



Logistics Fuel Catalytic Cracking for Hydrogen Generation

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Outline

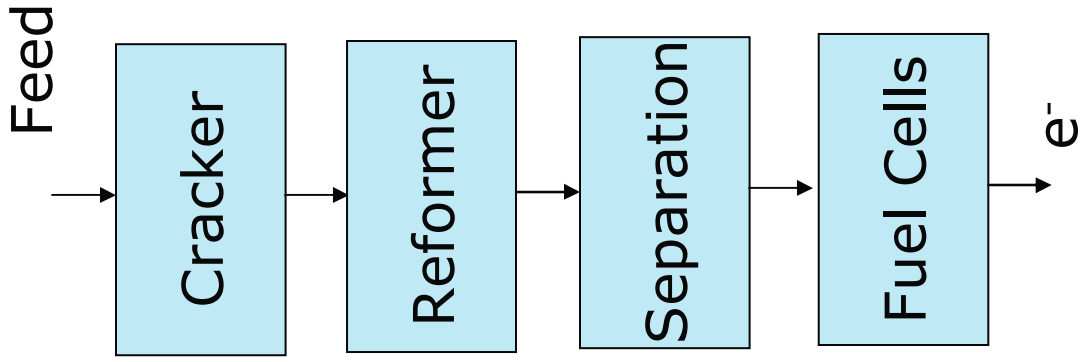
- Introduction
- Simulation of integrated process
- Experimental
- Results and discussion
- Closing notes & future work



Hypothesis

Catalytic cracking of high sulfur, heavy hydrocarbons can be used to produce a gas phase that can be steam reformed to produce hydrogen and liquid phase suitable for a process heat source.

Introduction



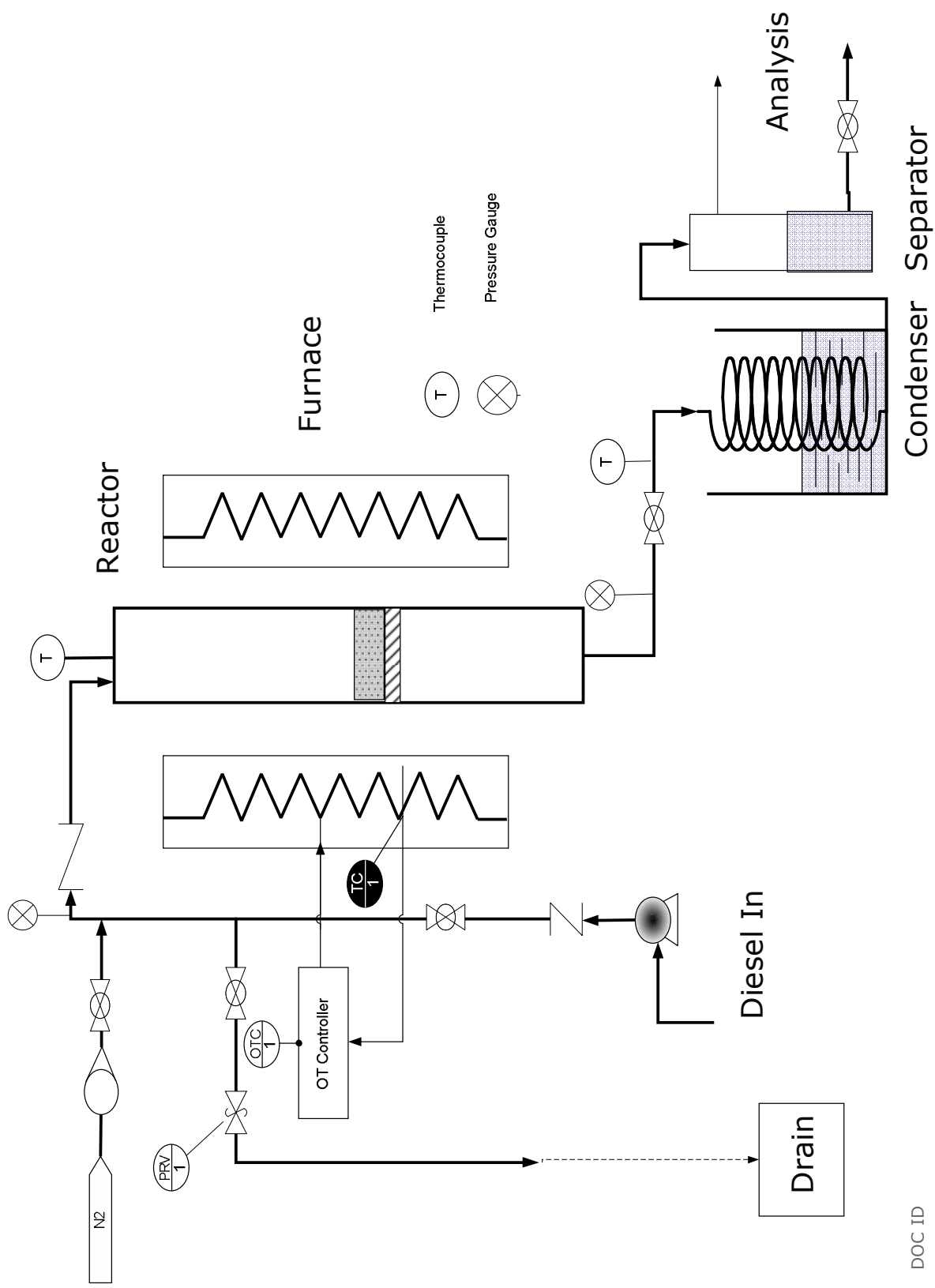
Reaction:



Separation Options:

- PSA
- PROX/H₂S removal

Experimental Set-up



Experimental Details



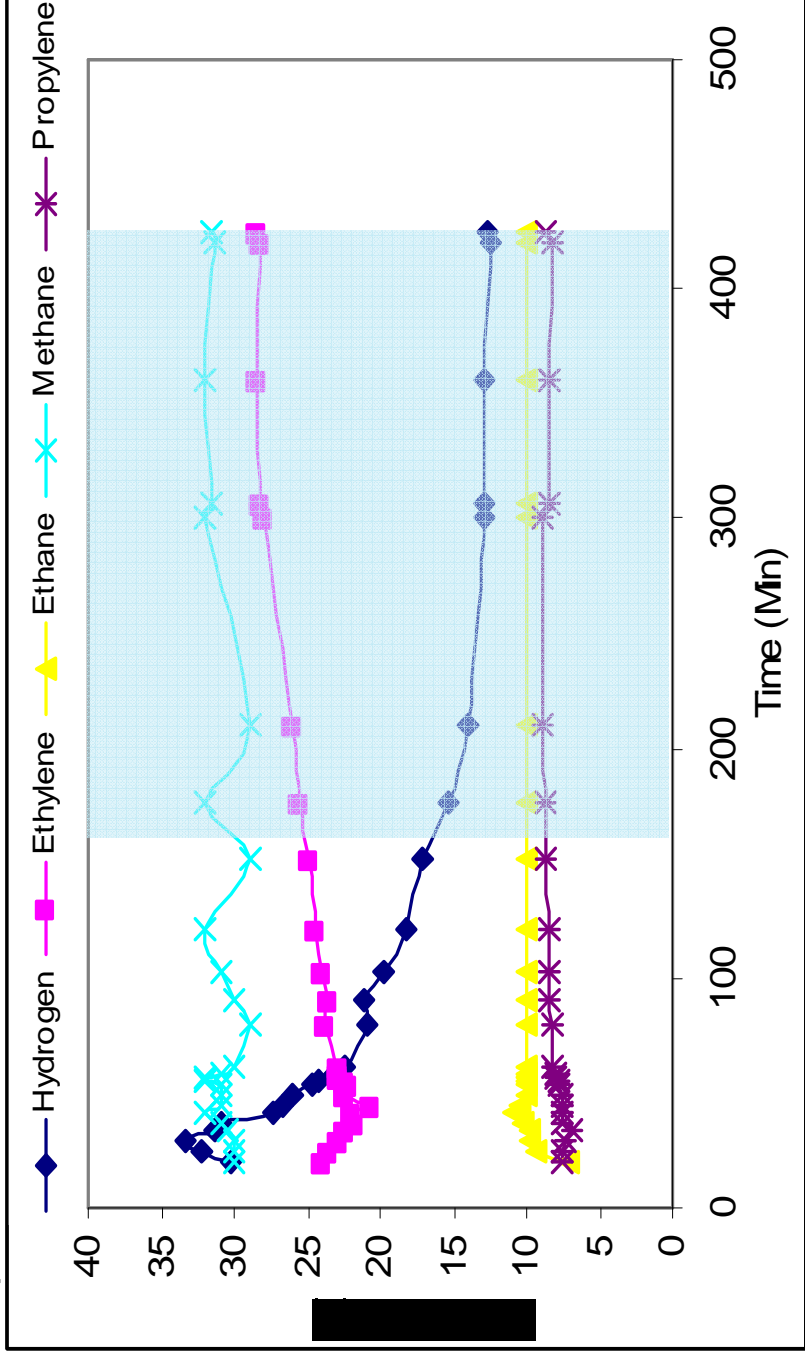
- Temperature: 600, 700 °C
- Pressure: 1 atm
- Fuels: Diesel (Procured at pump), JP 8 (from Texaco, 1535 ppm sulfur content)
- Catalysts: MFI – 300 (UOP), MFI – 40 (UOP), MBCZ – CH1 (Engelhard)



Results – Typical Gas Distribution

Conditions:

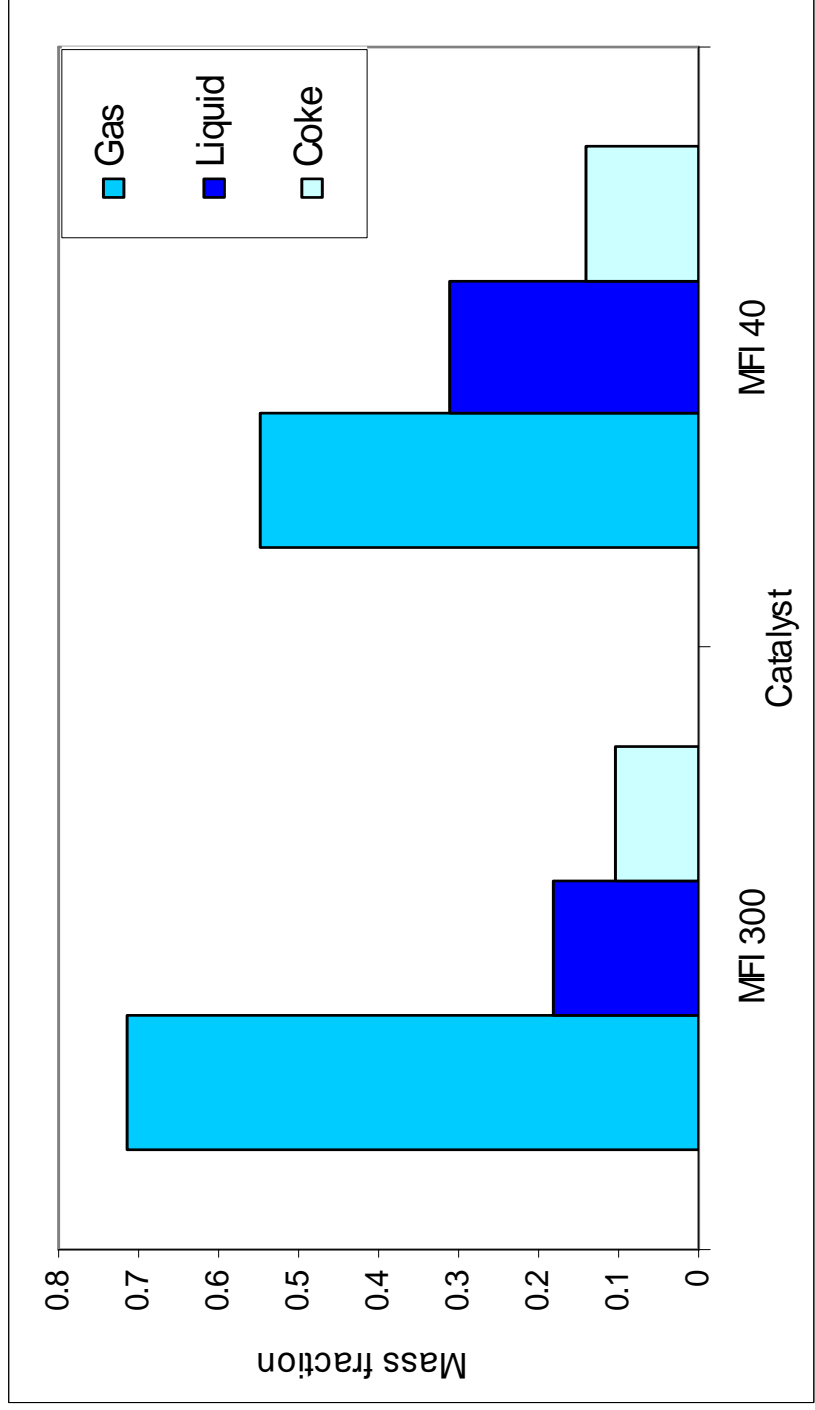
- Fuel = JP 8
- Temperature = 700 °C
- Pressure = 1 atm
- Catalysts = MFI-300



Catalyst Activity Comparison

Conditions:

- Fuel = JP 8
- Temperature = 700 °C
- Pressure = 1 atm
- Catalysts = MFI-300, MFI-40

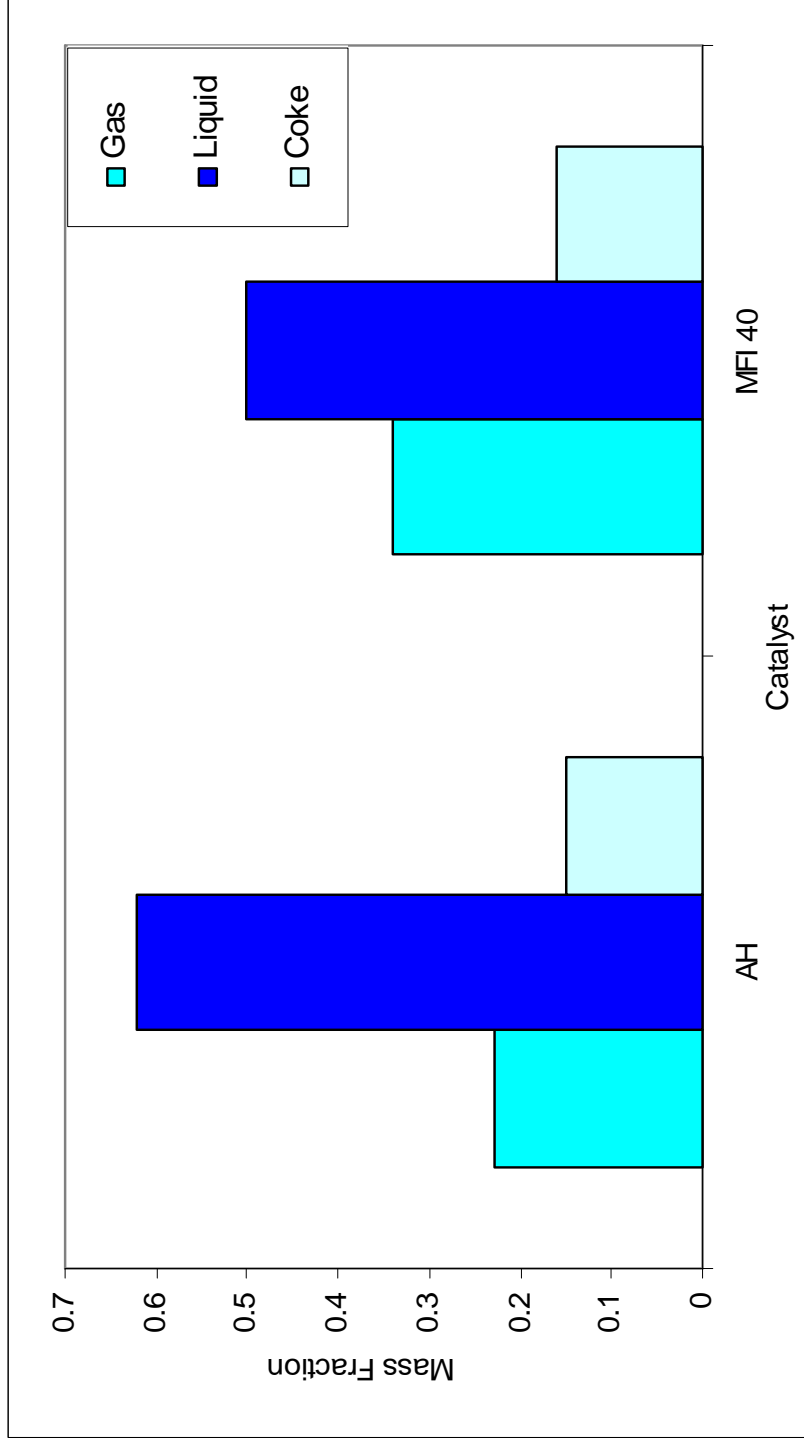




Catalyst Activity Comparison Ctd.

Conditions:

- Fuel = Diesel
- Temperature = 600 °C
- Pressure = 1 atm
- Catalysts = MFI-40, MBCZ – CH1(AH)

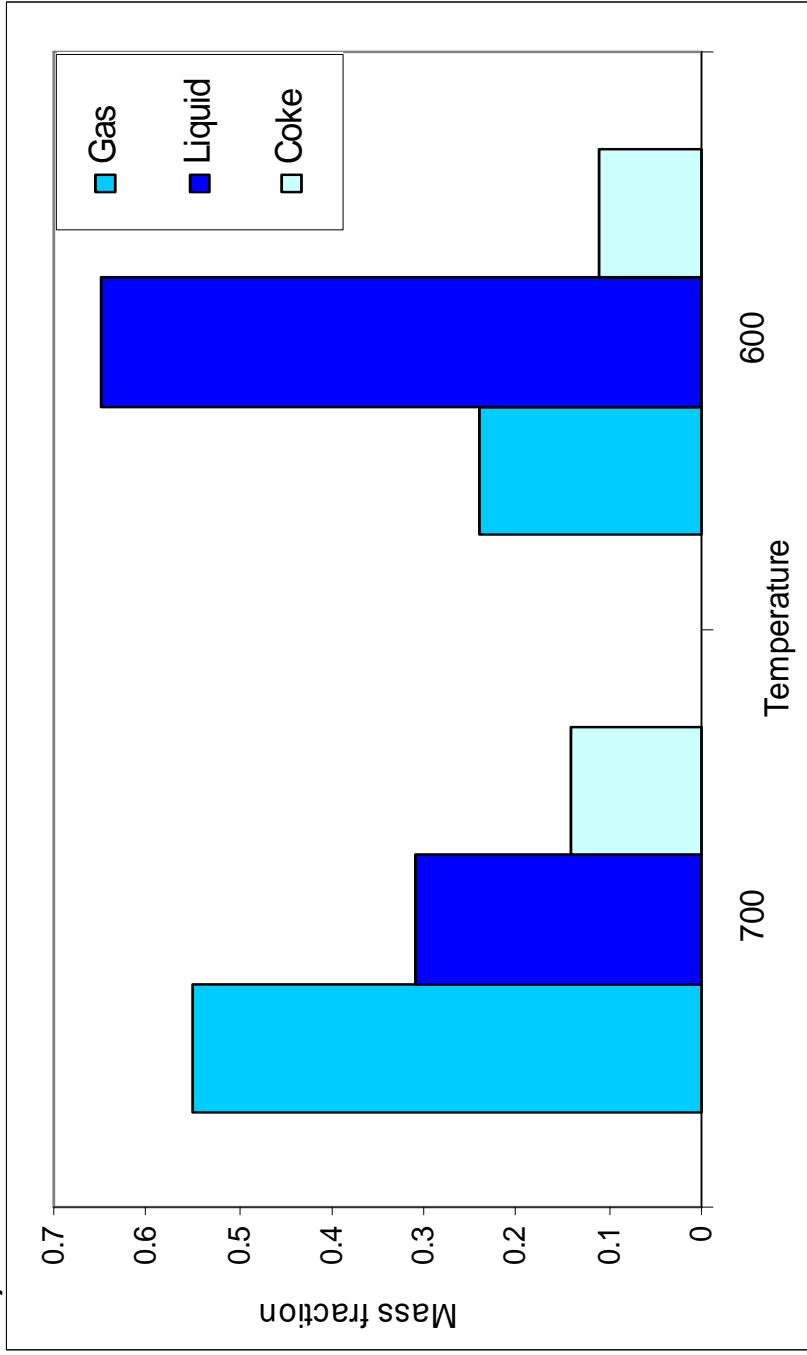




Activity as a Function of Temperature

Conditions:

- Fuel = JP 8
- Temperature = 600 °C, 700 °C
- Pressure = 1 atm
- Catalysts = MFI-40

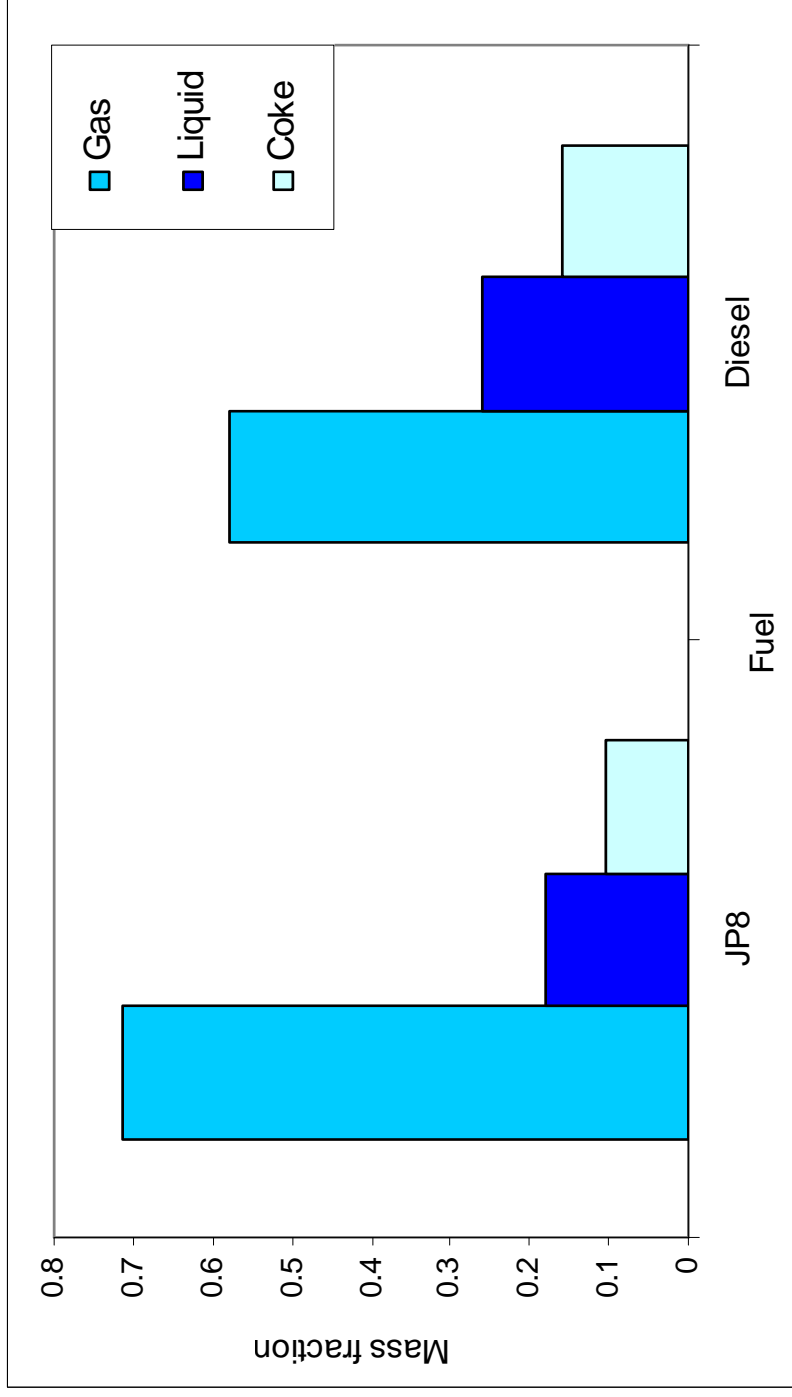




Fuel Comparison

Conditions:

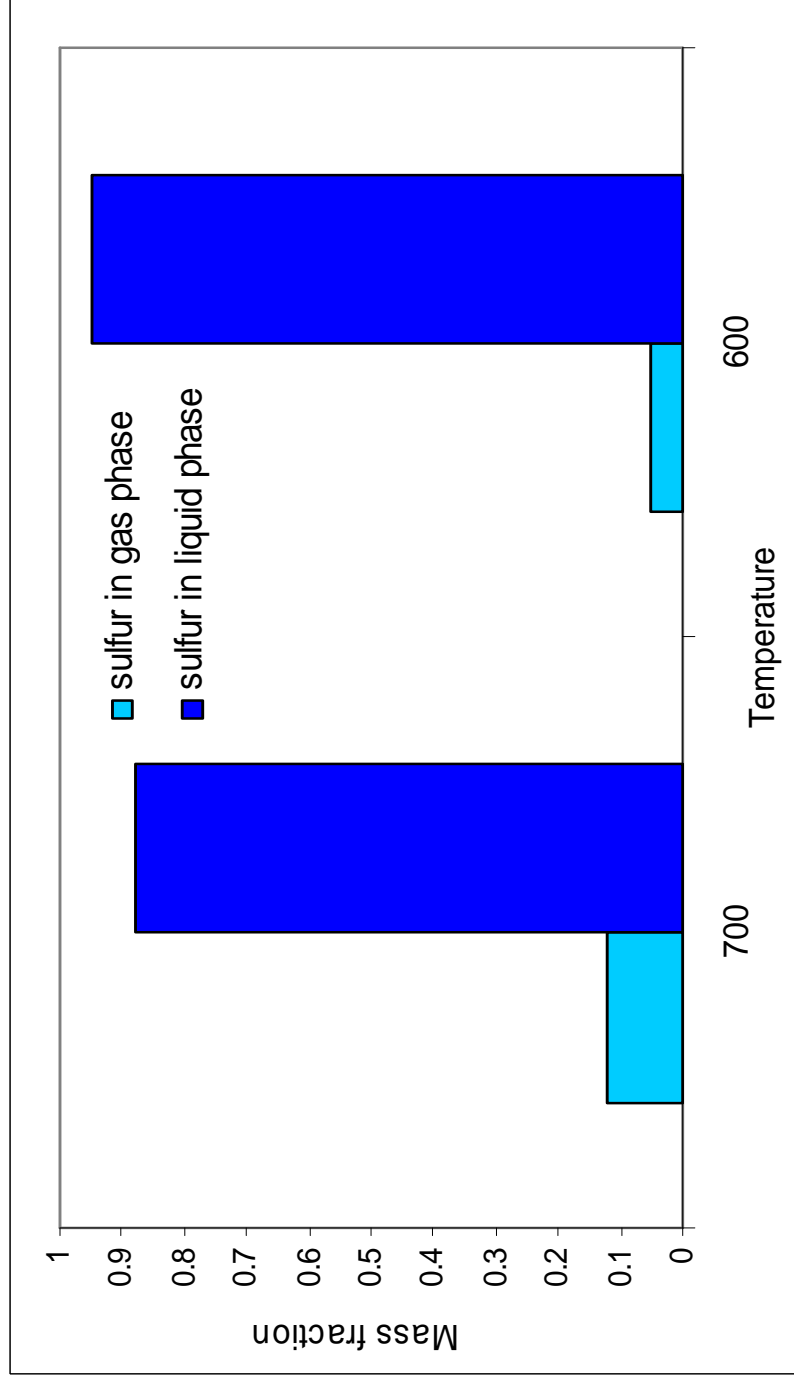
- Fuel = JP 8, Diesel
- Temperature = 700 °C
- Pressure = 1 atm
- Catalysts = MFI-300



Sulfur Distribution

Conditions:

- Fuel = JP 8
- Temperature = 600 °C, 700 °C
- Pressure = 1 atm
- Catalysts = MFI-40

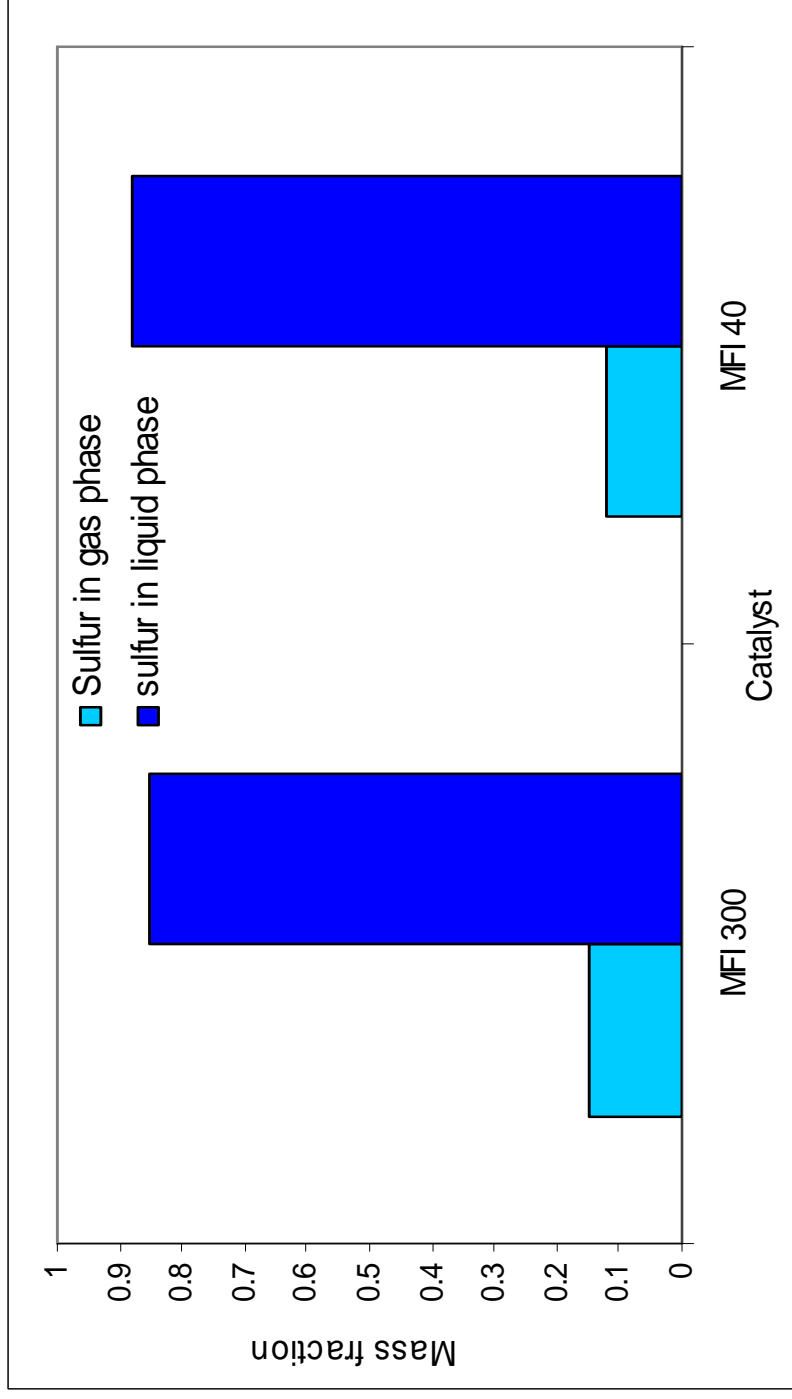




Sulfur Distribution Ctd.

Conditions:

- Fuel = JP 8
- Temperature = 700 °C
- Pressure = 1 atm
- Catalysts = MFI-40, MFI 300





Closing Notes & Future Work

- Final efficiency = 78% (without PSA)
= 58% (with PSA)
- Cracking could be a feasible way to process high sulfur logistics fuel
- Regeneration studies on cracker would yield more specific results
- Design of a robust cracking-regeneration scheme



Thank you 😊

