
PhD thesis presentation

Optimal design of a CO₂ absorption unit and assessment of solvent degradation

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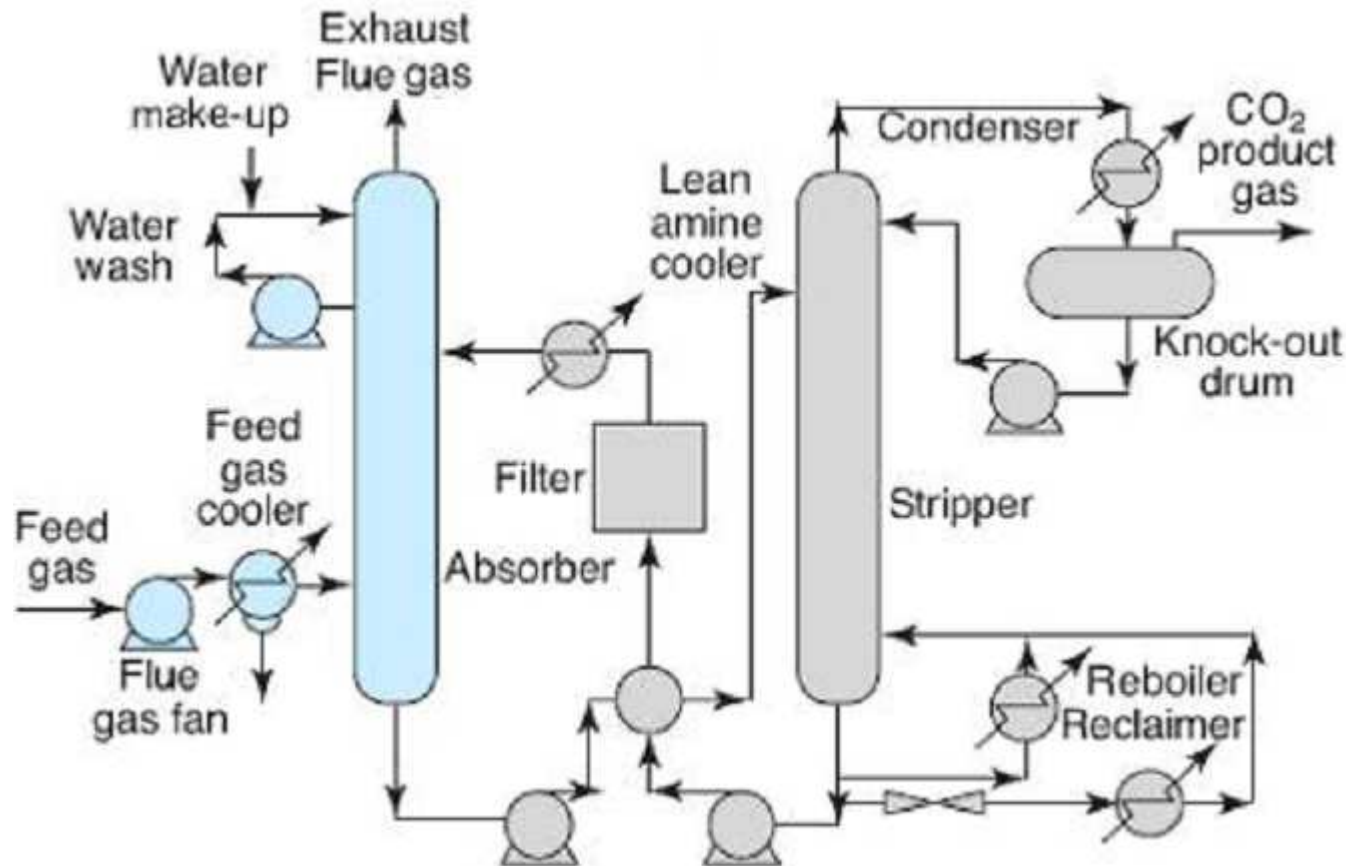
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1. Introduction

Post-combustion capture



2. Objectives

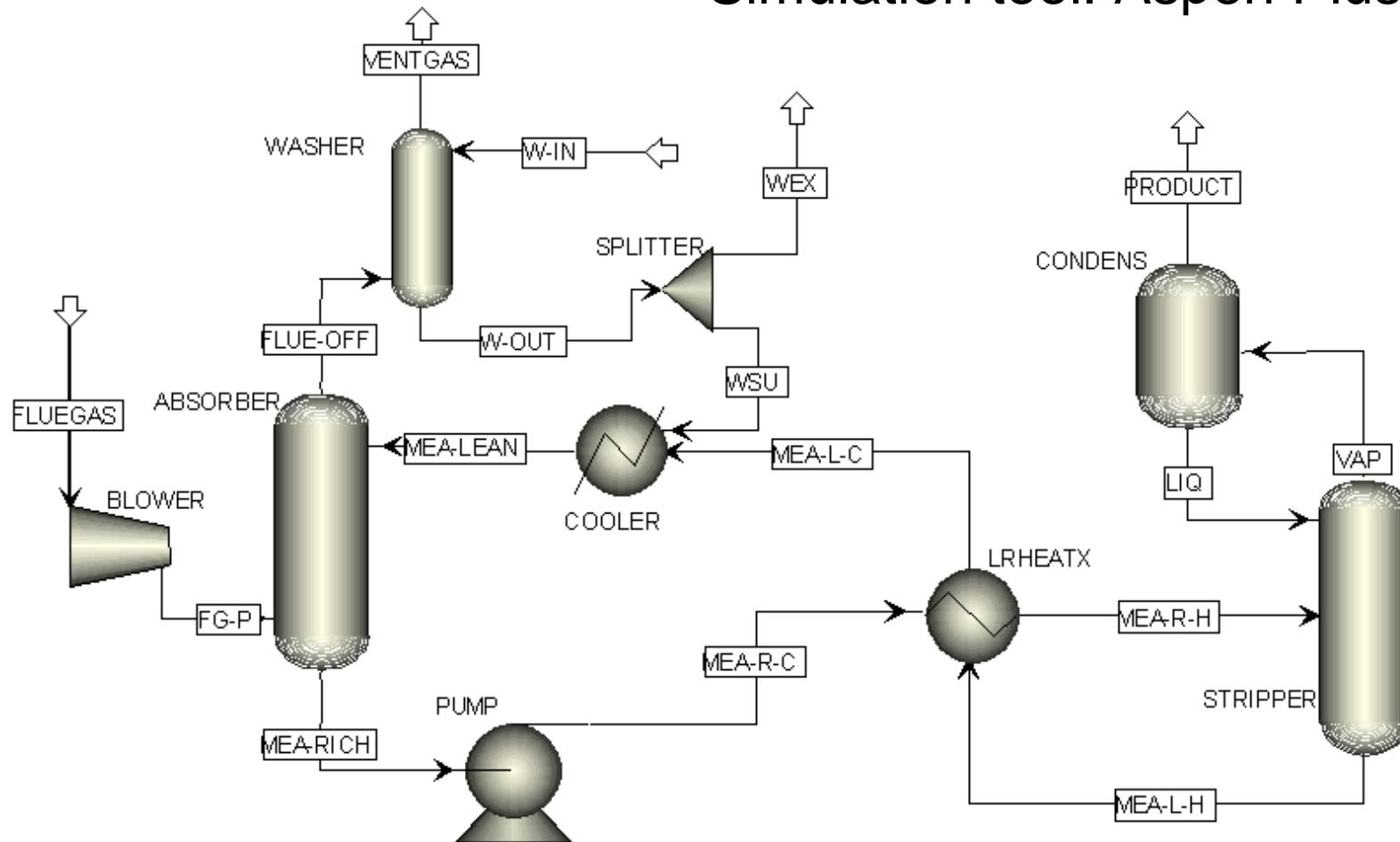
Objectives:

- Simulation and optimal conception of the CO₂ capture process
- Comparative degradation study for amine solvents

=> Final objective is to propose optimal operating conditions for CO₂ capture

3. Model description

Simulation tool: Aspen Plus



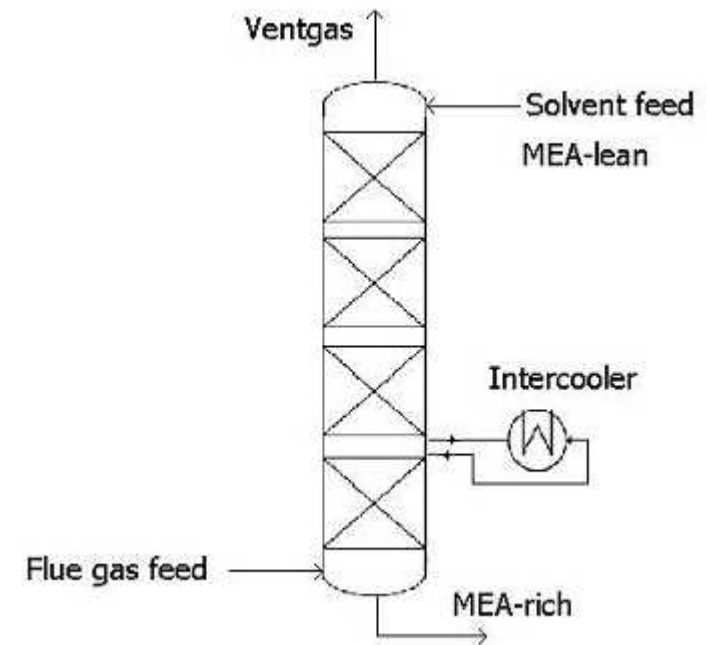
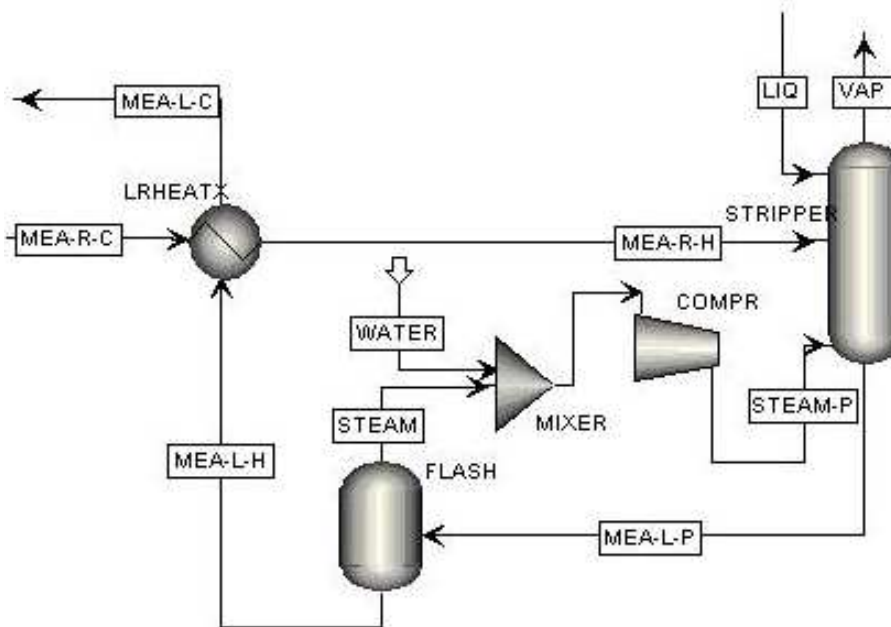
3. Model description

Parameter	Best-case value	Reduction of the thermal energy consumption	Disadvantage
MEA inlet flow	11,725 m ³ /h	- 3%	not experimentally confirmed yet
MEA inlet concentration	40 wt-%	- 12,5%	Corrosive behavior
MEA inlet temperature	30 °C	-2,5%	Increase of the cooling water requirement
Stripper pressure	2,2 bar	- 16%	Possibility of solvent degradation
Temp. approach at the L-R heat exchanger	5 °K	- 5%	Increase of the equipment costs

3. Model description

Process modifications:

- Lean vapor compression
- Absorber intercooling
- ...



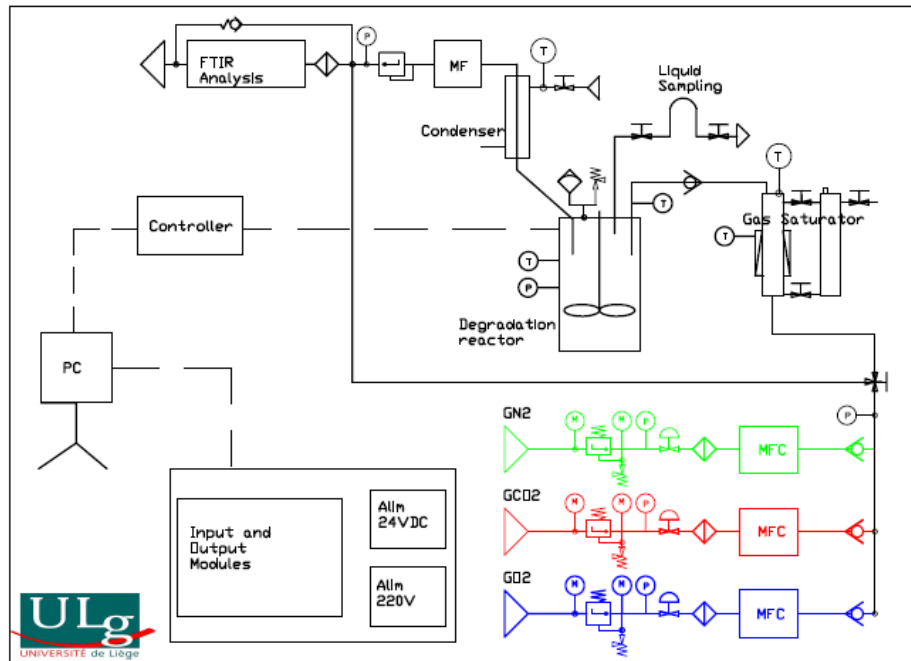
4. Solvent degradation

Degradation study:

- Study of classical solvents
- Study of newly developed solvents and of degradation inhibitors
- Liquid and gaz phases analysis
- Optimal conditions in order to avoid degradation

4. Solvent degradation

Degradation test rig



5. Conclusion

- Advanced technical challenge
- Fast-developing technology
- Research objective:
multi-parameter optimisation



Thank you for your attention !

