

**Foods  
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## Set-up of sonotrode based extraction to recover phenolic compounds from olive leaves





# 1.Introduction



Olive leaves



Phenolic compounds

**BENEFICIAL  
ACTIVITIES**

Antioxidant

Antiinflammatory

Anticarcinogenic

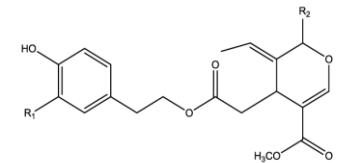
Antiviral

Antimicrobial

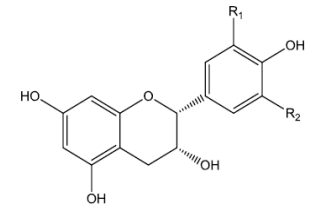


Main phenolic  
compounds in olive  
leaves

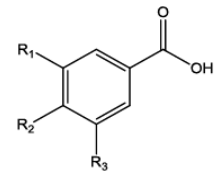
Secoiridoids



Flavonoids

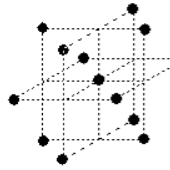


Simple phenols





# 2. Extraction of phenolic compounds by sonotrode ultrasound assisted extraction



Box-Behnken design (BBD)

Runs	X <sub>1</sub>	X <sub>2</sub> (Power)	X <sub>3</sub>
1	30	20	5.5
2	30	100	5.5
3	100	20	5.5
4	100	100	5.5
5	65	20	1
6	65	100	1
7	65	20	10
8	65	100	10
9	30	60	1
10	100	60	1
11	30	60	10
12	100	60	10
13	65	60	5.5
14	65	60	5.5
15	65	60	5.5

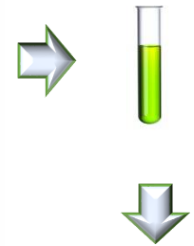
X<sub>1</sub>: %EtOH/H<sub>2</sub>O (v/v), X<sub>2</sub>: amplitude X<sub>3</sub>: time (min)



0.25 g of olive leaves



Sonotrode ultrasound assisted extraction

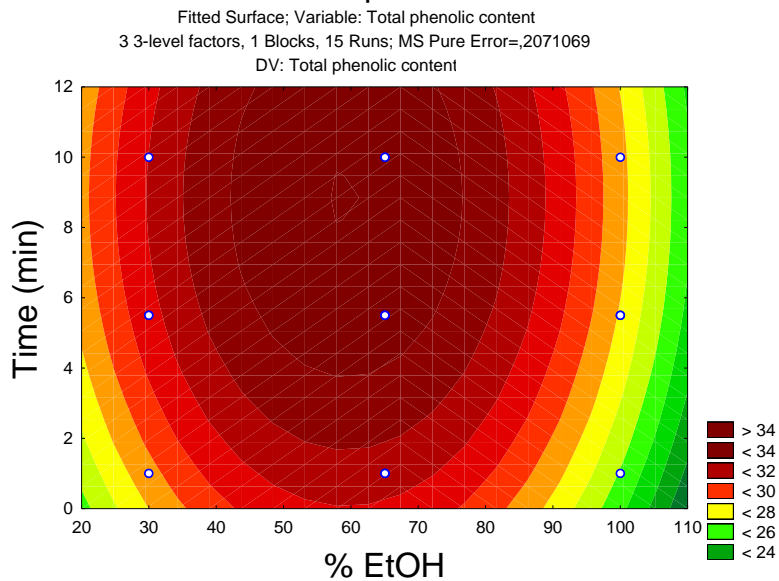
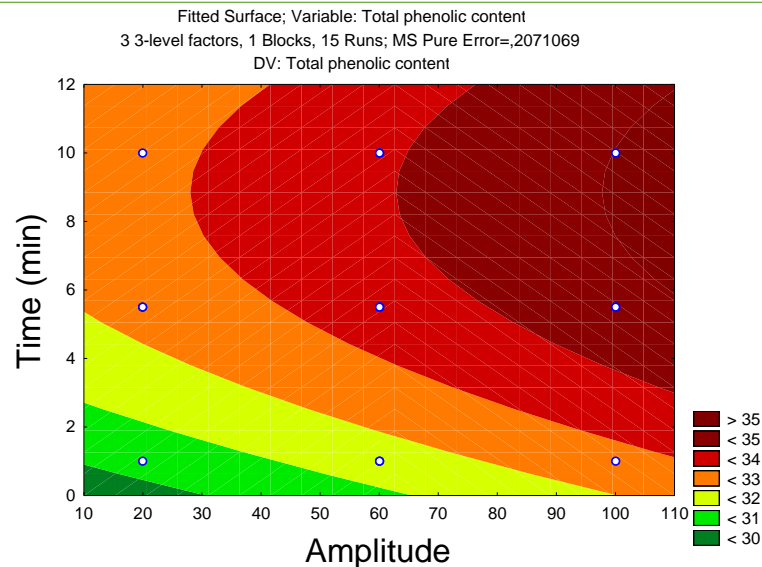
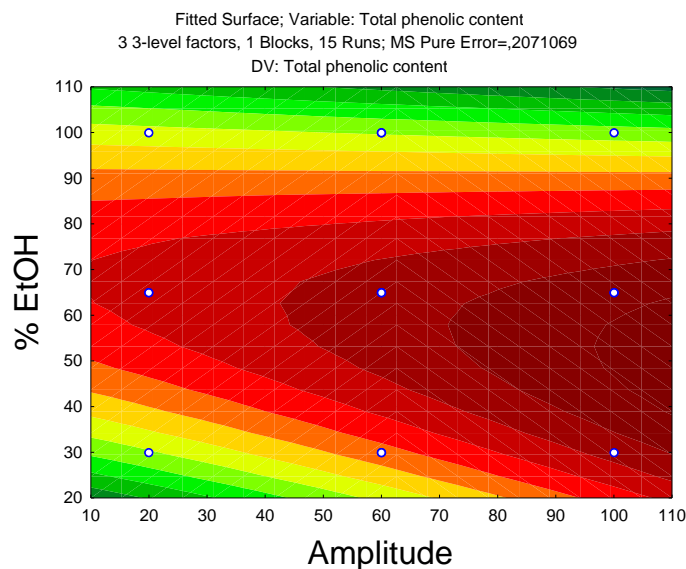


HPLC-MS

MeOH/H<sub>2</sub>O (50:50)



# 3. Optimization of sonotrode UAE conditions by Surface plots



Optimal conditions	Values
Amplitude (%)	100 %
EtOH/ water (% (v/v))	55 %
Time (min)	8 min
Predicted (total compounds (mg g <sup>-1</sup> d.w.))	35.54
Obtained ((total compounds (mg g <sup>-1</sup> d.w.))	40.9 ± 0.2
CV(%)	9.05



The model was considered suitable

# 4. Comparison of the sonotrode conditions with the conventional bath

Sonotrode



## Optimum conditions

Time: 8 minutes  
55% EtOH/water  
100% of the Amplitude


Conventional ultrasonic bath



## UAE Conditions

Frequency: 35KHz  
Time: 20 min  
80 % EtOH/water

Not significant differences in the phenolic recovery



# 5. Conclusions

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- The optimal conditions selected for the sonotrode were compared with the result obtained by a conventional ultrasonic bath achieving similar concentrations
- Sonotrode could be considered as an efficient extraction technique that allows a good recovery of phenolic substances from olive leaf that could be easily scale-up at industrial level