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1	Volatile production from pyrolysis of cellulose, hemicellulose and lignin
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6	Abstract
7	To better understand pyrolysis mechanism and further develop selective pyrolysis
8	technology, characteristics of volatile products in the pyrolysis of three main
9	components (cellulose, hemicellulose and lignin) were investigated and compared by
10	amplifying experiments in a tube furnace at 300-700 °C. Distribution of volatile
11	products (including bio-oil and bio-gas), the influence of temperature and
12	contributions of each single component were discussed in depth. It was found that, for
13	each sample pyrolysis, pyrolysis temperature and their own chemical structures
14	played an important role in the yields, composition of bio-oil and bio-gas. The
15	optimal temperatures for production of bio-oil from cellulose, hemicellulose and
16	lignin focused at 500 $^\circ$ C, 450 $^\circ$ C and 600 $^\circ$ C, respectively, and cellulose made greater
17	contribution to bio-oil formation, and hemiellulose was the major contributor for
18	bio-gas. Moreover, the more bio-gases from the three components generated at the
19	higher temperature, but compositions of volatile products were different depending on
20	their unique chemical structures. In the three components, cellulose produced the
21	highest CO, hemicellulose owned the highest CO ₂ , and lignin generated the highest
22	CH ₄ characterized by the largest HHV. As for bio-oil, cellulose bio-oil displayed
23	unique saccharides and higher furans, hemicellulose bio-oil contained higher acids
24	and ketones, while phenols were the dominant composition of lignin bio-oil.
25	Keywords: Pyrolysis; Cellulose; Hemicellulose; Lignin; Bio-oil; Bio-gas

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