

# CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME II

Editors:

Ibrahim Ali Noorbatcha  
Hamzah Mohd. Salleh  
Mohamed Elwathig Saeed Mirghani  
Raha Ahmad Raus



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## CHAPTER 24

### MECHANICAL PROPERTIES OF A GELATIN REPLACER, PECTIN, FROM BANANA AND MANGO PEELS

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#### ABSTRACT

An experimental design was used to study the influence of pH, temperature and time on the extraction of pectin from banana peels (*Musa*) and mango peels (*Mangifera indica*). The yield of the extracted pectin was measured to determine the optimum extraction condition. Alcohol insoluble solid (AIS) method was used for the extraction technique where ethanol was the solvent. The design of experiment was performed using statistical software Design Expert to know the pattern on the experiment conducted. The temperature, pH and time of extraction of AIS were optimized using 2-factorial design. Statistical analysis showed that the optimum parameters that provided the maximum pectin yields were at 4 hours, pH 2.0 and 90°C of extraction. The pectin yields from both banana and mango peels were measured and calculated to be within the range of 53 to 134 mg/g and 58 to 122 mg/g respectively.

**Keywords:** pectin, gelatin replacer, experimental design, extraction, peels

#### INTRODUCTION

Gelatin is a protein derived from collagen, a natural protein present in the tendons, ligaments, and tissues of mammals. Gelatin has been regarded as special and unique substances with a wide range of applications in various industries. Gelatin has abilities to form strong, transparent gels and flexible films that are easily digested, soluble in hot water, and capable of forming a positive binding action. This characteristic made it a valuable substance in food processing as a beverage clarifier fining agent for white wine. Moreover, gelatin has long been used as a food ingredient for gelling purposes in food to foaming agent in bioreactor applications. Gelatin also has wide usage in pharmaceuticals soft and hard capsule. In the biomedical field gelatin is use in the wound dressing and three dimensional tissue regeneration methods and also being used in numerous non-food applications for example, in photography and paper production (Schrieber and Garies, 2007).

Gelatin is produced by partial hydrolysis of the connective tissues, bones and skins of animals, usually cows and pigs (Karim and Bhat, 2008). The worldwide production of gelatin as