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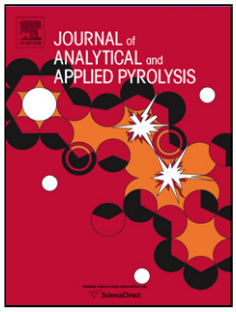


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# Fast pyrolysis of coal particles in a novel hot plate reactor: Implications of the reaction atmosphere on the reactivity and char chemical structure

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**HIGHLIHTS**

- It is proved the relevance that the coal rank has on devolatilization process.
- In pulverized coal the volatile properties in $CO_2$ are not determinants at high HR
- Time scale of the pyrolysis determines the impact of secondary processes.
- Changes in chemical structure during pyrolysis depend on atmosphere reaction

## Abstract

Fast pyrolysis of pulverized coals (Highly Volatile Bituminous C-(HVBC) and Semi-anthracites (SA) were studied in a novel hot plate reactor (HPR). The combined effect of the heating rate (HR) and the reaction environment inside the reactor on chars structure were detailed analyzed. The iso-conversional Flynn–Wall–Ozawa (FWO) methodology was utilized to study mass loss during fast pyrolysis of both coals. It was found that, at high HR, the mass loss rate during pyrolysis and the degree of microstructural ordering reached by the chars strongly depend on secondary reactions between carbonaceous structures, the volatiles and the reaction atmosphere.