Assessment of solvents for hydrothermal extraction of phenols from 2-phase olive pomace

Georgia Altiparmaki [a], Konstantinos Moustakas[b], Stergios Vakalis[a]

[a] Energy Management Laboratory, Department of Environment, University of the Aegean, University Hill – 81100 Mytilene Greece.
[b] National Technical University of Athens, School of Chemical Engineering, Unit of Environmental Science & Technology

University of the Aegean
Department of Environment

Introduction

Lesvos island is one of the biggest olive oil producers in Greece and has more than 11 million olive trees. The island has 54 olive mills and three specialized olive pomace processing mills. This study sampled 2-phase olive pomace from the biggest olive pomace processing mill on the island and compared the efficiency of hydrothermal extraction (HT) vs ultrasonic extraction (USE) of phenols from the olive pomace.

Methods

The proposed method utilized 1 g of grinded (as received) olive pits and 10 grams of solvent that were placed in a hydrothermal reactor (HT) at 120 °C and in a ultrasonic bath at 45 °C for residence times of 30 and 60,. In the framework of this study four different solvents were utilized: ethanol, methanol, isopropanol and acetone. The COD and Total Phenolic Content of the extracts was measured in a Hach 3900 by means of the APHA and the Folin method respectively. The HHV before and after the extraction of the phenols was measured on a Parr 6400 Calorimeter.

Fig.1. Parr Hydrothermal Reactor & Calorimeter

Results and Discussion

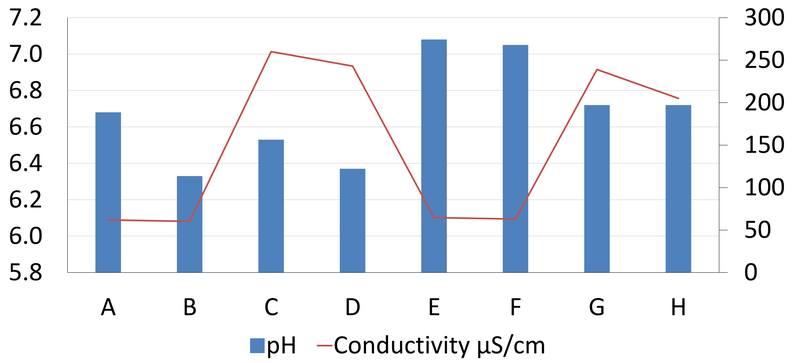

Fig.2. Analysis of pH and Conductivity of liquid extracts

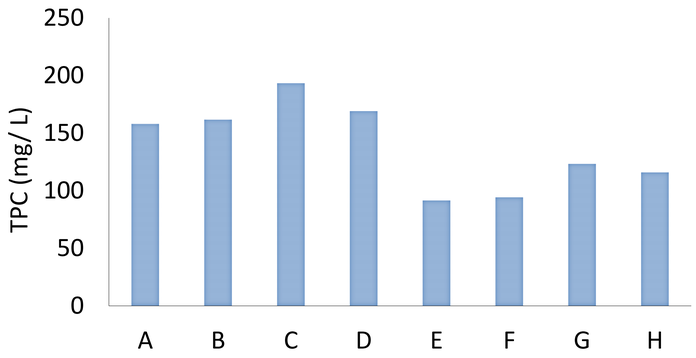

Fig.3. Analysis of TPC of the liquid extracts

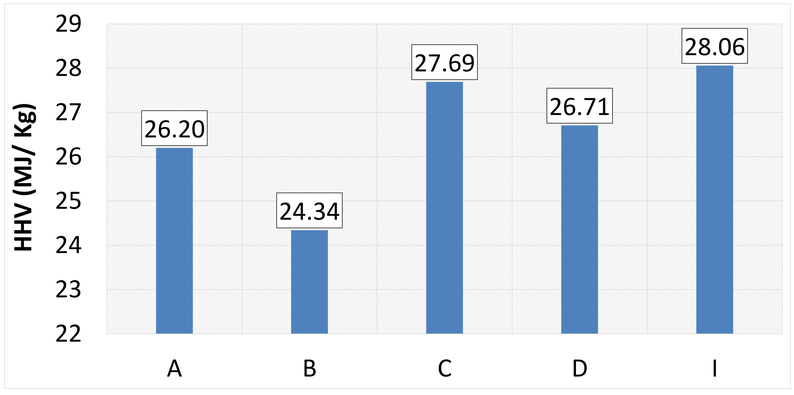

Fig.3. Analysis of HHV of the solid fraction

Description	Sample
HT, 30 min (e)	A
HT, 60 min (e)	B
HT, 30 min (m)	C
HT, 60 min (m)	D
USE, 30 min (e)	E
USE, 60 min (e)	F
USE, 30 min (m)	G
USE, 60 min (m)	H
Blank	**I**

- The utilization of methanol increased significantly the conductivity of the liquid extracts. HT produced more acidic extracts than USE.
- HT produced extract with higher TPC than USE
- The HHV of the olive pomace was reduced at all cases after the extraction since the extracts contain significant heating value. Longer extraction times reduced more the HHV of olive pomace.
- Future work will focus on the specific profiling of the extracted phenols was assessed by means a Nexis 2300 GC with a BID (plasma) detector. The method EPA 624 was utilized along with the specialized column MEGA-624.

We acknowledge support of this work by the project "Center of Sustainable and Circular Bioeconomy [Aegean_BIOECONOMY]" (MIS 5045851) which is implemented under the Action "Reinforcement of the Research and Innovation Infrastructure", funded by the Operational Programme "Competitiveness, Entrepreneurship and Innovation" (NSRF 2014-2020) and co-financed by Greece and the European Union (European Regional Development Fund).

UNIVERSITY OF THE AEGEAN
DEPARTMENT OF ENVIRONMENT

Co-financed by Greece and the European Union