A Kinetic Study of $NH_3/H_2/CH_3OH$ Fuel Mixture

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Introduction

Power to Fuel

Co-firing

NH_3

- High ignition temperature.
- Low flammability.
- Possible NO_X emissions.

+

CH_3OH

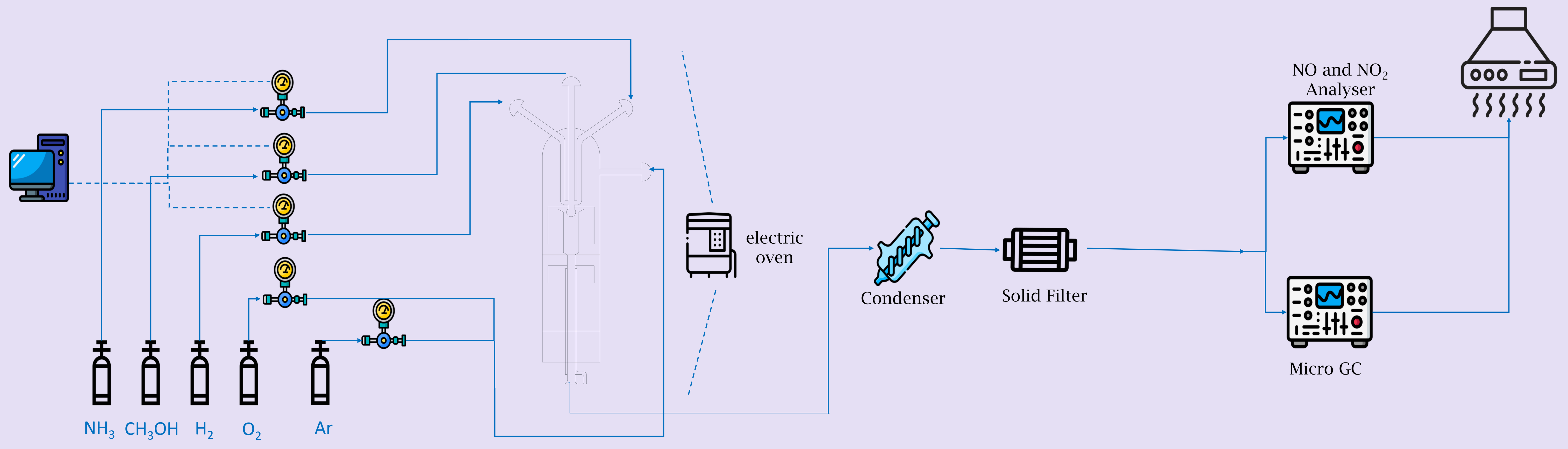
- Better ignition temperature.
- Low NO_X emissions.
- No soot emissions.

+

H_2

- High efficiency
- Clean combustion.
- Complete oxidation.

Methodology



- ✓ NH_3 = 500 ppm
- ✓ CH_3OH = 500 ppm
- ✓ H_2= 500 ppm
- ✓ λ = 0-2
- ✓ T = 875 – 1425 K

Experimental + Simulation

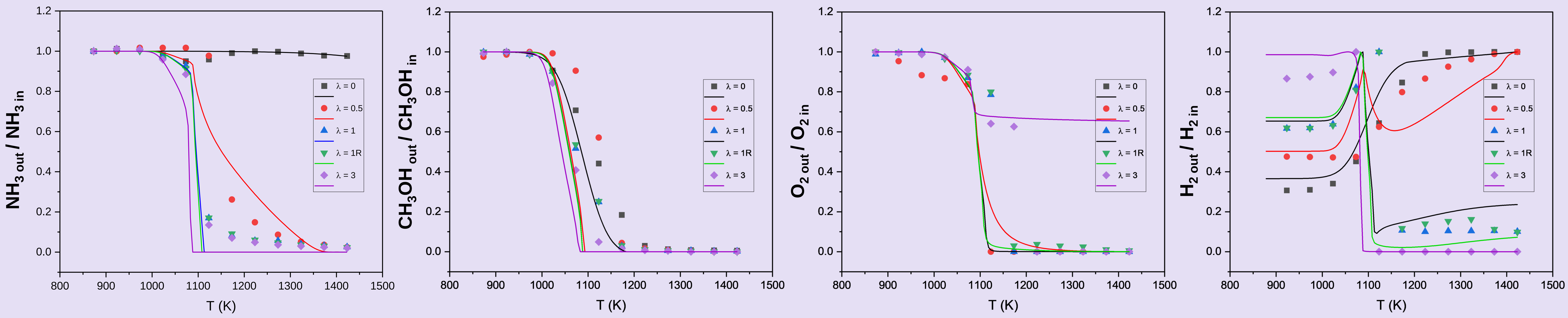


Figure 1. Species profiles in $NH_3/CH_3OH/H_2$ oxidation depend on λ.

Conclusions

NH_3 + CH_3OH + H_2 → BEST

- ✓↑λ promotes ammonia conversion and shifts the onset of oxidation to lower temperatures.
- ✓Under λ = 0, NH_3 remains unreacted.
- ✓For λ ≥ 1, complete NH_3 conversion occurs at ~1100 K.
- ✓Excellent repeatability at λ = 1 demonstrates the reliability of the experimental methodology.

References

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