5ª Jornada de Doctorandos

Escuela de Doctorado Universidad de Valladolid

OPTIMIZATION OF PROTEIN EXTRACTION FROM MICROALGAE GROWN IN WASTEWATERS: Effect of operational variables of alkaline hydrolysis

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1. INTRODUCTION

PROTEIN GAP

Multiple applications
↓
Food/feed supplements
Functional foods → Bioactive peptides
Emulsifying/foaming agents

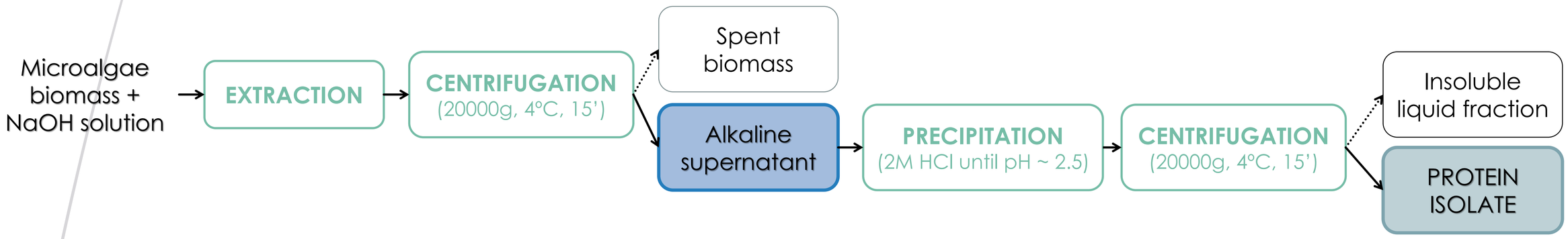
MICROALGAE FROM WASTE WATERS TREATMENT

Very interesting biomass
↓
BIOREFINERY
Proteins
Lipids and Carbohydrates

ALKALINE HYDROLYSIS

Key process on protein isolates production
PROTEIN SOLUBILIZATION + Isoelectric point precipitation
↓
Varying [NaOH], temperature and time

2. MATERIALS & METHODS



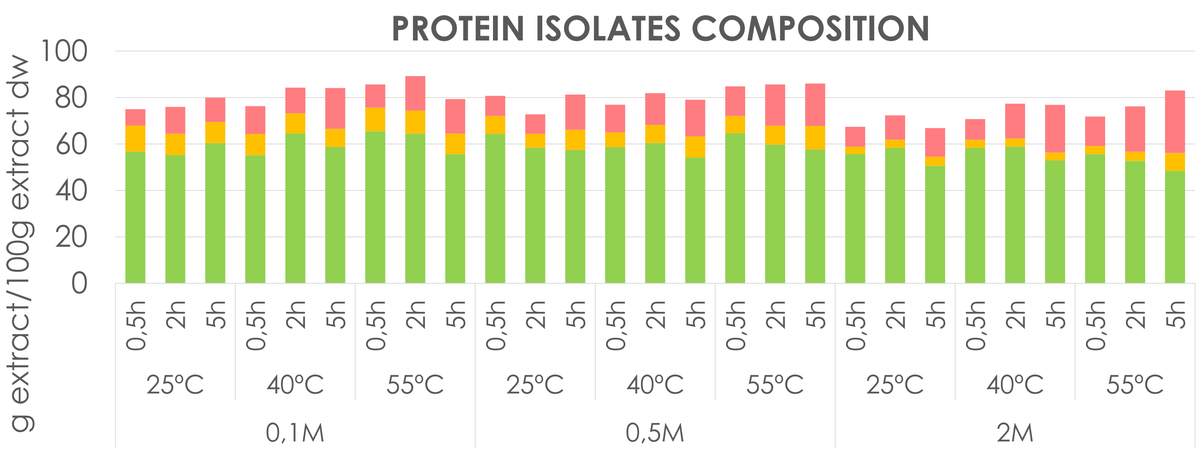
Alkaline hydrolysis:

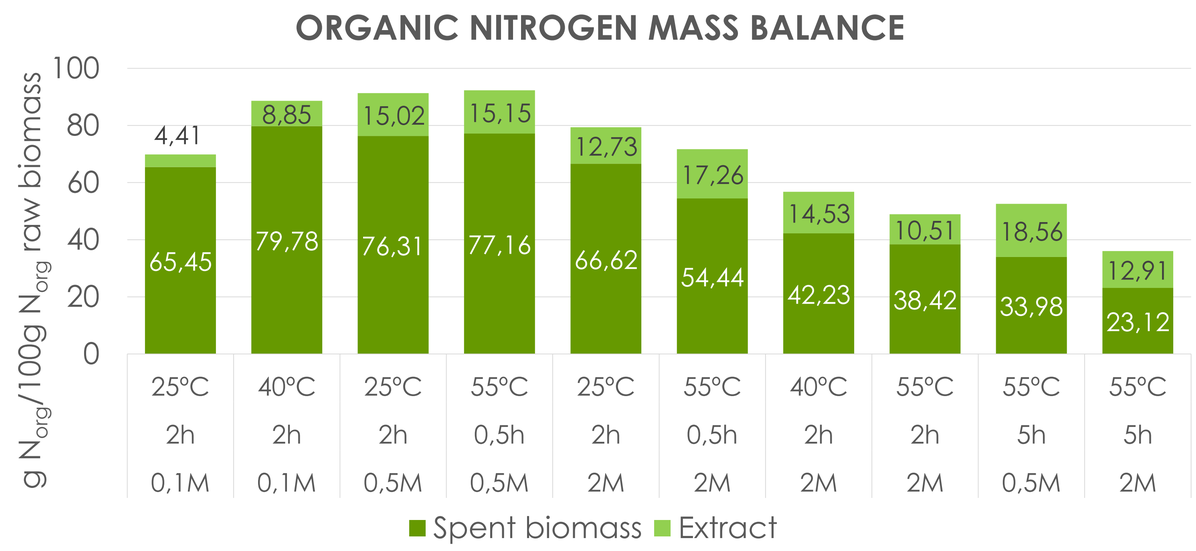
- 5% w/w of microalgae biomass in NaOH solution, 200rpm.
  - NaOH concentration: 0,1, 0,5 and 2M
  - Temperature: 25, 40 and 55º C
  - Time: 0.5, 2 and 5h

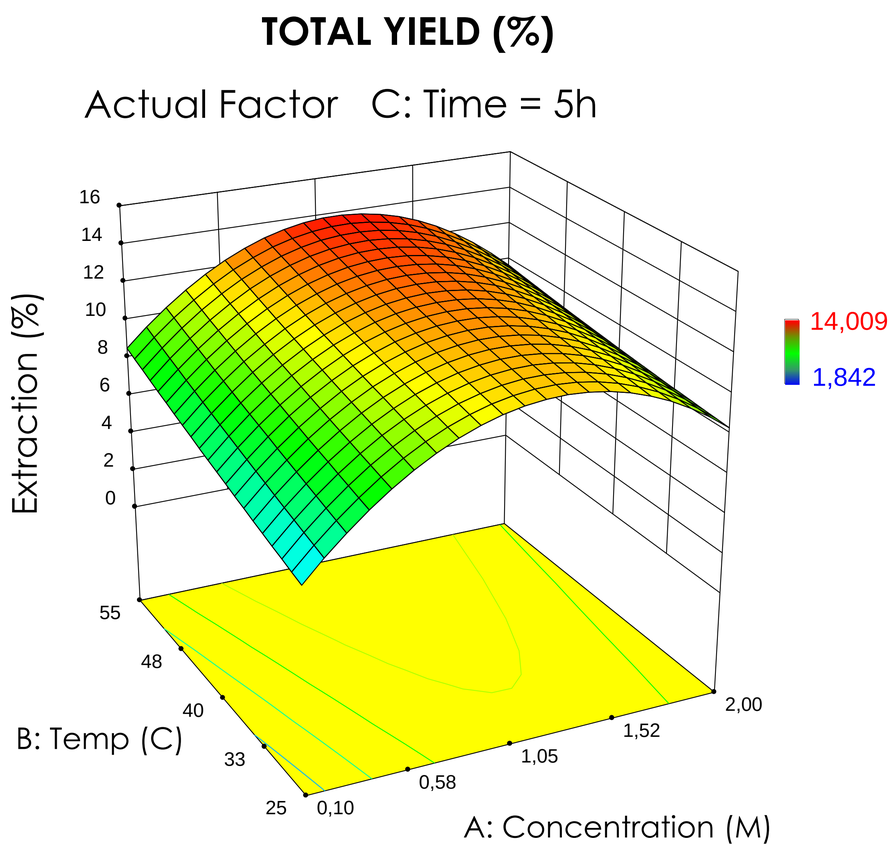
Chemical characterization

- Proteins content: NKT method
- Carbohydrates content: NREL modified method
- Lipids content: Kochert method
- Ash: 550ºC, 24h

3. RESULTS







4. CONCLUSIONS

- Alkaline hydrolysis only caused slight microalgae protein solubilization, obtaining recoveries up to 17.7% for NaOH 0,5M, 55ºC and 5h.
- All protein isolates had a similar composition, independent of the applied extraction conditions (average protein content: 50%, av. lipid content: 10-20%, av. carbohydrates content: 5-10%, ash: 10-20%)
- Above optimal conditions, the harsher extraction conditions, the lower yields and protein recoveries.
- Organic Nitrogen mass balance showed partial degradation of N compounds, lower total recoveries with harsher conditions.

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