Data Article

Thermal stability data of juglone from extracts of walnut (*Juglans regia*) green husk, and technologies used to concentrate juglone

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**A B S T R A C T**

The data presented in this article are focused on thermal stability data of both juglone standard (in ethanol and methanol) and a natural extract containing juglone from lyophilized walnut green husk (in ethanol and methanol). On the other hand, we also show the data of the impact of three concentration technologies over the concentration yield of juglone from the natural extract in ethanol and methanol. All data presented are related with the information included in “Polyphenolic extracts of walnut (*Juglans regia*) green husk containing juglone inhibit the growth of HL-60 cells and induce apoptosis” Soto-Maldonado et al., 2019, where the discussion and interpretation of results can be found.

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1. Data

Data described here are related with the kinetics of thermal stability of juglone standard in ethanol (in a range between 173.6 and 212.6 ppm of juglone) and methanol (in a range between 206.9 and 251.3 ppm of juglone) at 20 °C, 40 °C, 60 °C, and 70 °C (Fig. 1) and juglone extracted from walnut green husks in ethanol (in a range between 70.1 and 132.2 ppm of juglone) and methanol (in a range between...
Specifications table

| Subject area          | Process Chemistry and Technology                                      |
|-----------------------|------------------------------------------------------------------------|
| More specific subject | Extraction of bioactive compounds from vegetable matrix.                |
| area                  | Agro industrial waste valorization.                                    |
| Type of data          | Figures and Table                                                      |
| How data was         | Juglone concentration was obtained by high-performance liquid chromatography (HPLC, Perkin Elmer 200 series) using a photo diode array (PDA) detector. Concentration of extracts was carried out by Rotavapor, Speed Vacuum, and Vacuum Oven equipments. |
| acquired              |                                                                 |
| Data format           | Raw Analyzed data                                                      |

**Experimental design, materials, and methods**

**2. Experimental design, materials, and methods**

**2.1. Materials**

The walnut green husk samples was stored frozen and then lyophilized using an Ilshin freeze-dryer (−53 °C; 50 mTorr). The lyophilized sample was processed using an IKA A 10 Basic mill to obtain a powder and then vacuum packaged until its use. Juglone standard (99% purity) was purchased from Sigma-Aldrich.

**2.2. Thermal stability tests**

The powder from walnut green husk/solvent (ethanol or methanol) ratio used to obtain the juglone extracts was 1:20 at 40 °C for 6h [2]. The supernatant was analyzed by HPLC to quantify the juglone concentration. The extracts were incubated at different temperatures (40 °C, 60 °C, and 70 °C) for a
maximum period of 8h. Samples were taken every 1h and filtered using a 0.45 μm mesh to obtain walnut green husk extracts to measure the juglone concentration by HPLC [1]. The data of juglone concentration in a period of 8h was graphed at each temperature for the extracts in ethanol or methanol to obtain the kinetics of thermal stability. The same methodology was used with juglone standard at 20 °C, 40 °C, 60 °C, and 70 °C in ethanol and methanol during 9h.

2.3. Concentration technologies

To concentrate the juglone from green husk extracts in ethanol, three concentration technologies were used: Speed vacuum (SV), vacuum oven (VO), and rotavapor (RV). All the three alternatives were carried out at 40 °C and the juglone concentration was measured before and after concentration. The concentration process was carried out until the initial liquid extract was reduced to the 5% of the volume. The final concentrated extract was used to measure the juglone concentration. The final juglone yield of each technology was quantified in terms of the mass balance.

Fig. 1. Thermal stability of juglone standard at different temperatures. A: juglone standard in ethanol, B: juglone standard in methanol.
2.4. Statistical analysis

The program Addinsoft (2019). XLSTAT 2019.1.3 statistical and data analysis solution. Boston, USA, was used to carried out the ANOVA test to determine the statistically significant difference with 95% confidence.

Fig. 2. Thermal stability of juglone extracts from walnuts green husk at different temperatures. A: juglone extract in ethanol, B: juglone extract in methanol. * Statistically significant difference with a P value < 0.05.

Table 1
Data of juglone yield from three concentration technologies using juglone extract from walnut green husk in ethanol.

| Concentration Technology | Juglone Concentration (ppm) | Juglone Yield (%) |
|--------------------------|------------------------------|-------------------|
| SV                       | $2.94 \pm 0.141^b$           | 0.14              |
| VO                       | $23.21 \pm 1.909^b$          | 1.16              |
| RV                       | $58.07 \pm 4.130^a$          | 2.81              |
| Control (time 0)         | $103.43 \pm 5.402^a$         | 100               |

* Anova test determined statistically significant difference with all other concentration technologies.
^ Anova test determined statistically significant difference with RV and Control but not with SV or VO respectively.
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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] C. Soto-Maldonado, M. Vergara-Castro, J. Jara-Quezada, E. Caballero-Valdés, A. Müller-Pavez, M.E. Zúñiga-Hansen, C. Altamirano, Polyphenolic extracts of walnut (Juglans regia) green husk containing juglone inhibit the growth of HL-60 cells and induce apoptosis, Electron. J. Biotechnol. 39 (2019) 1–7.
[2] L. Laroze, C. Soto, M.E. Zúñiga, Phenolic antioxidants extraction from raspberry waste assisted by-enzymes, Electron. J. Biotechnol. (6) (2010) 13, https://doi.org/10.2225/vol13-issue6-fulltext-12.