UNIVERSITI TEKNOLOGI MARA

EXTRACTION OF NATURAL COLORANT FROM ONION (*Allium cepa*) SKINS USING PRESSURIZED LIQUID EXTRACTION (PLE) FOR APPLICATION IN FABRIC DYEING

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Candidate's declaration

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ABSTRACT

Complete extraction of colorants often requires several steps and may use a mixture of several solvents. Pressurized liquid extraction (PLE) is an alternative method for colorants extraction. This study focuses on the influence of some operative parameters of PLE employed for the extraction of colorants from onion (*Allium cepa*) skins. Extractions were conducted at temperatures ranging from 50 to 150 °C with a pressure of 1000 psi and two extraction cycles of 15 minutes. The effect of two extraction solvents (distilled water and 0.1 % HCl in methanol (v/v)) was examined. It was found that extraction temperature and type of extraction solvent influenced the yield and color of extracted colorant, and the composition of anthocyanins extracted. Elevated temperatures were found to increase the yield significantly, while the effect of extraction pressure was found to be insignificant. In acidified methanol extraction, the yields (colorant (g) / 100 g sample) varied from 9.56 ± 0.46 to 16.71 ± 1.60 while using water; the yields varied from 7.06 ± 1.30 to 20.99 ± 0.75. Highest amount of yield was obtained at 150 °C for both acidified methanol and water extractions. However, the color of extract changes from red to brownish red as the extraction temperature increased probably due to degradation of anthocyanins. The color measurement indicated that PLE method using acidified methanol gave stronger reddish shade compared to that extracted using water. Major anthocyanins compounds identified include cyanidin 3-glucoside, cyanidin 3-rutinoside and cyanidin chloride and their composition depended on the extraction temperature and type of solvent used. Data showed that highest amount of identified anthocyanins were extracted at temperature of 80 °C using acidified methanol. Extracted cyanidin 3-glucoside, cyanidin 3-rutinoside and cyanidin chloride were 43.68 ± 0.24, 3.86 ± 0.04 and 1.55 ± 0.03 ppm, respectively. Using similar solvent, the yield and composition of anthocyanins obtained by conventional soaking method was comparable to those obtained using PLE at 80 °C. Colorant extract was successfully converted into conveniently handled powder by forming inclusion complexes with β-cyclodextrin. Selected powdered colorants were used for dyeing various types of fabric with different mordants. It was found that wool gave a broader range of shades. Based on washing fastness test, dyed wool showed good washing property.

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