

Title Free radical-scavenging activity of *Aloe vera* (*Aloe barbadensis* Miller) extracts by supercritical carbon dioxide extraction

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### Abstract

The free radical-scavenging activities of extracts of *Aloe vera* of leaf skin by supercritical CO<sub>2</sub> extraction and solvent extraction were determined. An orthogonal array design matrix of L<sub>9</sub> (3<sup>4</sup>) was considered to optimize supercritical carbon dioxide extraction processing at a CO<sub>2</sub> flow rate of 12–36 l h<sup>-1</sup>, 35–45 MPa and 32–50 °C. The optimum extracted yield of 1.47% was provided at 50 °C 36 l h<sup>-1</sup>, 35 MPa and 20% of modifier of methanol. These four factors were all demonstrated to be significantly crucial in the supercritical carbon dioxide extraction operation, as two-variable interactions. The extracts of *A. vera* rind by supercritical carbon dioxide extraction and solvent extracts provided significantly higher free radical-scavenging activities of 33.5% and 39.7%, respectively, than extracts of *A. vera* gel extracted by ethanol with a free radical-scavenging activity of 14.2%. The inhibition percentage of extracts of *A. vera* and reference antioxidants followed the decreasing order: Trolox (76.8%) > ethanol extracts of *A. vera* skin (39.7%) > BHT (35.9%) > the extract of supercritical carbon dioxide extraction (33.5%) > α-tocopherol (25.6%) > ethanol extracts of *A. vera* pulp (14.2%). Compared to BHT and α-tocopherol, the extracts of *A. vera* skin, by supercritical carbon dioxide extraction and ethanol, showed stronger antioxidant activities. Components in the rind of *A. vera* are responsible for the higher antioxidant activity of *A. vera* extracts.