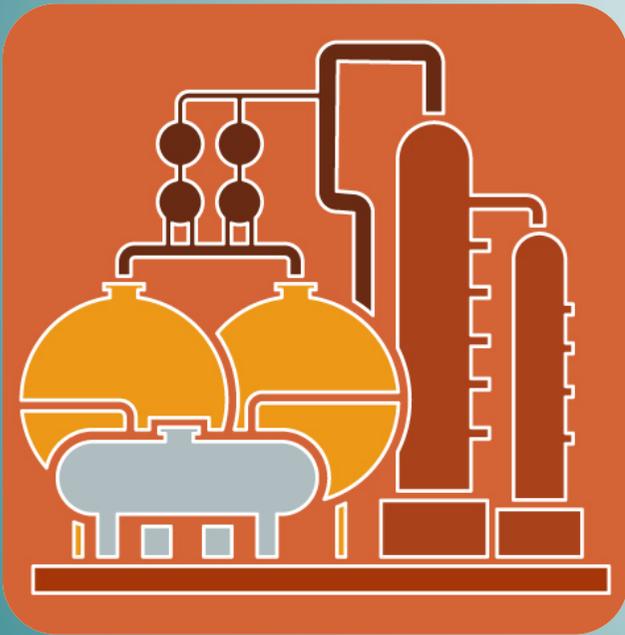


Chemical Process Design / Diseño de Procesos Químicos

Memo I. Guidelines Memo I



Javier R. Viguri Fuente
Eva Cifrian Bemposta

Department of Chemistry and Process and Resource Engineering
GER Green Engineering and Resources Research Group

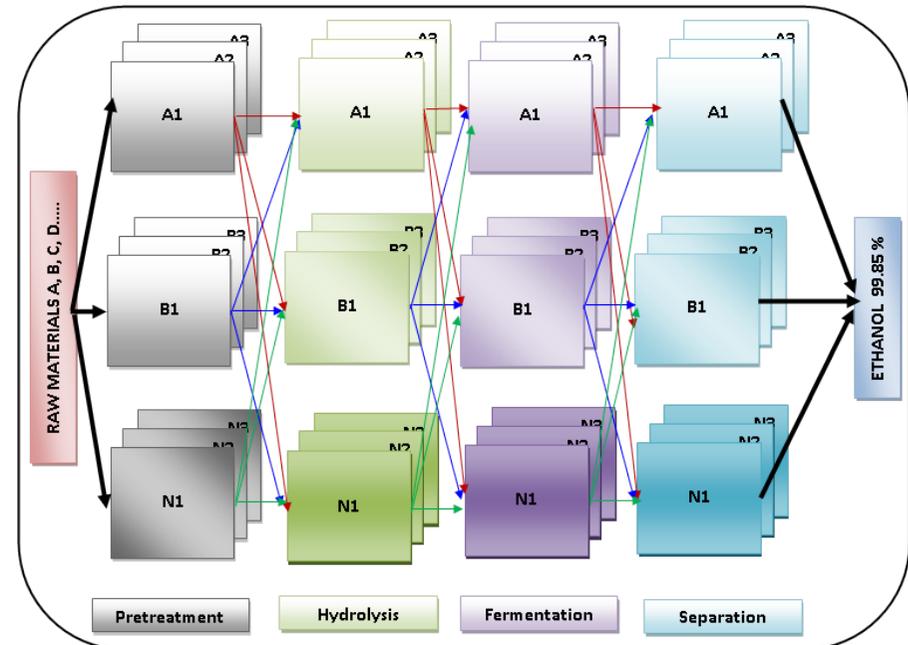
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Guidelines for Memo 1: Flowsheet Description

Objective: In MEMO 1, you should decide the alternative you are going to follow to produce second generation bioethanol and you must draw the process flowsheet.

To-do list:

1. Perform a literature review of **all alternatives to produce bioethanol from lignocellulosic biomass via hydrolysis**: You can begin with Balat, 2011; Llano, 2016; Alvira et al., 2010; Xu and Huang, 2014.
2. Represent the alternatives analyzed in a **superstructure diagram**.
3. Briefly **discuss the alternatives you considered**. If there are three ways of performing a separation, what are they, and why did you choose one over the others?



Guidelines for Memo 1: Flowsheet Description

- 4. Select and display one flowsheet alternative.** The flowsheet must contain an appropriate level of detail, showing and labelling *all* equipment.
- 5. Lead the reader through your flowsheet, briefly describing the function of each major unit.** Estimate operating conditions if you can (in SI units). Follow the major streams, starting with the feed. Then provide a **complete equipment list** in the appendix.
- 6. Perform a gross profit calculation** for this process including the storage and transportation costs, making reasonable assumptions, to determine if it is worth proceeding.
- 7. Make a list of your references** as you encounter them. For each entry, write a phrase or two describing its contents, thereby forming an annotated bibliography. Just a long list of references is of limited value to someone using your report. Use the format specified in the “cite” in the Library of the University of Cantabria.
- 8. Preparation and delivery of Memo 1.**

Memo 1 must contain:

- **Cover letter (1 page).**
- **Main Text (6 pages max. of text; place figures and tables in appendix):**
 - **State the problem.**
 - **Overview of the alternatives you considered.**
 - **Briefly describe the function of each unit of your flowsheet.**
 - **Gross profit results.**
- **References: articles, patents, encyclopedias, web.**
- **Appendix: superstructure diagram; flowsheet; equipment list; figures, tables; gross profit calculation.**

Some references to consult:

- Balat, M. (2011): «*Production of bioethanol from lignocellulosic materials via the biochemical pathway: a review*». Energy Conversion and Management, 52. Pp. 858-875.
- Llano, T. (2016): «*Developments in a sulphite pulping process for the valorisation of its carbohydrate resources within the biorefinery concept*». Doctoral Thesis. Universidad de Cantabria.
- Alvira, P.; Tomás-Pejó, E.; Ballesteros, M. & Negro M.J. (2010): «*Pretreatment technologies for an efficient bioethanol production process based on enzymatic hydrolysis: a review*». Bioresource Technology, 101. Pp. 4851-4861.
- Xu, Z. & Huang, F. (2014): «*Pretreatment methods for bioethanol production*». Appl Biochem Biotechnol, 174. Pp. 43-62.