CHAPTER III
EXPERIMENTAL

3.1 Materials and Equipment

3.1.1 Equipment

Desktop computer (Intel® Core™ 2 Duo CPU T5900 2.20 GHz, 2 GB of RAM, Windows 7 and Microsoft Office 2010)

3.1.2 Software

- Aspen Plus version 8.6
- Excel
- ECON

3.2 Experimental Procedures

3.2.1 Literature Survey Study

The objective here is to define the sustainable design problem, taking into account, the available knowledge of the process.

- Review the background of CO_2 conversion into useful chemicals.
- Study the feasibility of potential chemicals and select the best for the process.
- Focus on the selected chemicals, getting all the necessary information.

3.2.2 Process Simulation

The objective here is to obtain steady state mass and energy balance information for the process so that analysis related to cost, sustainability, etc., can be performed.

- Simulate the process at the established base case design for the process flow-diagram and the selected chemicals, using the selected process simulator.

- Verify that the necessary assumptions for the steady state simulation models used in process simulation are compatible with the actual process-operation scenario.
- Verify if the available data satisfy the data needed by the simulator

3.2.3 Sustainability Analysis

The objective here is to perform the sustainability analysis in order to indicate area for base case design improvement.

- Determine the parameters (indicators) for the sensitivity analysis.
- Generate alternative designs based on operability, energy consumption, environmental impact and cost. Verify the new designs through process simulation.

3.2.4 Economic Evaluation

The objective here is to perform economic analysis in order to compare the generated sustainable design alternatives.

- Collect stream and operational data of materials, unit operations and utilities from process simulation.
- Determine the indicators for the economic analysis with the selected software.
- Analyze and compare the cost requirements of each part of the process based on materials, equipment and utilities.