Optimization of Starch from Indonesian Local Corn with Concentration Variation of Sodium Metabisuphite and Drying Time

Richie A. I. Chandra, Sriwidodo, Aliya Nur Hasanah, and Rahma Agustina

***Abstract*—Local corn produce starch with high whiteness, but has not been developed in the Pharmaceutical Industry. Starch is one of the raw materials that are used as an excipient of tablet. This study aimed to obtain corn starch as an excipient meets the standards and determine the effect of concentration sodium metabisulfite and drying time on the quality of starch. The research method using a completely randomized design with two factors, the concentration of sodium metabisulfite (3000 ppm, 2500 ppm and 2000 ppm) and drying time (24 hours, 28 hours). Starch was isolated by the wet method and starch were analyzed qualitatively, tested physicochemical properties, and is characterized by instrument Fourier Transform Infrared (FTIR) and scanning electron microscope (SEM). Results of the analysis showed that the starch from the corn meet the standards as pharmaceutical excipients. Concentration Sodium metabisulfite has very significant effect on yield, moisture content, and sulfite residue while drying time significantly affect yield, moisture content, compressibility and sulfite residues. combined treatment of drying time and the concentration of sodium metabisulfite has significant effect on yield, pH and compressibility. 28-hour drying time and concentration of 2500 ppm Sodium metabisulfite give the best effect on the quality of corn starch.**

***Index Terms*—Corn Starch, drying time, local corn, sodium metabisulphite, excipients.**

I. Introduction

Based on the data from the Ministry of Health, it is found that 95% of raw materials of drugs in Indonesia are still dependent on imports [1]. Dependence on imported raw materials makes Indonesia a nation that is less self-sufficient in terms of raw materials, while Indonesia has abundant biodiversity and has great potential as a producer of raw material for medicine [2].

Starch is a raw material widely used in the food industry and pharmaceutical industry, namely as an excipient in pharmaceutical preparations such as fillers, binders, disintegrator tablets [3]. Starch is widely used in the pharmaceutical industry because it is inert, inexpensive, and white [4].

Corn is a plant producing starch with starch content of about 54.1 to 71.7% [5]. Corn is composed of various types of amylose and amylopectin starch in the form of low-to-high [6]. High content of amylopectin can be found in the Local Corn Pulut.

Local corn is white maize contained in several regions in Indonesia [7]. The advantages of local corn white are the color of corn and fairly high amylopectin content [8]. According to the Ohio State University extension in corn starch amylopectin content is glutinous almost 100% [9].

In the process of corn starch isolation, soaking in sodium metabisulphite takes more than 20 hours at a temperature of 48 - 52 ^{o}C [10]. According to Slamet, immersion in a solution of sodium metabisulfite can prevent browning reaction on starch made so that the resulting product will produce a brighter color. In addition, the sodium sulfite ion content metabisufit also damage the matrix proteins play a role in the endosperm of corn with a way of breaking the disulfide bonds of proteins that can facilitate the release of starch in the endosperm of corn [10].

Another stage in the isolation of starch is drying. The drying process to reduce the moisture content of the material and prevents spoilage microorganisms or materials due to enzymatic processes [11] which can affect the quality of the resulting starch.

This study was conducted to develop the use of local corn in Industrial raw materials and to determine the effect of immersion concentration Sodium metabisulfite and drying time on the quality and physicochemical properties of corn starch produced Indonesian local corn.

II. Procedure

A. Corn Starch Isolation

Isolation of corn starch corn was finely done by cleaning the skin and hair of corn. Shell corn soaked with a solution of sodium metabisulfite concentration of 2000 ppm, 2500 ppm and 3000 ppm for 24 hours at a temperature of 50 °C. Shell corn subsequently rinsed with distilled water (1: 2) and drained. then finely milled corn grinding machine with the addition of distilled water (1: 3) to form slurry, finely ground with the addition of distilled water (1: 2) using a blender, the slurry were filtered using gauze and distilled water added about 1.5 liter accompanied by stirring so that separate between the left over corn flesh and starch suspension. Corn starch suspension was precipitated for 24 hours at room temperature. The precipitate formed is separated from the filtrate and included in the chamber which already contains distilled water. This deposition process was repeated twice each for 2 hours. Last precipitation process, added a solution

Manuscript received April 17, 2015; revised June 20, 2015.

The authors are with the Pharmacy Faculty, Universitas Padjadjaran, Indonesia (e-mail: richie.chandra@unpad.ac.id).