as a potential drying source for aqueous tablet film coating. Free films of 4 formulations containing either hydroxypropyl methyl cellulose or methyl cellulose were prepared using a conventional microwave oven as the drying source. Oven drying at various temperatures and convective air drying in the microwave oven at zero power setting were used as controls. Microwave drying rates were 2–22 times faster than controls. The physical properties of the films were not adversely affected by microwave drying, as indicated by water vapor permeability and tensile strength/Young's modulus measurements. The results suggest that microwave drying could be used as a substitute for conventional hot air drying in aqueous film coating.

Introduction

Successful film coating depends on the removal of the polymer solvent from the deposited film. While organic solvents have been used, there has been an increase in the use of primarily aqueous solvent systems in recent years. Water is an attractive solvent because it is safe, non-toxic, inexpensive and readily available. Relative to organic solvents, however, there are several drawbacks associated with its use. Due to its high latent heat of vaporization, energy costs and drying times are increased. Water penetration into the tablet core

may degrade drugs subject to hydrolysis. The films themselves may be damaged during prolonged tumbling in fluid bed or pan coaters.

Microwave drying may alleviate some of these problems by reducing drying times and energy costs. Microwave drying is used successfully in the food industry (Decareau, 1985) and for films in the plastics industry (Stephanson, 1972). Within the pharmaceutical industry, microwave energy has been used to dry granules (Cliff, 1986), but no application to film coating has been reported.

This report presents a comparison of conventional hot air drying and microwave drying of free films formed from aqueous film coating solutions. Drying rates have been determined for microwave-dried films and for controls. Since any increase in the drying rate afforded by microwave drying is useless if film quality is compromised,

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