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Introduction

- Biomass is a sustainable and effective solution to CO₂ emission reduction.
- Pelletisation results in higher energy density, ease of handling and transportation.
- For efficient combustion, pellets need to be pulverised.
- Finer particles of <63µm release more volatiles contributing almost 100% in flame propagation without formation of char.
- Inerts like ash+moisture act to reduce the reactivity that is more severe for wood as compared to crop residues.

Experimental Methodology

- Modified Hartmann dust explosion tube was used for measurements of flame speed and minimum explosive concentration (MEC) [1].
- Dust is pneumatically dispersed with pre-existing spark.
- Pressure transducer and array of thermocouples recorded pressure rise and time of flame arrival (flame speed).

Conclusions

- Average particle size of different sized fractions against their respective MEC obtained from modified Hartmann tube.
- Minimum explosible concentration decreases with decreasing particle size.
- Good correlation of %ash+H₂O vs. MEC were obtained for biomass samples.
- % ash+H₂O affect MEC more for wood samples than for crop residues.

Results

- For biomass samples 90% of the volatiles released at around 450°C in contrast to coals (750°C).
- Fine particles with higher surface area release more volatiles.
- No evidence of char residue left for fine particles of biomass.

References