COMPRESSION AND MECHANICAL PROPERTIES OF DIRECTLY COMPRESSIBLE PREGELATINIZED SAGO STARCHES

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Abstract

This study investigates the compression and mechanical properties of directly compressible pregelatinized sago starches in comparison with Spress® B820 and Avicel® PH 101. The sago starch is pregelatinized at 65°C with different pregelatinisation times of 15, 30, 45, and 60 min, creating samples PS1, PS2, PS3, and PS4, respectively. Compressibility of the powders is analyzed by Heckel and Kawakita equations. The compressibility of sago starch is found to be lower than that of its pregelatinized forms, and the compressibility increases with an increase in the pregelatinisation time. Avicel® PH 101 is the most compressible among the powders evaluated, followed by PS4, Spress® B820, PS3, PS2, PS1, and sago starch. As for mechanical properties, Avicel® PH 101 is found to have the highest radial tensile strength and the hardest compacts, indicating that it has the highest compactibility, followed by Spress® B820, PS4, PS3, PS2, PS1, and sago starch.

Keywords: sago, starch, pregelatinized, compressibility, compactibility

1. Introduction

Starch is widely used as a pharmaceutical excipient, primarily in tablet formulations, functioning as a diluent, binder, and disintegrant [1,2,3,4]. Worldwide, corn starch is the most widely used starch in tablet formulations owing to its availability [5]. Because of compression problems, native starches are not suitable for use as excipients in direct compression formulations [2,6,7]. Pregelatinisation is a proven method that renders starches directly compressible [3,8,9,10]. As an example, corn starch has been successfully pregelatinized and is commonly used as a directly compressible excipient with the commercial name Spress® B820 [11].

Direct compression is a technique involving compaction of a bulk material whose ingredients are composited to form tablets [12]. Mixing and compressing are the only steps involved in direct compression for the production of tablets, making it preferable in tablet production.

Malaysia is one of the leading sago starch-producing countries in the world [13], mainly for use in food products [14]. Literature reviews show no report as yet on the application of a local sago starch for a directly compressible material in tableting. This study investigates the compression and mechanical properties of pregelatinized sago starch as a directly compressible excipient, and compares it with Spress® B820, a similar existing