

# The influence of UV irradiation on physicochemical properties of ethanol *Rosa canina* L. extract

## Abstract

*Rosa canina* hip is known for its preventive and curative activities against a wide range of renal, inflammatory, gout, and gastric diseases. However, the functionality, stability, and bioavailability of its active compounds, particularly polyphenols, within products mostly depend on several factors, among all, UV irradiation, which is widely used in food and pharmaceutical industries. In the present study, *R. canina* extract was prepared using percolation, 70% ethanol, and solid-to-solvent ratio of 1:2 at 25°C. Physico-chemical properties of the extract before and after UV irradiation were determined via analyzing total polyphenol content (TPC, Folin-Ciocalteu assay), total flavonoid content (TFC, colorimetric assay), total protein content (Bradford assay), antioxidant potential (ABTS and DPPH assays), extraction yield, pH value, zeta potential, conductivity, density, surface tension, and viscosity. Zeta potential and conductivity were determined by photon correlation spectroscopy (PCS); each sample was measured three times at room temperature. Density and surface tension were measured using silicon crystal (as the immersion body) and Wilhelmy plate, respectively, in Force Tensiometer. Viscosity was determined using Rotavisc lo-vi device equipment with the chamber, adapter, and spindle. Each sample (6.7 mL) was examined three times at room temperature. The statistical analysis was performed by using the analysis of variance (one-way ANOVA) followed by Duncan's post hoc test within the statistical software, STATISTICA 7.0. The differences were considered statistically significant at  $p < 0.05$ ,  $n = 3$ . TPC of non-treated extract was  $9.64 \pm 0.98$  mg gallic acid equivalent (GAE)/mL, whereas in UV irradiated extract TPC was  $9.54 \pm 0.30$  mg GAE/mL; no statistically significant difference in TPC between native and UV irradiated extracts. TFC of the non-treated extract was  $1.65 \pm 0.18$  mg catechin equivalent (CE)/mL, while in UV irradiated extract TFC was  $1.75 \pm 0.13$  mg CE/mL. Total protein content was  $0.827 \pm 0.039$  and  $0.800 \pm 0.030$  mg/mL for non-treated and UV irradiated extracts, respectively. ABTS radical scavenging potential was  $0.676 \pm 0.023$  and  $0.538 \pm 0.012$  mmol Trolox/mL for non-treated and UV irradiated extracts, respectively. In DPPH assay, IC<sub>50</sub> was  $10.74 \pm 0.48$  and  $17.78 \pm 1.03$  µg/mL for non-treated and UV irradiated extracts, respectively. The extraction yield was  $32.8 \pm 0.2$  and  $31.3 \pm 1.0\%$ , and pH values amounted 4.33 and 4.49 for native and UV irradiated samples, respectively. Zeta potential was  $-0.587 \pm 0.020$  and  $-0.052 \pm 0.001$  mV, while conductivity was  $0.046 \pm 0.002$  and  $0.650 \pm 0.012$  mS/cm for nontreated and UV irradiated extracts, respectively. Density was  $0.931 \pm 0.001$  and  $0.969 \pm 0.001$  g/mL, the surface tension was  $25.4 \pm 0.2$  and  $23.3 \pm 0.4$  mN/m, and viscosity was  $4.21 \pm 0.01$  and  $5.49 \pm 0.07$  mPa/s for non-treated and UV irradiated extracts, respectively. UV irradiation did not influence total polyphenol, flavonoid, and protein content, but statistically significantly decreased the antioxidant potential of the extract. Additionally, UV irradiation caused the increase in conductivity, density, and viscosity of the extract, and the decrease in zeta potential, i.e. the stability of the system and surface tension. The presented study provides evidence of the influence of UV irradiation on physico-chemical properties of *R. canina* extract that can add value and improve the quality of the existing food, and functional food products.