Evaluation of Condensate Stabilization Plant through Static and Dynamic Process Simulation

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Today's Agenda:

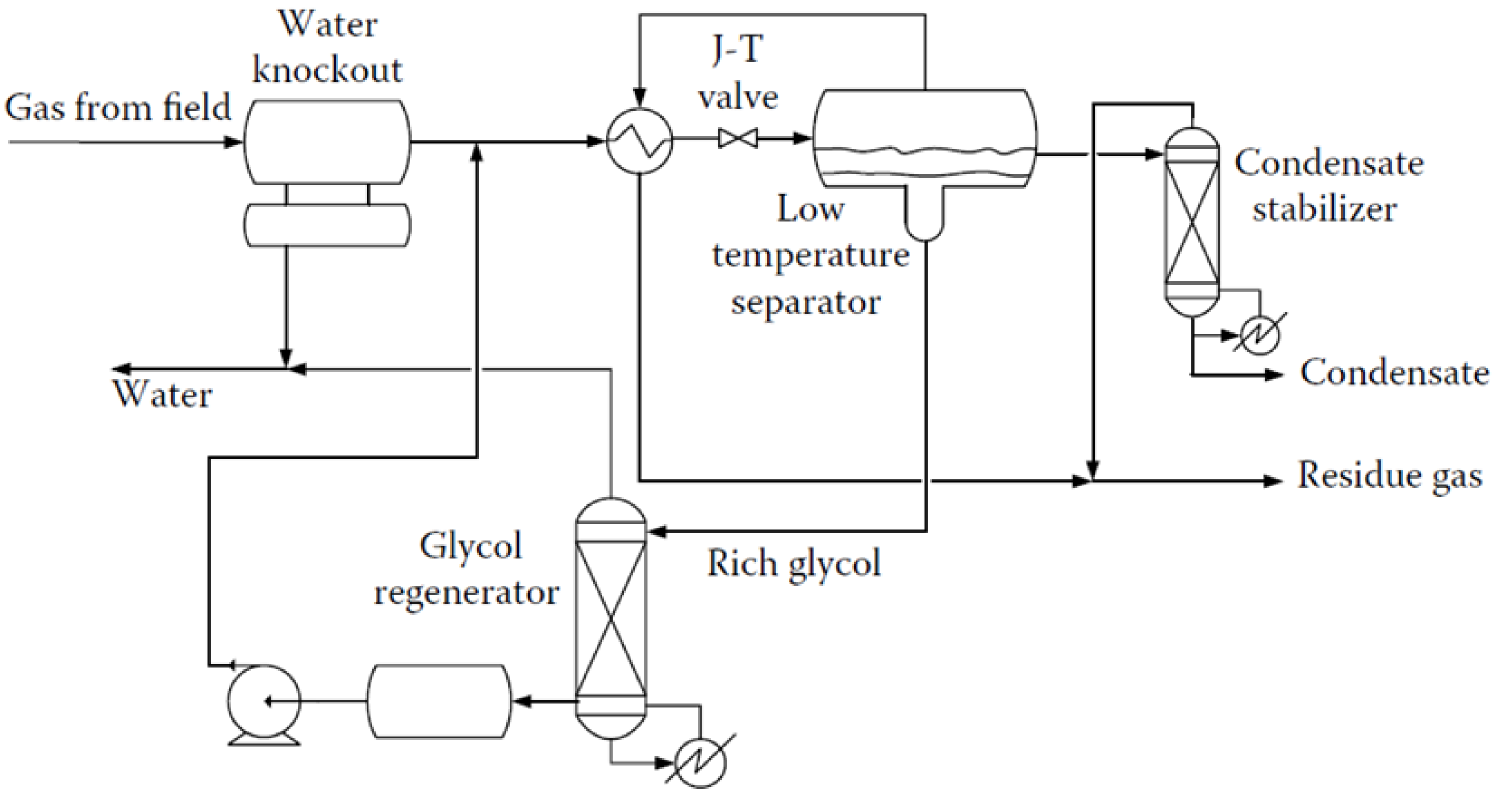
- ✓ Introduction
- ✓ Objective
- ✓ Methodology
- ✓ Results and Disscussion
- ✓ Conclusion
- ✓ References
- ✓ Acknowledgements

Introduction

- **Condensate** is the liquid formed by the condensation of a gas, specifically, the hydrocarbon liquid separate from natural gas because of changes in temperature and pressure when the gas from the reservoir was delivered to the surface separators. Such condensate remains a liquid at atmospheric temperature and pressure.
- **Condensate stabilization** is the removal of light components from hydrocarbon liquid to lower its vapour pressure to a desired level. Stabilization may be used to meet a required pipeline sales contract specification or to minimize the vaporization of the hydrocarbon.

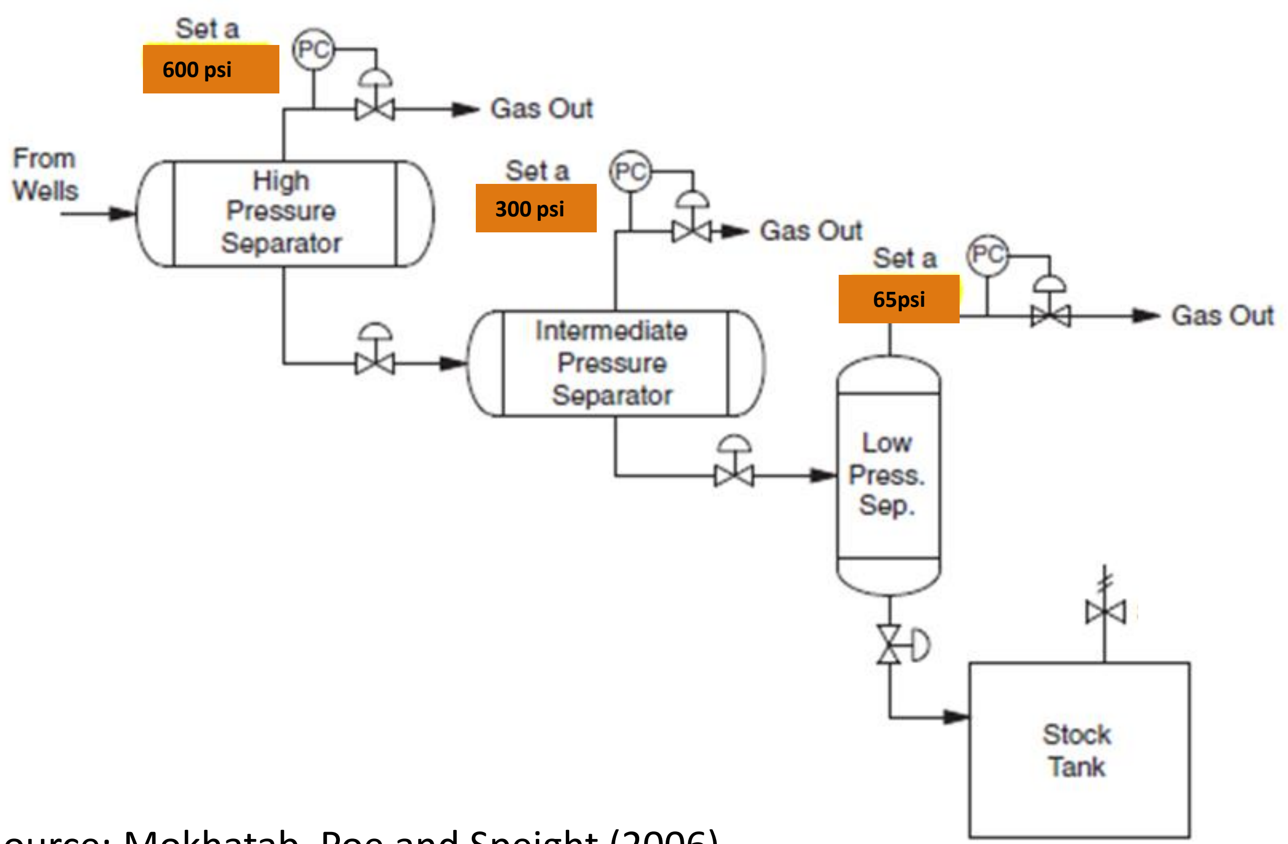
Introduction

✓ **How can this be done?**



Introduction

✓ **Three Stage Separation**



Source: Mokhatab, Poe and Speight (2006)

Objectives

- ✓ Based on actual plant data in the literature, it carried out a simulation using Aspen HYSYS® software to predict the opposite process behavior on some proposed amendments (Rahmanian, Ilias and Nasrifar, 2015).
- ✓ In the static software module, changes in temperature, pressure and flow of plant behavior were evaluated.
- ✓ In the dynamic software module, a control system was tested and configured to stabilize disturbances in the model.

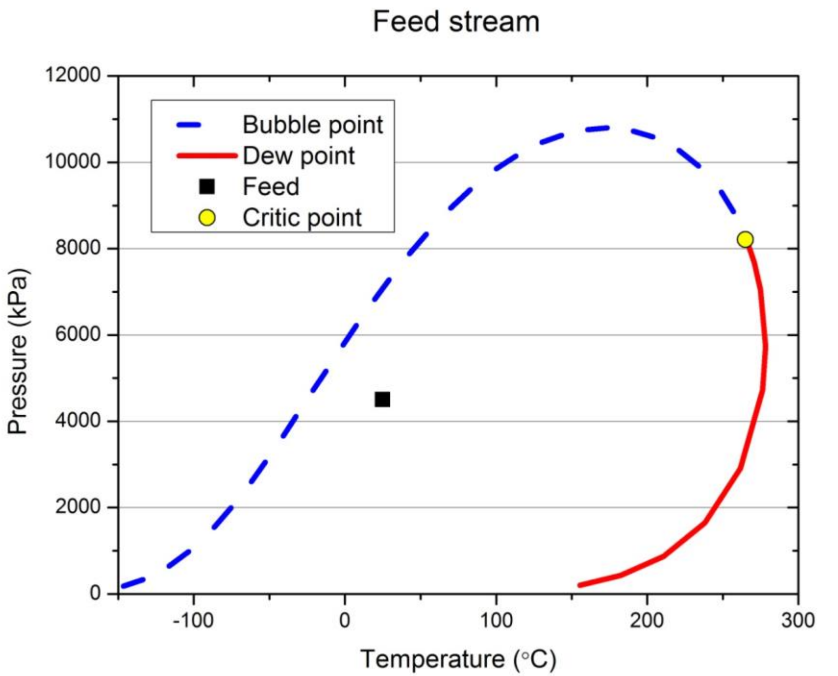
Methodology

- ✓ In this work we use the software Aspen Hysys® version 8.6
- ✓ Fluid-package: Peng-Robinson
- ✓ Feed condition

Temperature (°C)	25
Pressure (kPa)	4500
Molar flow ($kmol \cdot h^{-1}$)	4000

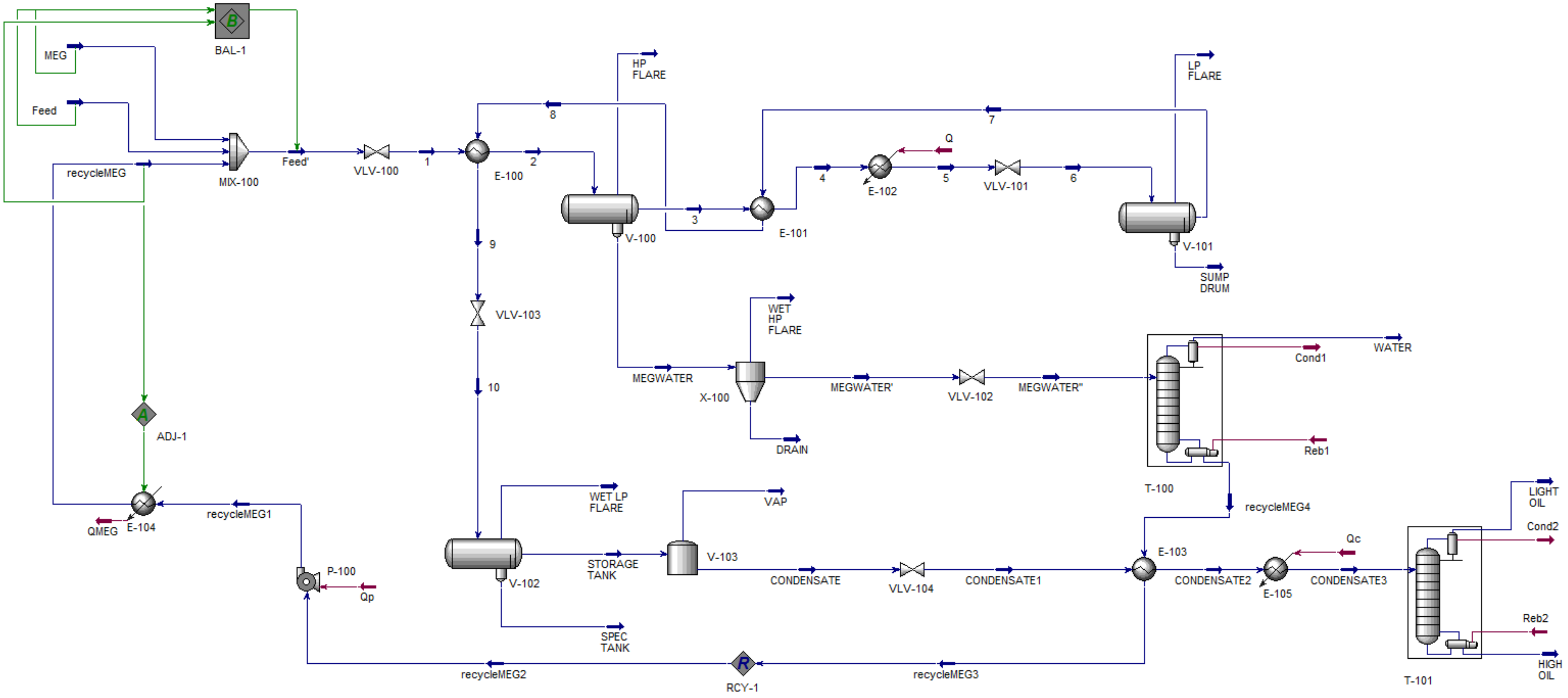
Vapour phase	0,1179
Liquid phase	0,7466
Aqueos phase	0,1354

Components	Mole fraction	Components	Mole fraction
Methane	0,217883	n-Nonane	0,046242
Ethane	0,054357	n-Decane	0,037196
Propane	0,051765	Cumene	0,005444
i-Butane	0,018877	n-C11	0,087716
n-Butane	0,038880	EGlycol	0,048356
i-Pentane	0,022965	1Pentanthiol	0,001091
n-Pentane	0,025828	nBMercaptan	0,000505
n-Hexane	0,037949	nPMercaptan	0,001477
Mcyclopentan	0,003282	COS	0,000007
Benzene	0,002240	E-Mercaptan	0,001687
Cyclohexane	0,004598	M-Mercaptan	0,000130
Mcyclohexane	0,012366	H2O	0,129641
Toluene	0,003802	H2S	0,010158
n-Heptane	0,046697	CO2	0,012006
n-Octane	0,054087	Nitrogen	0,002621
p-Xylene	0,020148	**SUM**	**1,000000**



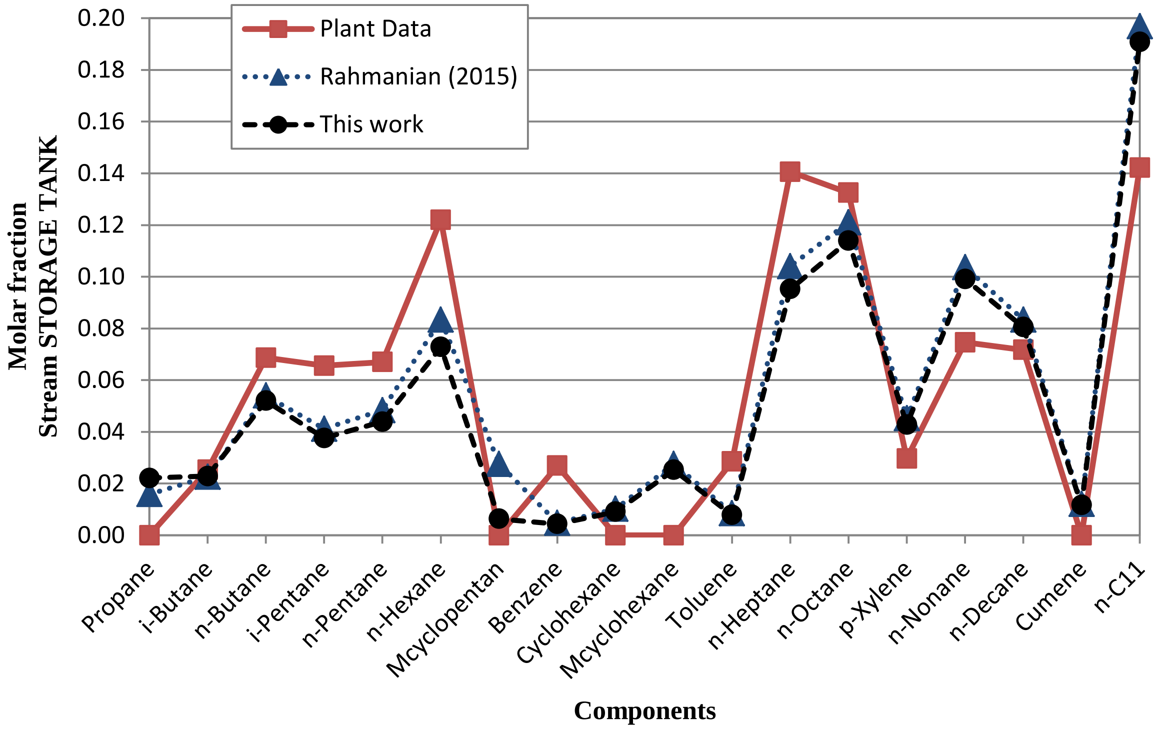
Methodology

✓ Process Flow Diagram for the Condensate Stabilization

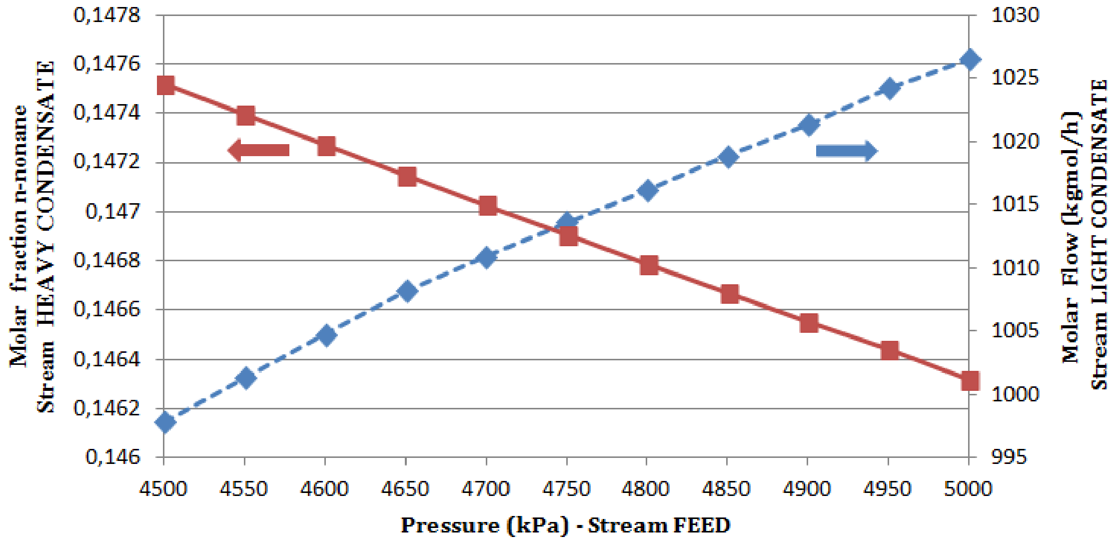


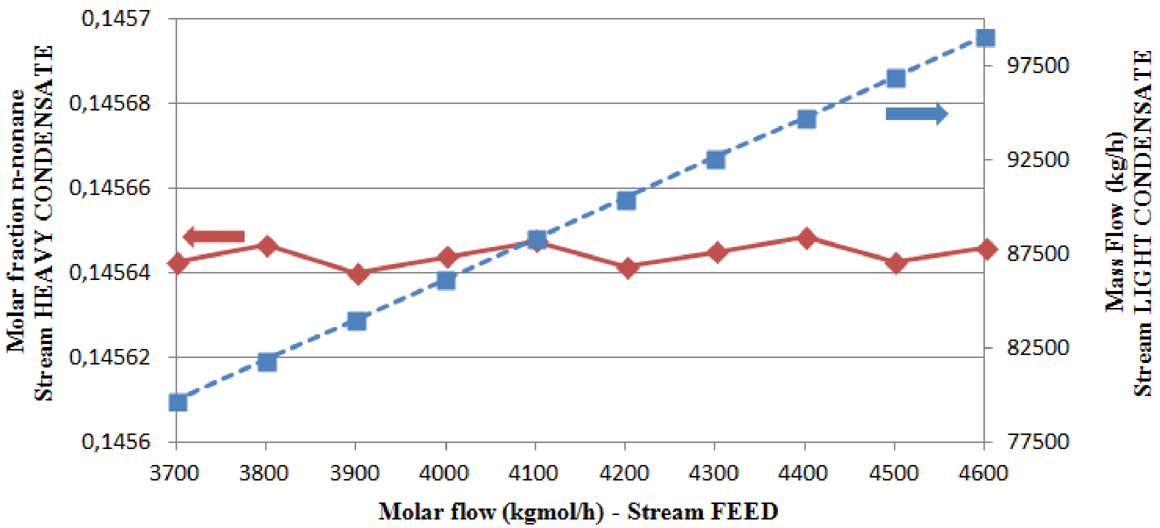
Results and Discussion

✓ For the Static Process Simulation

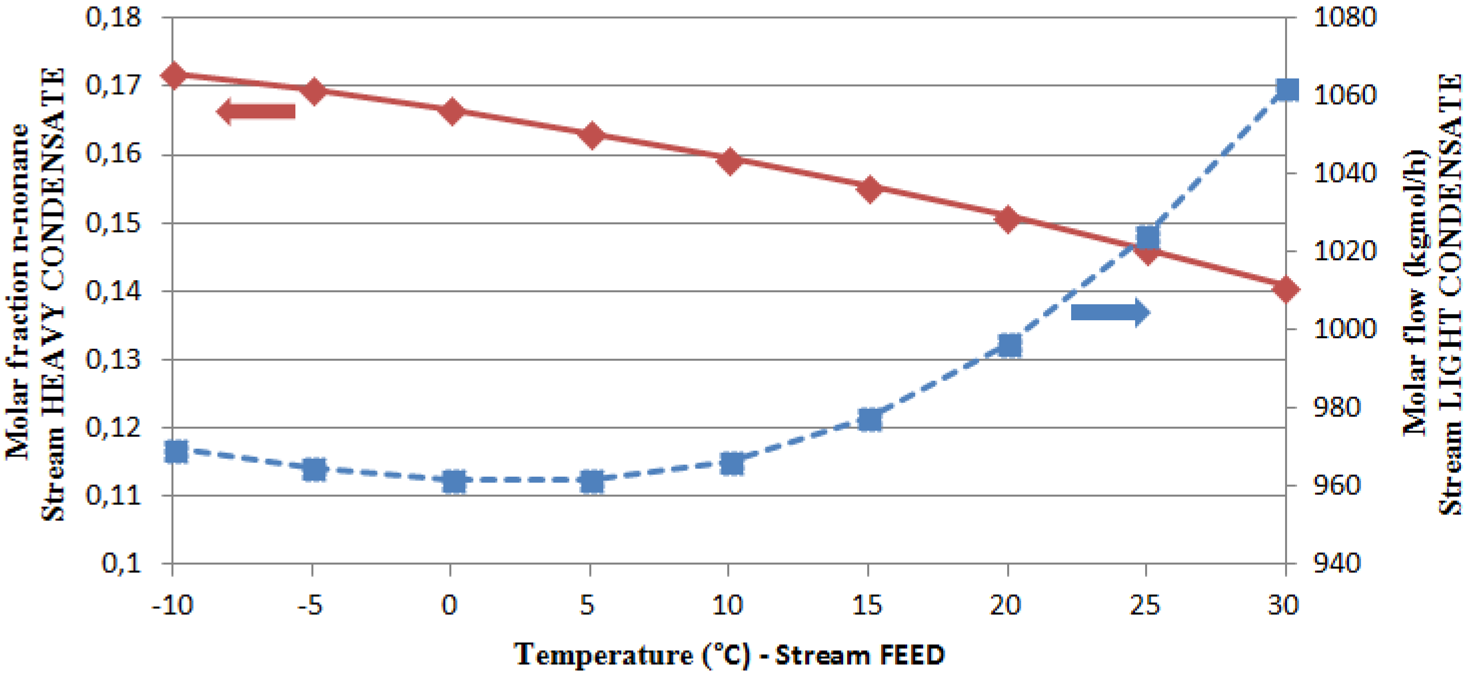


Results and Discussion

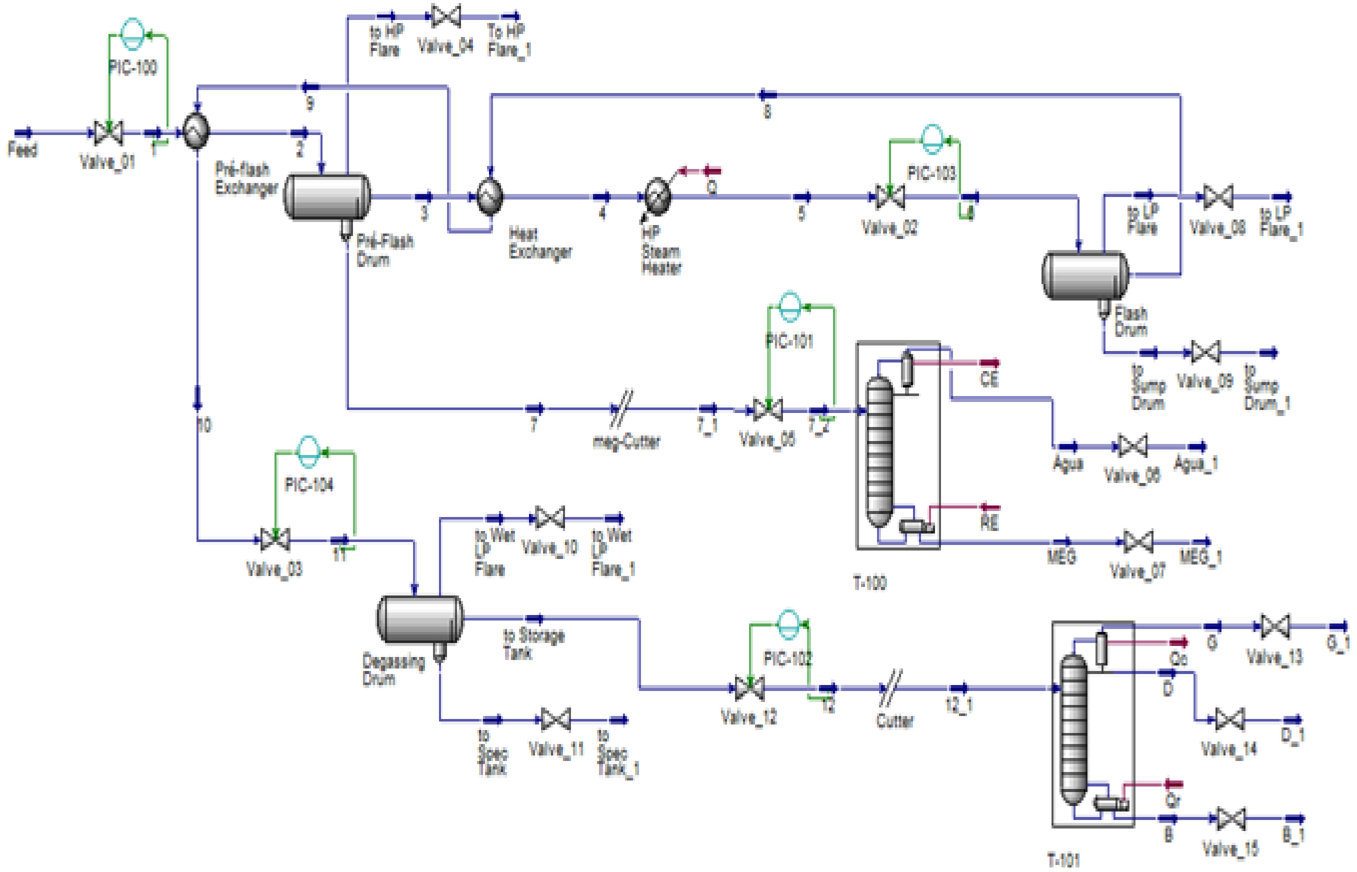




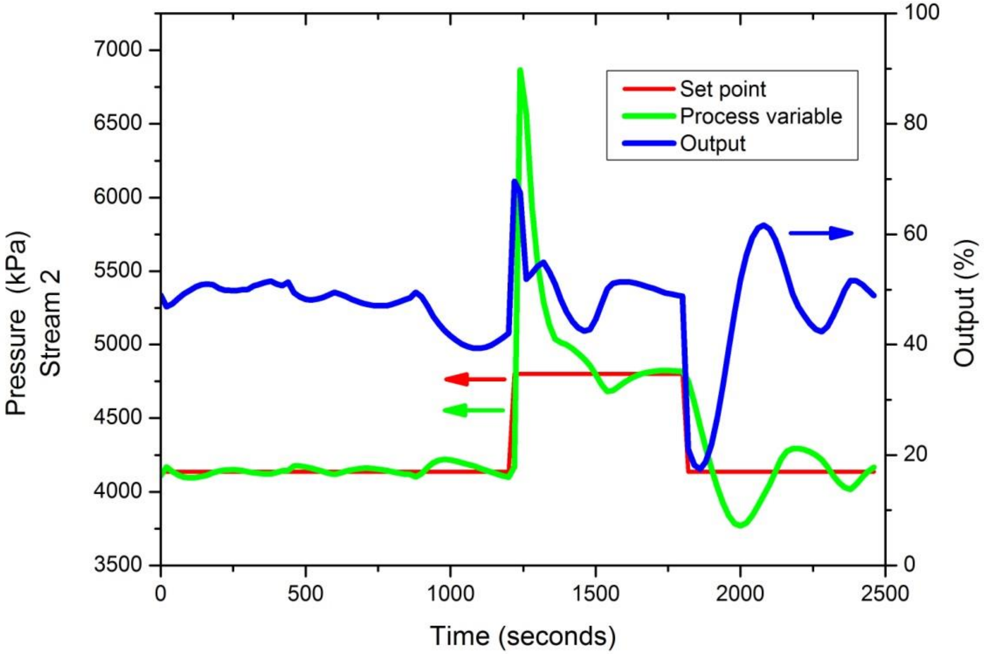
Results and Discussion

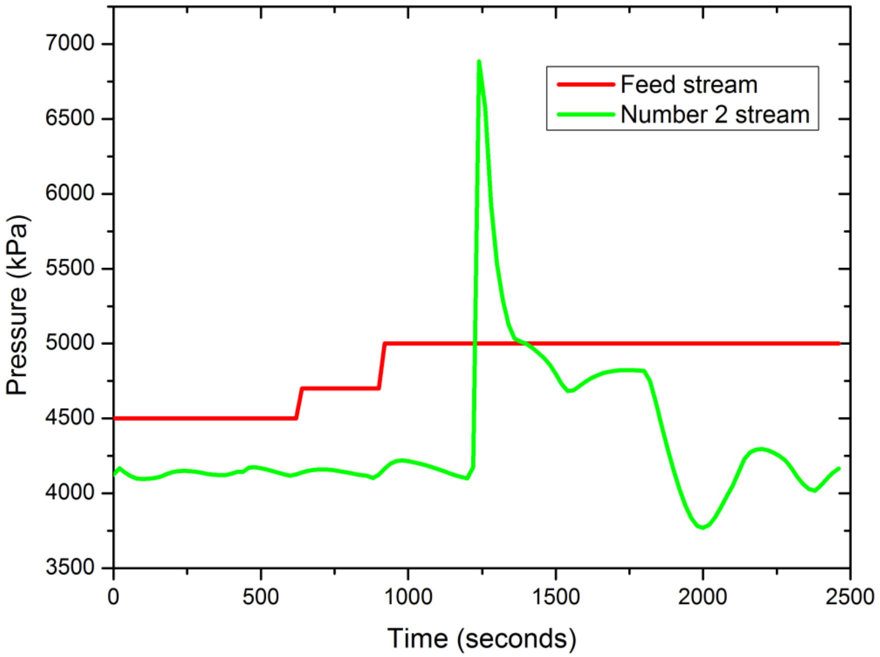


Results and Discussion



Results and Discussion





Conclusions

- ✓ The simulation performed for the condensate stabilization provided specification of the products like the RVP criteria, were presented in this work similarly to all changes programmed into the system.
- ✓ The changes in the feed stream (temperature, pressure and flow) influenced product quality.
- ✓ It is necessary to set other process specifications to simulate the conditions of condensate stabilization.
- ✓ It was possible to develop dynamic models for the process with added columns for regeneration of MEG and for separating the final product.
- ✓ The adjustment of the controllers is essential to the stabilization of the dynamic models.

References

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