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## Optimization of Extraction Conditions for Bio-Active and Antioxidant Properties of Dutch Coffee using Response Surface Methodology

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Coffee is rich in various bio-active substances and its consumption has been associated with many beneficial effects in human body. The sensory, physicochemical and functional characteristics of brewed coffee depend on multiple factors. In particular, roasting degree, particle size, and extraction temperature influence on the bio-active and antioxidant properties of the coffee. In this study, we tried to optimize the extraction conditions of dutch coffee to improve bio-active and antioxidant properties using response surface methodology. The Coffee for dutch coffee preparation was used Brazil santos NY2. The extraction temperature(4, 14.5 and 25°C), particle size(250, 425, and 600 µm), roasting level(4, 6, and 8 min at 220°C) were used as independent variables. The bio-active properties such as caffeine, chlorogenic acid and caffeic acid contents, and antioxidant properties such as total polyphenol contents, DPPH radical scavenging activity, and ABTS radical scavenging activity of dutch coffee were analyzed as dependent variables. A complete enumeration method was utilized in order to take optimum extraction conditions of 27 samples. And, using the correlation between independent variables and response variables, an optimal regression equation for each independent variable was established. The optimal extraction condition of caffeine content was 14.51°C, 783.34 µm, 53.59 min. The optimal extraction conditions of chlorogenic acid and caffeic acid content were 21.39°C, 586.80 µm, 56.11 min, and 16.87°C 843.15 µm, 41.10 min, respectively. The optimal extraction conditions for antioxidant properties were 24.92°C, 589.98 µm and 42.25 min for total polyphenol contents, 24.84°C, 601.10 µm and 36.55 min for DPPH radical scavenging activity, and 24.81°C, 642.34 µm and 41.65 min for ABTS radical scavenging activity, respectively. Consequently, we confirmed that bio-active and antioxidant properties of dutch coffee were affected by the roasting degree, particle size, and that extraction conditions were optimized using response surface methodology. Thus, these results suggest it is possible to provide the functional coffee that can improve the health of consumers by the optimized extraction condition of dutch coffee, and to provide the information for improving the added value of coffee.