

Biocascade approach to valorize okara by using subcritical water to obtain valuable compounds: scaling up process

Pedro BAREA*, Alba E. ILLERA, Rodrigo MELGOSA, Óscar BENITO ROMAN, Helena CANDELA, Sagrario BELTRÁN, María Teresa SANZ*

Department of Biotechnology and Food Science, Chemical Engineering Division, University of Burgos, Pl. Misael Bañuelos s/n, 09001 Burgos, Spain

INTRODUCTION & OBJECTIVES



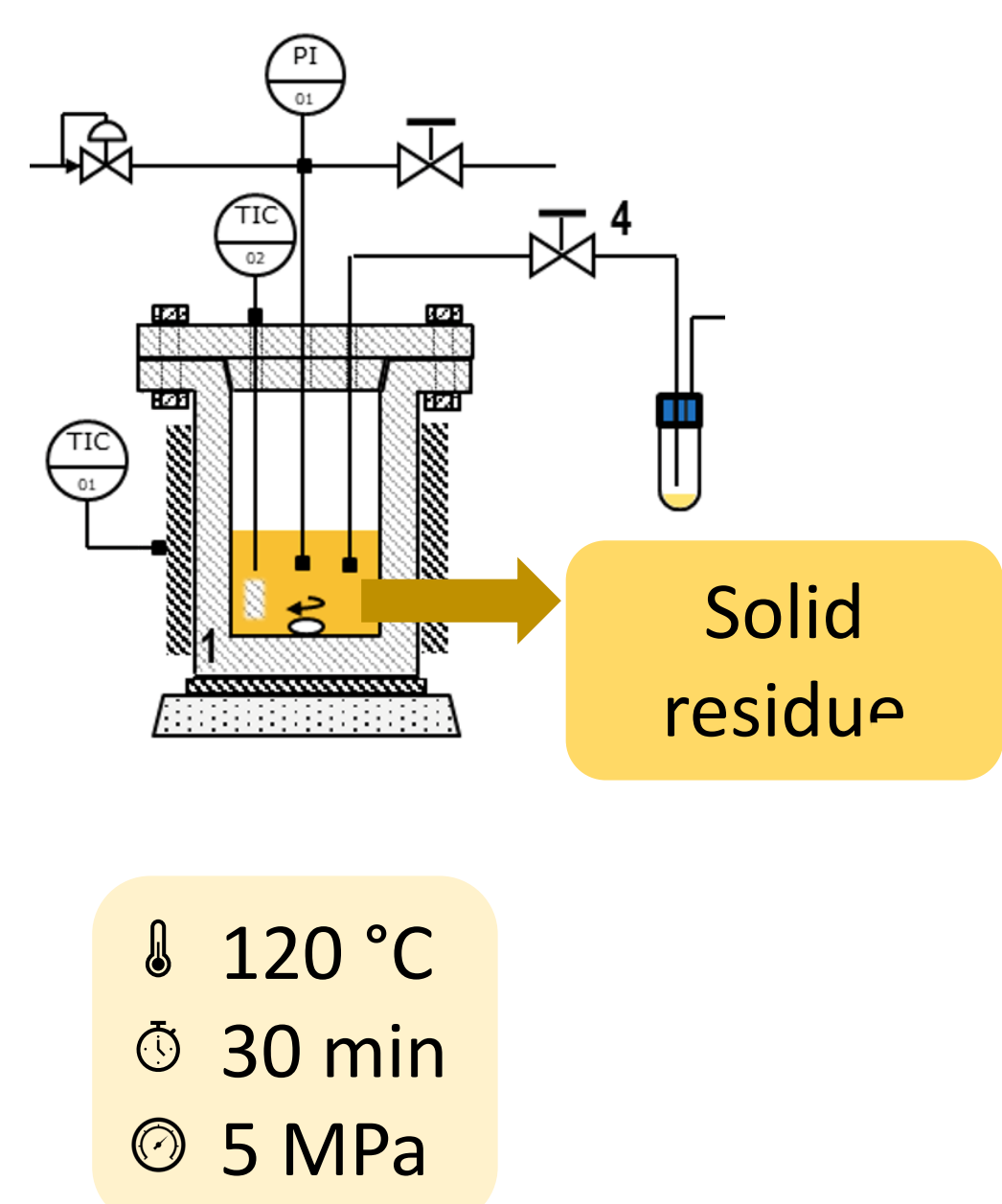
OKARA is the solid by-product of soybean beverage production with an interesting composition in bioactive compounds and proteins. It exhibits a moisture content of 82 % w/w and a protein content of 32 % w/w with an important content of isoflavones.

Protein	Lipid	Fiber	Bioactive compounds
31.9 %	10.4 %	35.0 %	↑↑ ISOFLAVONES

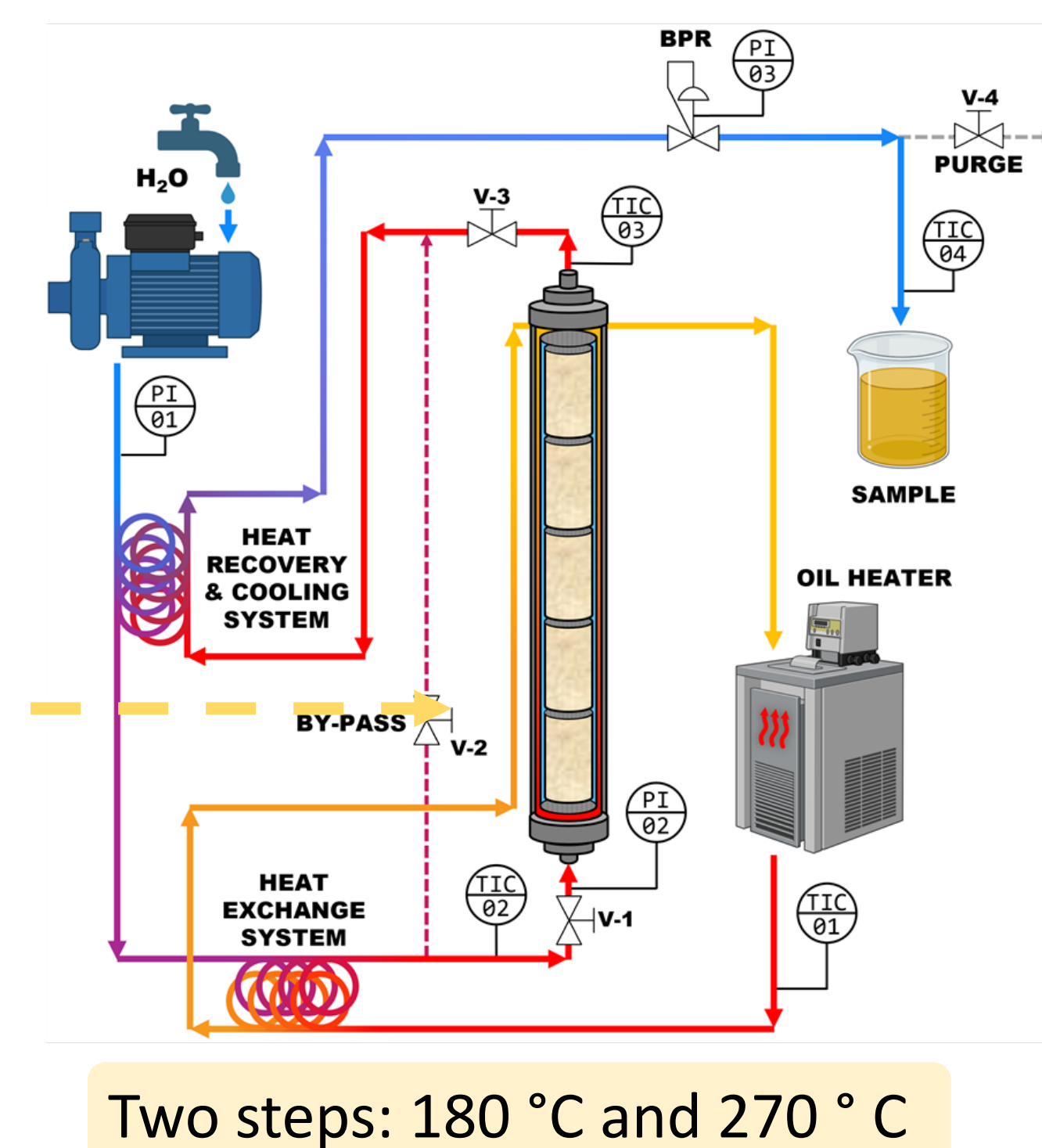
OBJECTIVE: Study of subcritical water treatment (SWT) in a **biocascade approach** proposing various stages to fractionate the valuable bioactive compounds of this by-product: (1) extraction of **isoflavones at 120 °C** in a batch reactor and (2) extraction and **hydrolysis of proteins** from the residual solid at higher temperatures in a semi-continuous reactor

METHODOLOGY. BIOCASCADE

1st step: Isoflavones extraction

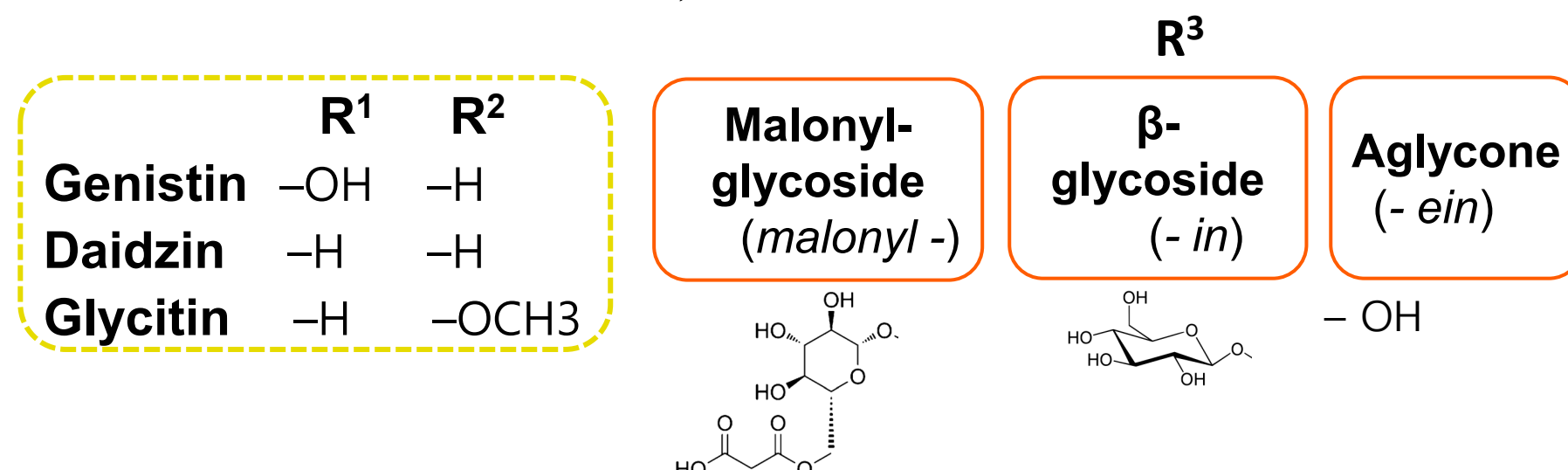
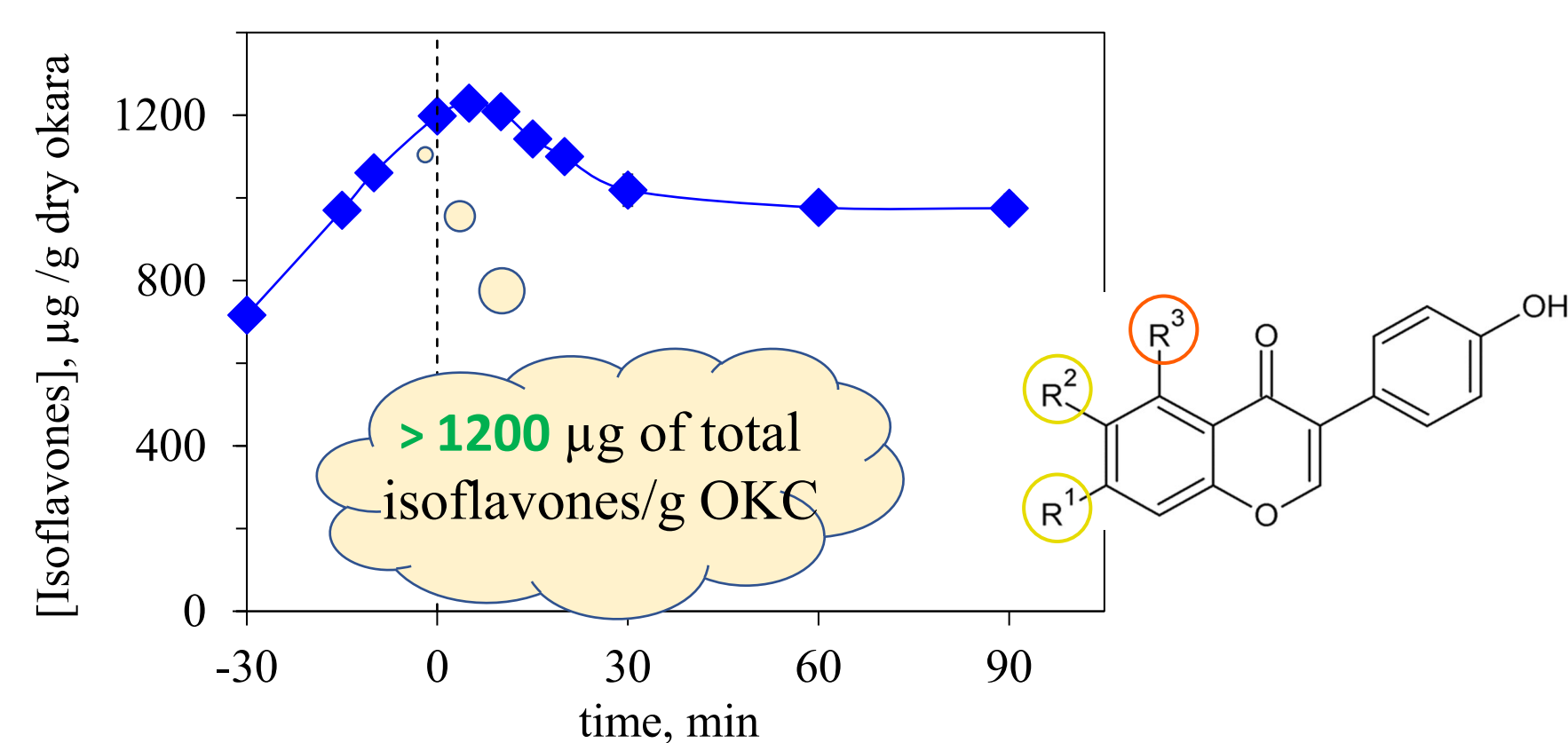


2nd step: Protein extraction

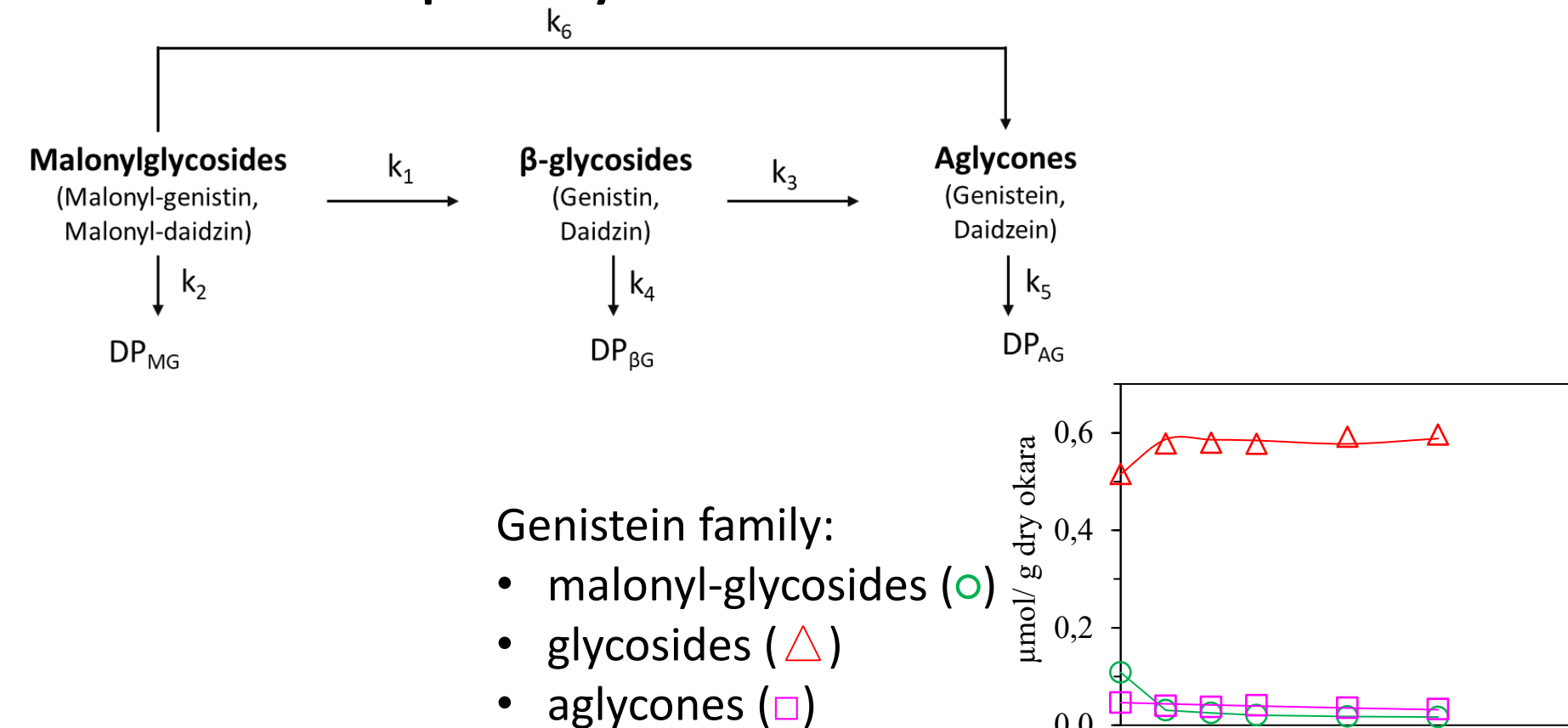


RESULTS

1. ISOFLAVONES EXTRACTION

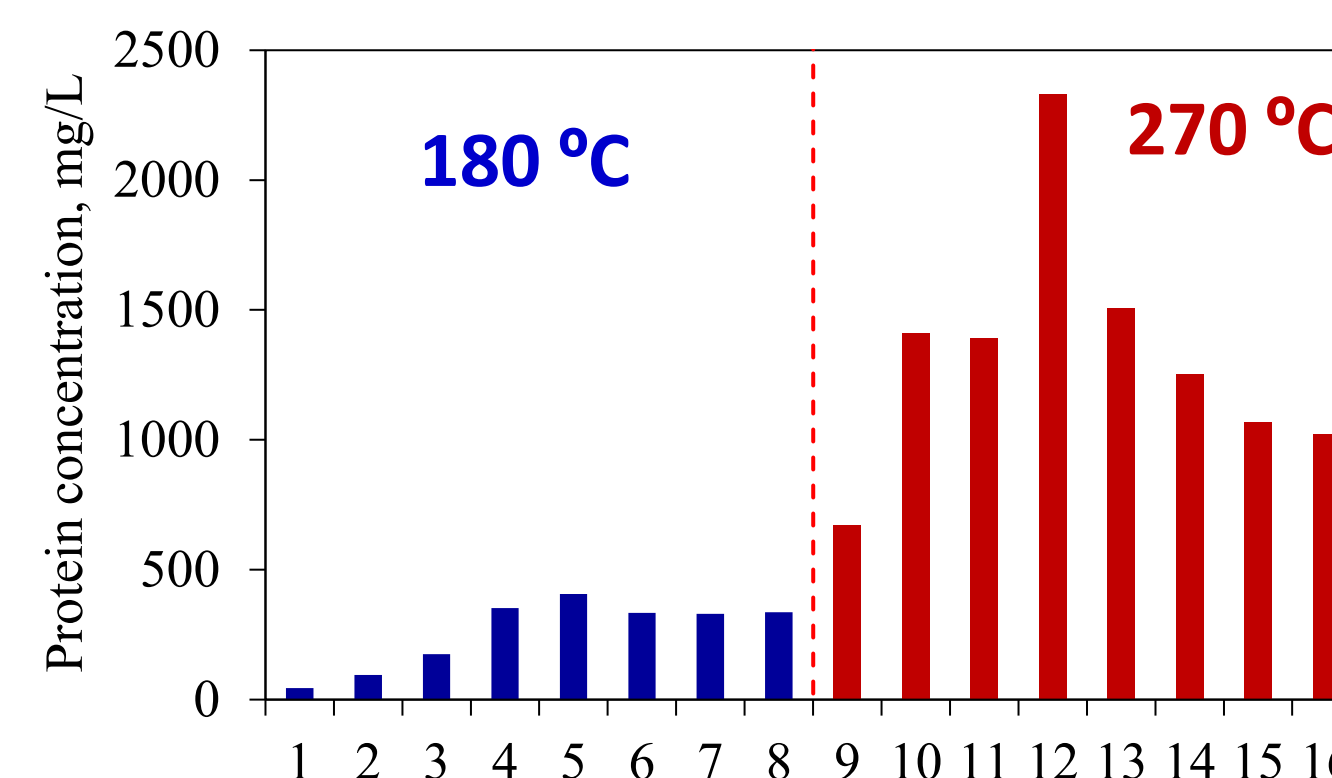


Interconversion pathways of isoflavone forms in subW

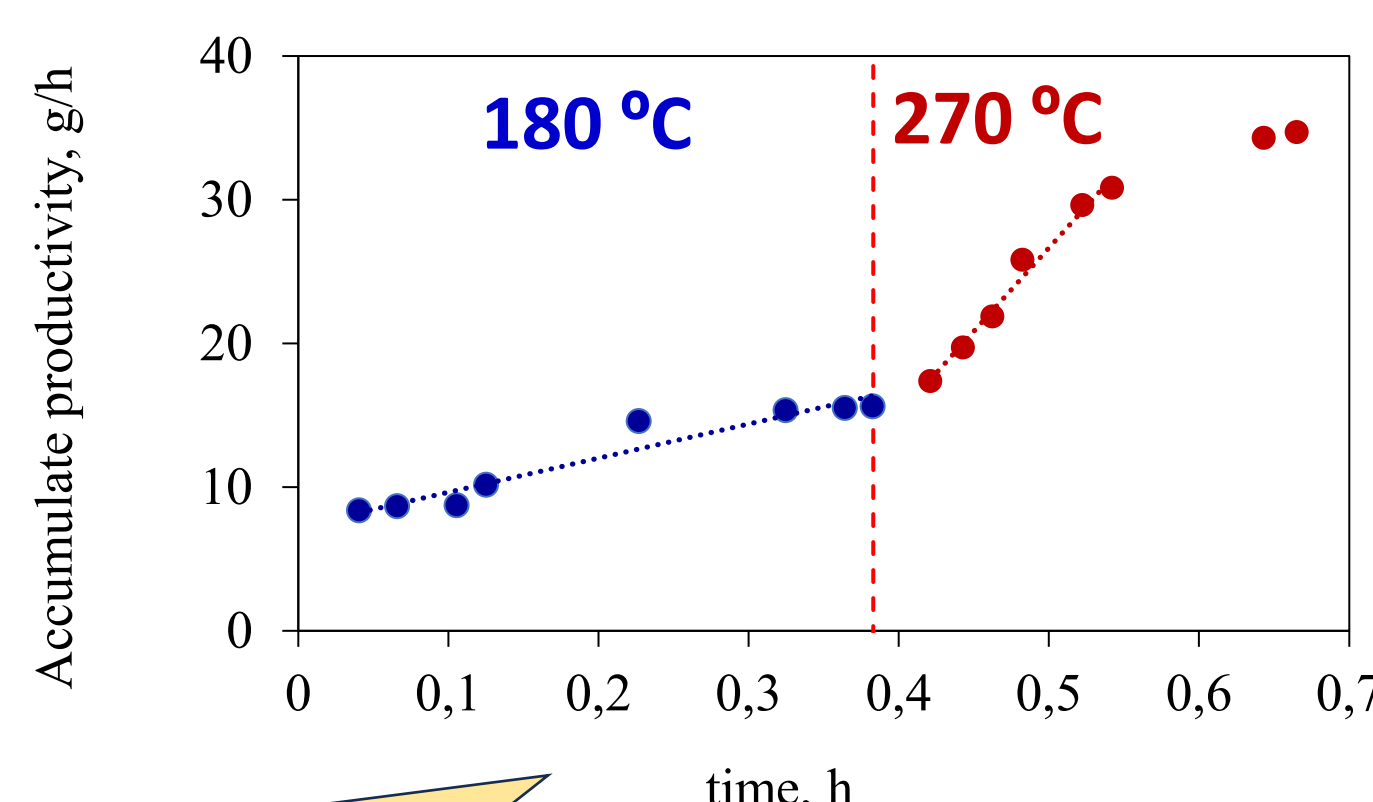


2. PROTEIN EXTRACTION

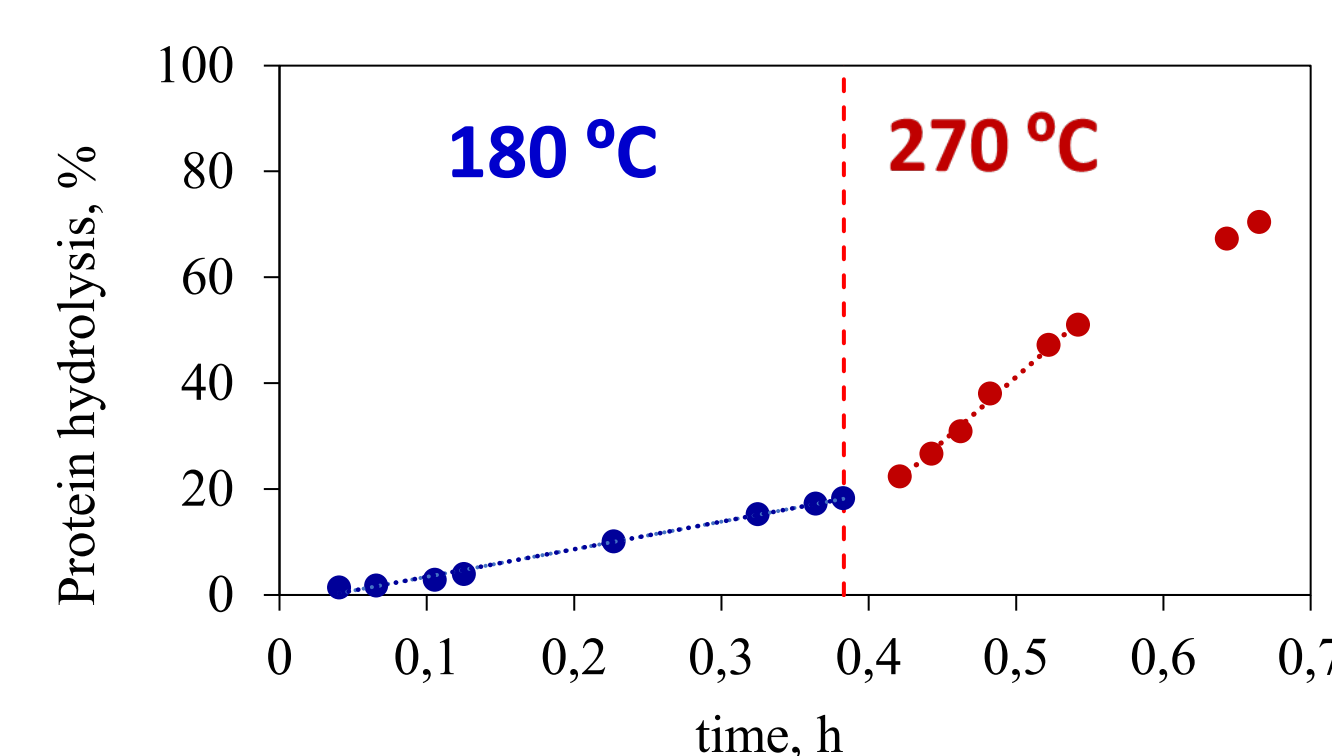
Concentration of **PROTEIN EXTRACTED** on each one of the collected samples through both temperature intervals



At 270 °C, the concentration of the protein is much higher than at 180 °C. At both T, a peak concentration was observed, followed by a decline in the protein in the collected extracts

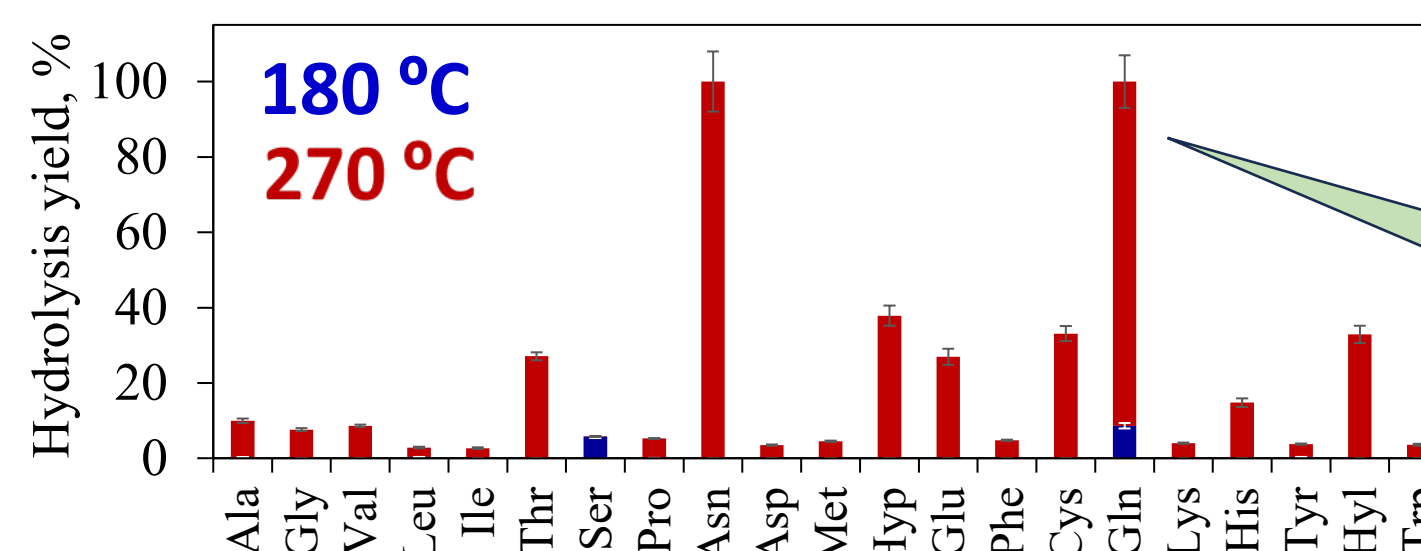


Moderate accumulate protein productivity (g/h) in the samples at 180 °C. Second interval at 270 °C showed higher accumulate productivity



At 180 °C: 18.3 % of the protein (6 g of protein)
 At 270 °C: 52.1 % of the protein (17.1 g of protein)
 TOTAL: 23.1 g of protein (70.4 % of the protein)

FREE AMINO ACIDS RELEASE



Asparagine and glutamine reached 100 %, due to conversion into aspartic acid and glutamic acid

CONCLUSION

❖ This work supports a two-step biocascade valorization of okara, maximizing its potential as a source of bioactive compounds (ISOFLAVONES), and proteins, released as free amino acids and bioactive peptides under SWT conditions

❖ Semi-continuous SWT showed much higher protein extraction at 270 °C than at 180 °C, reaching more than 70 % hydrolysis yield of total protein

❖ Further works are needed to study the release of structural saccharides

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