

Characterization and Kinetics Study of Off-gas Emissions from Stored Wood Pellets

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The potential health impact from the emissions of biomass fuels, including wood pellets, during the storage and transportation has not been documented in the open literature. The purpose of this study is to provide data on the concentration of CO₂, CO, and CH₄ from wood pellets stored in sealed vessels, and to develop a simple kinetic model for predicting the transient emission rate factors at different storage temperatures. Five medium size metal reactors (30 cm diameter by 60 cm long) equipped with heating and temperature control device were used to study the temperature effect on the off-gas emissions of wood pellets. Concurrently ten small aluminum canisters (10 cm diameter by 25 cm long) were used to study the off-gas emissions from different types of biomass materials. Concentrations of CO₂, CO and CH₄ were measured by a GC as a function of storage time and storage temperature. The results showed that concentrations of CO, CO₂ and CH₄ in the sealed space of the reactor increased over time, fast at the beginning but levelling off after a few days. A first order reaction equation fitted the data well.