Production of yeast extract from spent brewer's yeast at pilot scale

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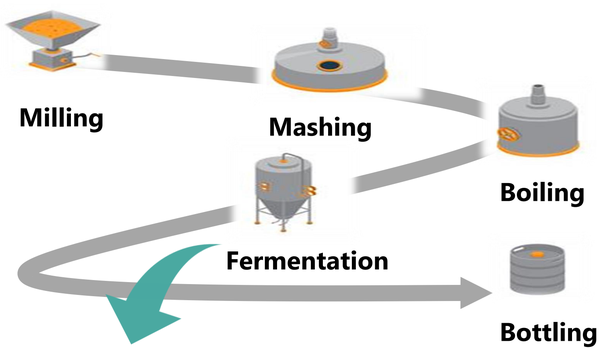


By-product: Spent Brewer's Yeast (SBY)

Introduction

During the brewing process, yeast is added to initiate fermentation, converting sugar to alcohol and carbon dioxide. Before full maturation of the beer, the excess yeast is collected and can be re-used in the brewing process up to around six times. After this, it becomes spent brewer's yeast (SBY). Brewer's spent yeast is the second largest by-product originated by brewery industry, and currently is sold as animal feed at low price or disposed as waste. However, brewing yeast has a valuable nutritional composition, predominantly composed by proteins, carbohydrates, minerals and lipids

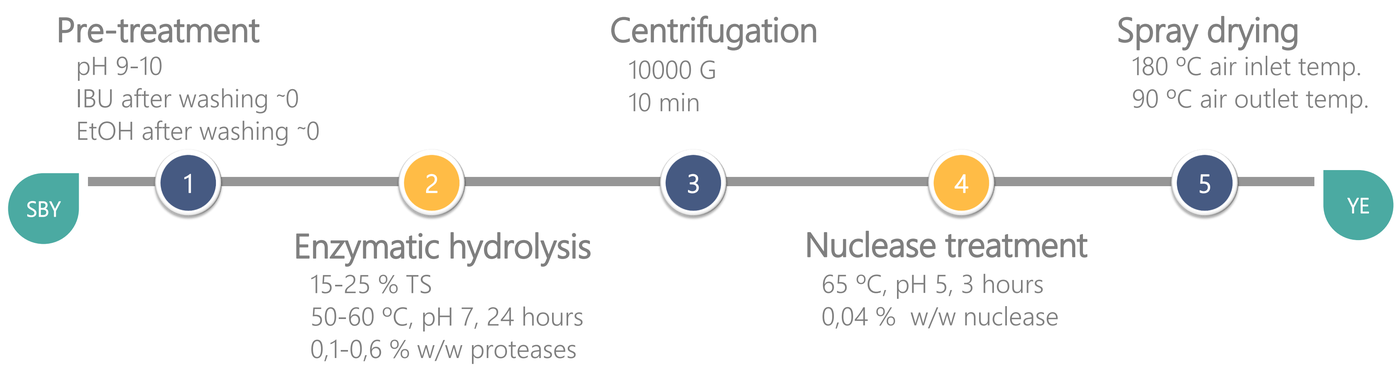
Objective

The main objective is to develop a new and innovative method to use spent brewer's yeast as a raw material to produce yeast extract (YE) as valuable product that can be used in a wide range of industrial applications and define new applications of this product closed to the market

YE potential applications

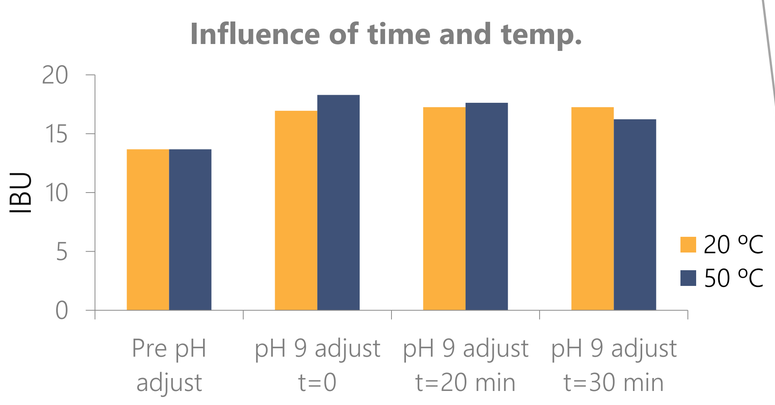
Yeast Extract is a food additive widely used as a nutritional supplement and flavor enhancer in food, beverage, pharmaceutical and animal feed industries

Base case definition at bench scale



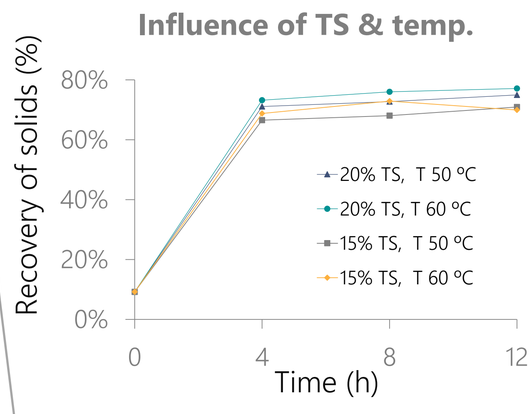
Process optimization at bench scale

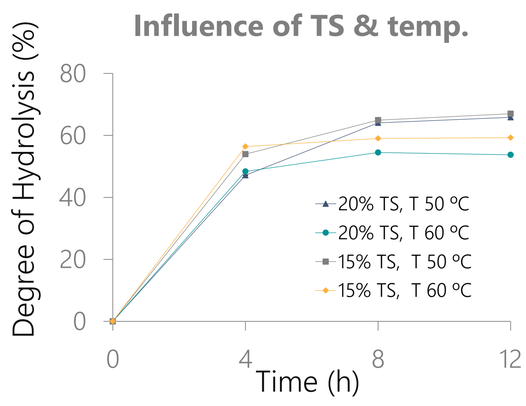
Pre-treatment

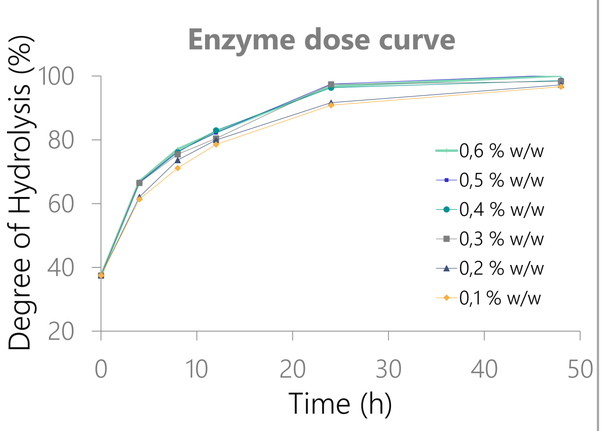


- Residence time does not affect the efficiency of the process
- Influence of temperature was not observed
- **Optimal solubilization conditions:**
  - **Residence time: < 1 minute**
  - **Temperature: room temperature**

Enzymatic hydrolysis

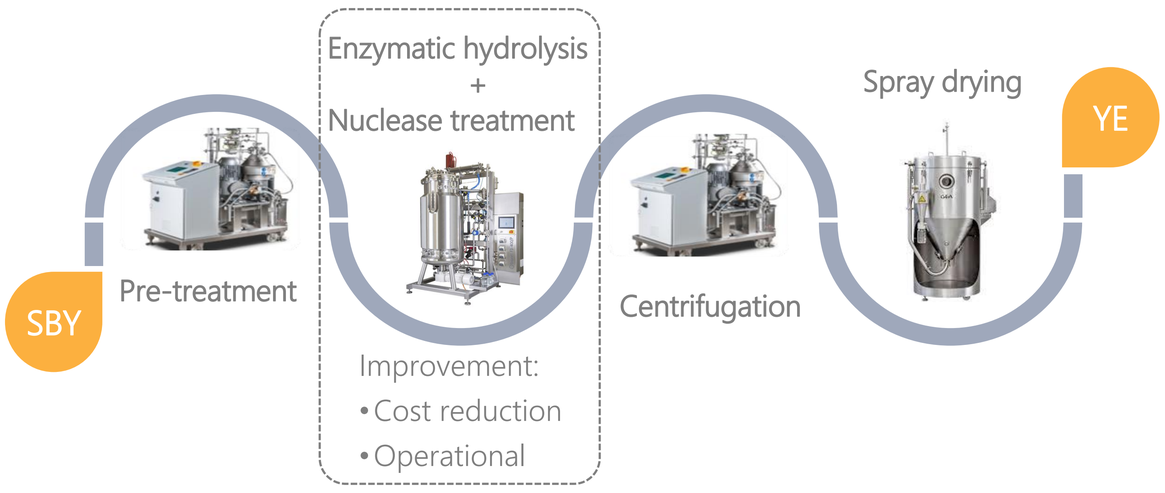






- After 4 hours, degree of hydrolysis and solids recovery maintain practically constant
- Degree of hydrolysis and solids recovery achieved during the enzymatic hydrolysis was slightly similar for all conditions tested
- Optimal conditions for enzymatic hydrolysis were defined as:
  - 50 ºC, pH 7, 20 % of TS, 24 hours
  - 0,1 % w/w enzyme dose

Validation of the process at pilot scale



Pilot scale process has been successfully validated by carrying out 4 validation batches, processing a total amount of 275 kg of SBY and obtaining 9 kg of DYE (Dried Yeast Extract)

Product	Yeast extract	UMAMEX 100LS	Ajirex Yeast extract
Supplier	LIFE YEAST	Kerry ingredientes & Flavours	Kohjin Life Sciences
Protein (g/100g)	62,8	54,0	37,3
Carbohydrate (g/100g)	0,1	26,0	23,6
Fat (g/100g)	0,7	1,0	0,0
Fiber (g/100g)	22,2	6,0	11,2
Na (mg/100g)	380,0	400,0	7700,0

Dried Yeast Extract has a high content of proteins (62,7 g/100 g)

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