

Supplementary Information

Microexplosions in the evaporation of biomass-derived pyrolysis oils and the effects of simple fuel processing

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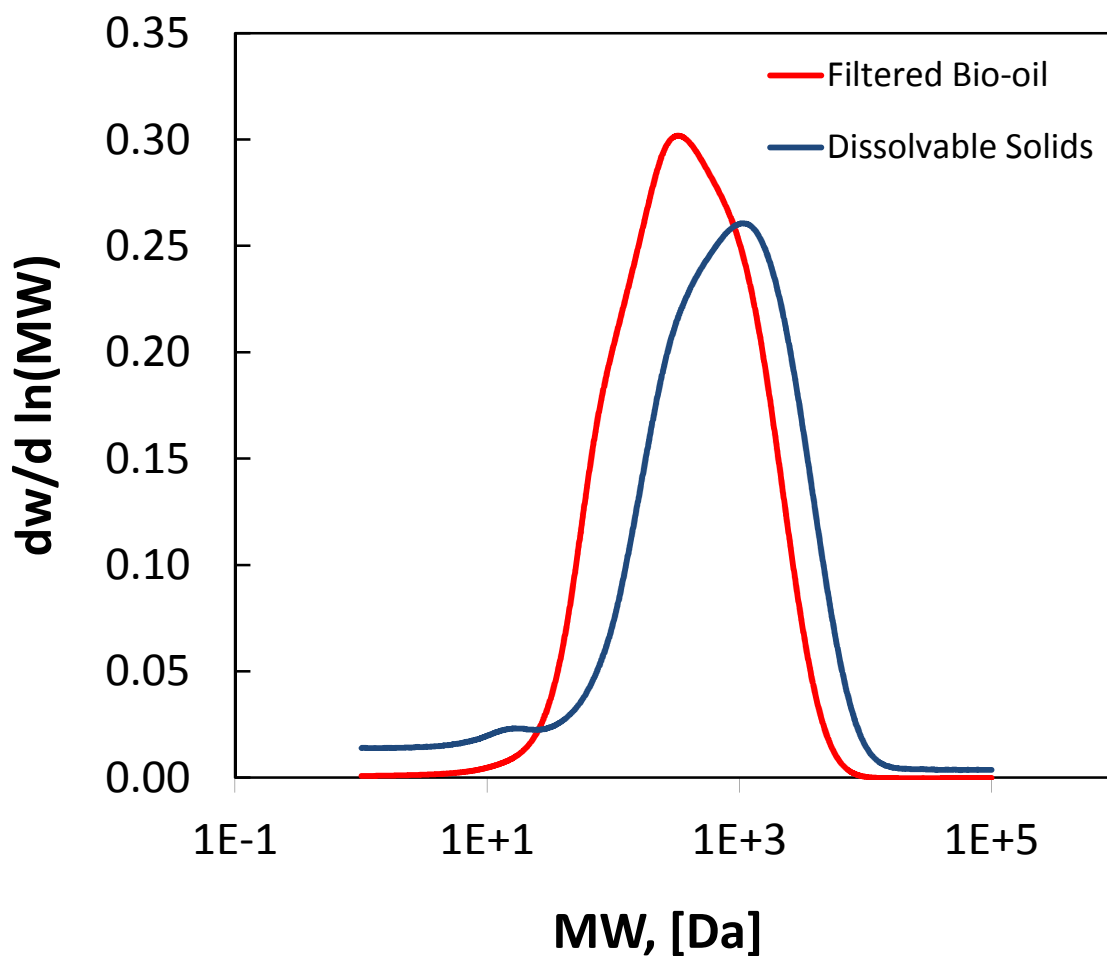
Overview of Supplementary Information

The supplementary information consists of the following files.

- Supporting Materials and Methods (this document)
- Supporting Figures (this document)
- Supporting Videos
 - Supporting Video 1 – Bio-oil Evaporation
 - Supporting Video 2 – Filtered Bio-oil Evaporation

S1. Supplementary Materials and Methods

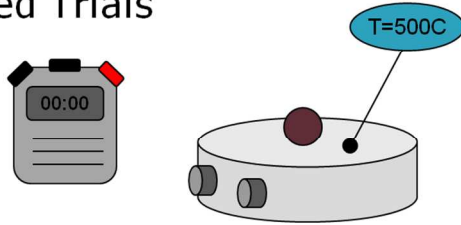
S1.1. Gel Permeation Chromatography (GPC)



Gel permeation chromatography was performed by dissolving 0.01 mL filtered bio-oil into 1.0 mL tetrahydrofuran (THF). Polystyrene standards (Varian EasiVial PL2010-0402) were used to calibrate the size distribution. Results indicate a shift toward higher molecular weight compounds in the solid sample.

S1.2. Experimental Pyrolysis Setup

■ Timed Trials



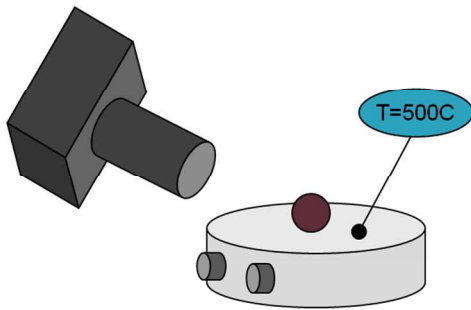
No. of Runs: 20-100

Data Recorded:

1. Time
2. Probability

T=500 °C, Flowing N₂

■ High speed photography



No. of Runs: 25-50

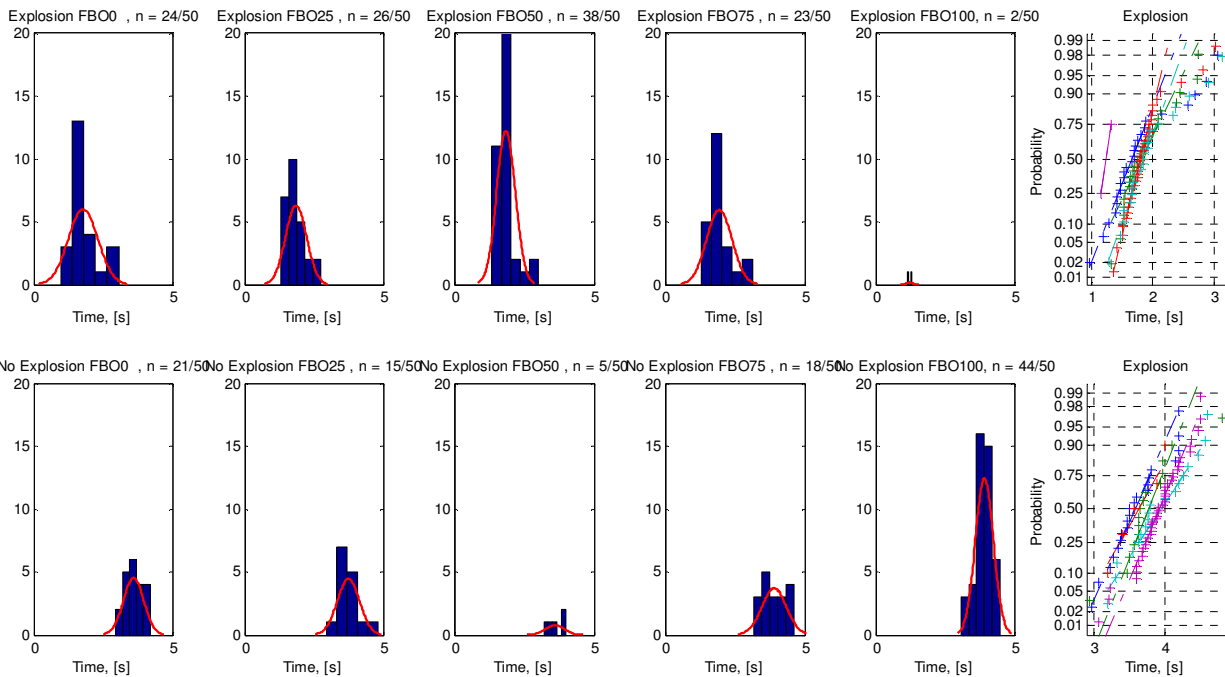
Data Recorded:

1. Qualitative observations, (1000fps)
2. d(t), (25 fps)

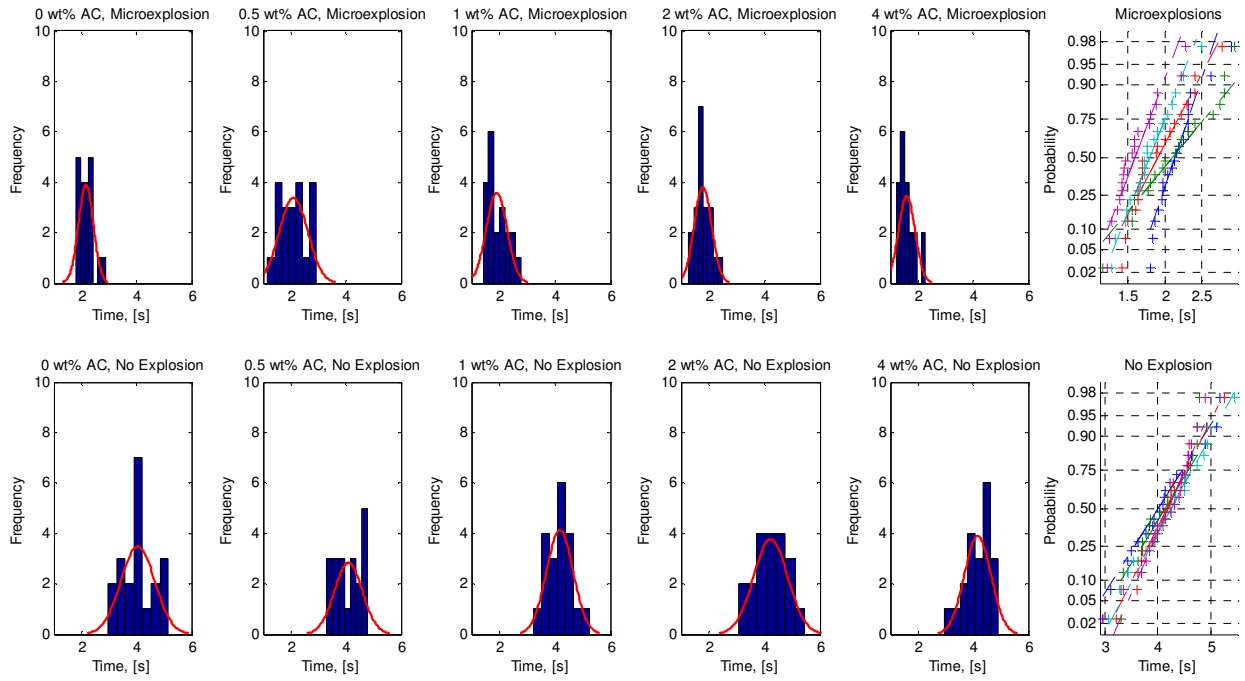
T=500 °C, Flowing N₂

S1.3. Statistical Analysis of Timed Trials

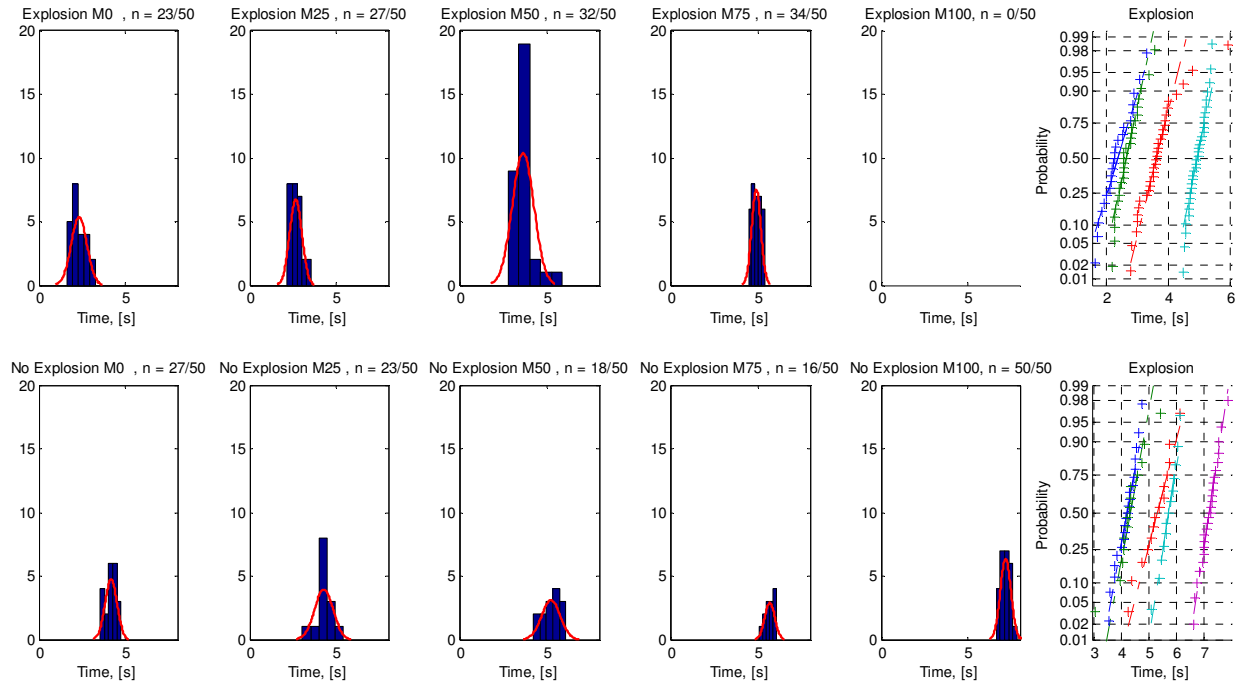
S1.3.1. Filtered Case



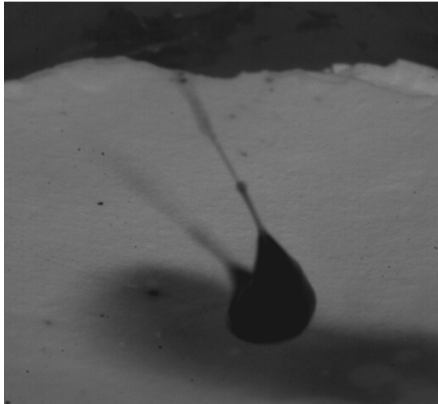
S1.3.2. Activated Charcoal Case



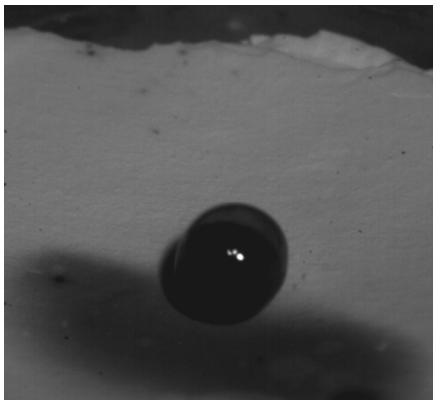
S1.3.3. Methanol Case



S1.4. Additional Frames (Pure Bio-oil)

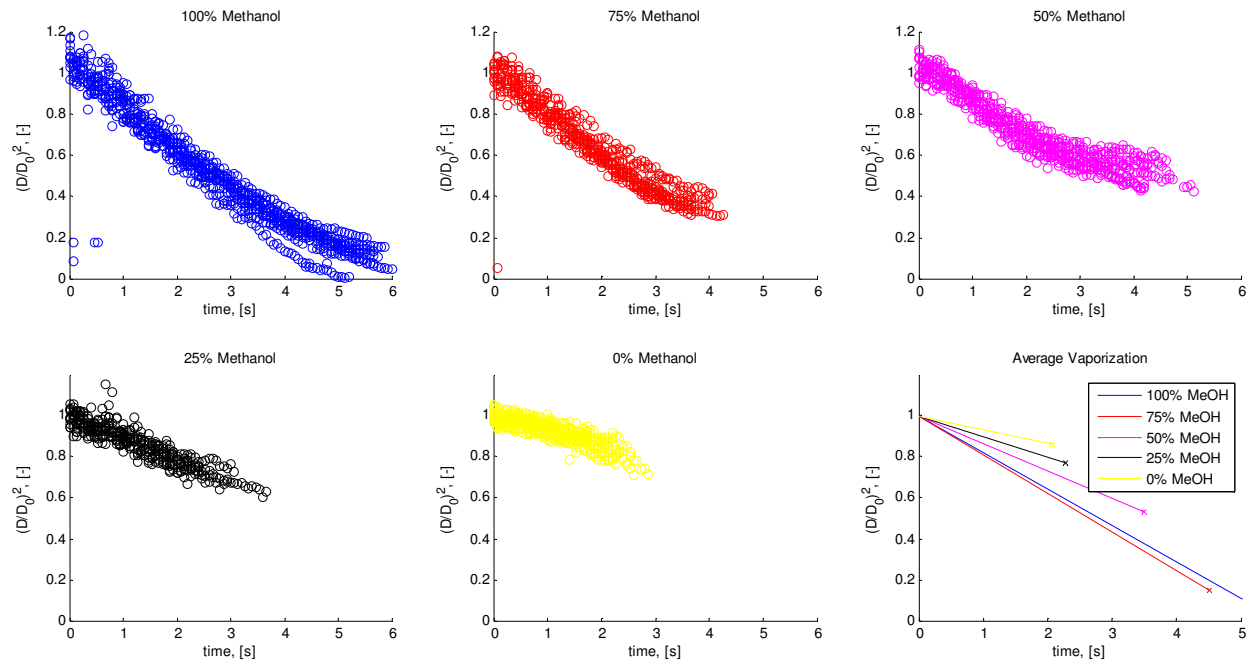


Bio-oil jetting, $t = 1174\text{ms}$



Bio-oil internal bubble formation, $t = 1527\text{ms}$

S1.5. Methanol Evaporation Rates



S1.6. Methanol Evaporation Rates

