Composition of phenolic compounds in gasification wastewater

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Research

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Abstract

The crude phenol was used as raw material, which was extracted by organic solvent from wastewater of typical fixed bed gasification process. The distillation range of raw materials was analyzed. According to the results of distillation range analysis, the wide and narrow fractions of raw materials were cut by using real boiling point distillation device. The method of derivatization pretreatment combined with gas chromatography external standard was used for qualitative and quantitative analysis of phenolic compounds in different fractions. The results showed that the yield of the fraction below 290 ℃ was 68.50% (mass fraction), in which 33 kinds of effective phenolic compounds could be identified, and the total amount of identified phenols was nearly 80%. The content of eight phenolic compounds was relatively high, among which the content of phenol was the highest (26.34%) , followed by catechol 13.44%. Among these phenolic compounds, the content of the remaining six phenols ranged from 4 to 8%, the total content of m-cresol and p-cresol was more than 12%, and the content of 5-indenol was nearly 8%. The yield of the fraction rich in low-grade phenol below 230 ℃ was 35.40%, in which the content of phenol was more than 40%, the total content of cresol was more than 23%, and the total content of m-cresol and p-cresol was nearly 20%. At room temperature, the fractions of 235 ~ 245 ℃ and 245 ~ 260 ℃ were white crystals, in which catechol content was about 50%, and 5-indenol content was more than 10%. The content of these two phenolic compounds with high added value was low in typical coal tar, so it was difficult to extract them. However, they could be enriched in gasification wastewater by water selection due to their strong polarity and good water solubility, which made it possible for them to be further extracted.

Full Text

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Figures

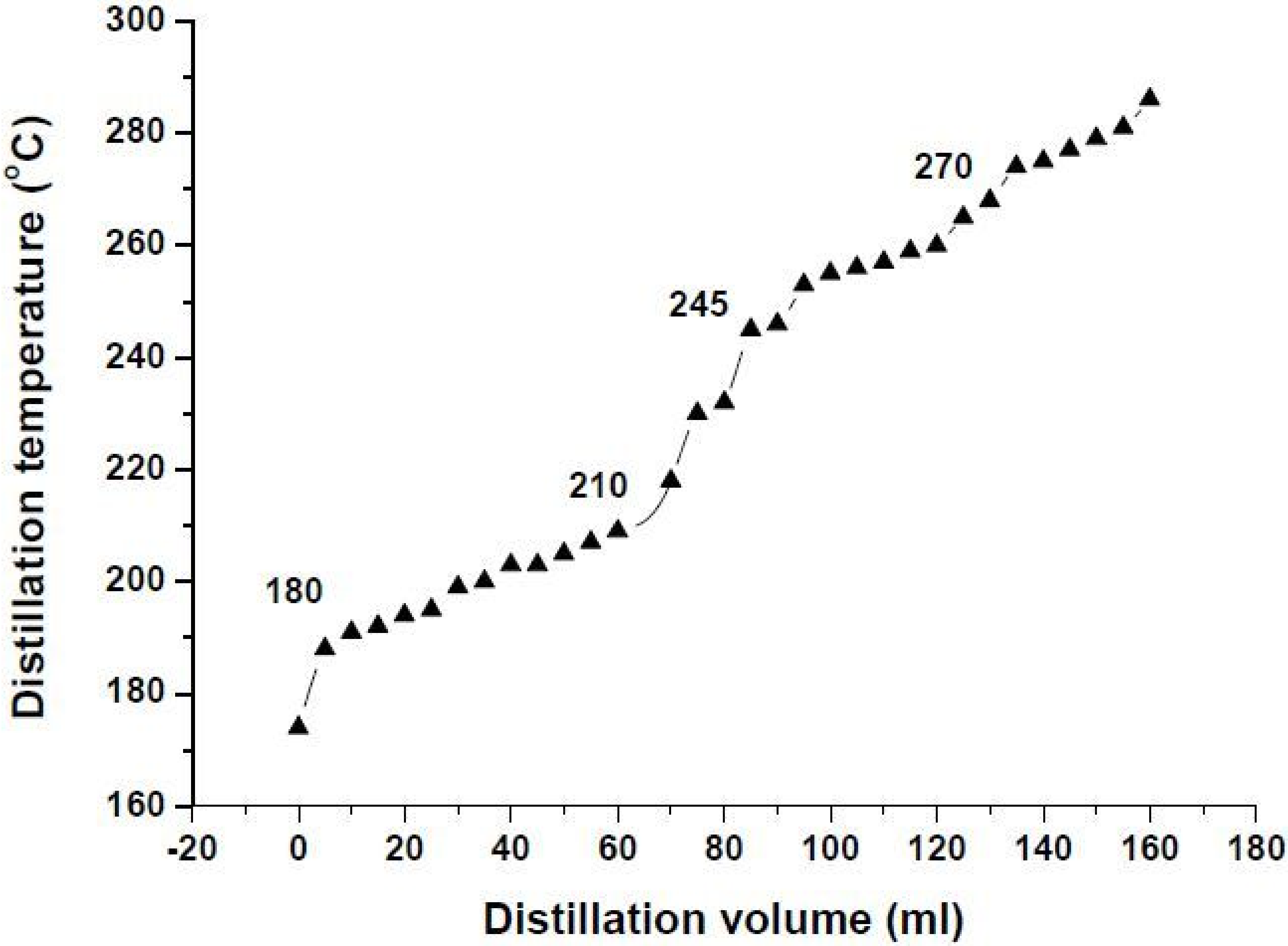

Figure 1

Distillation range analysis of raw material

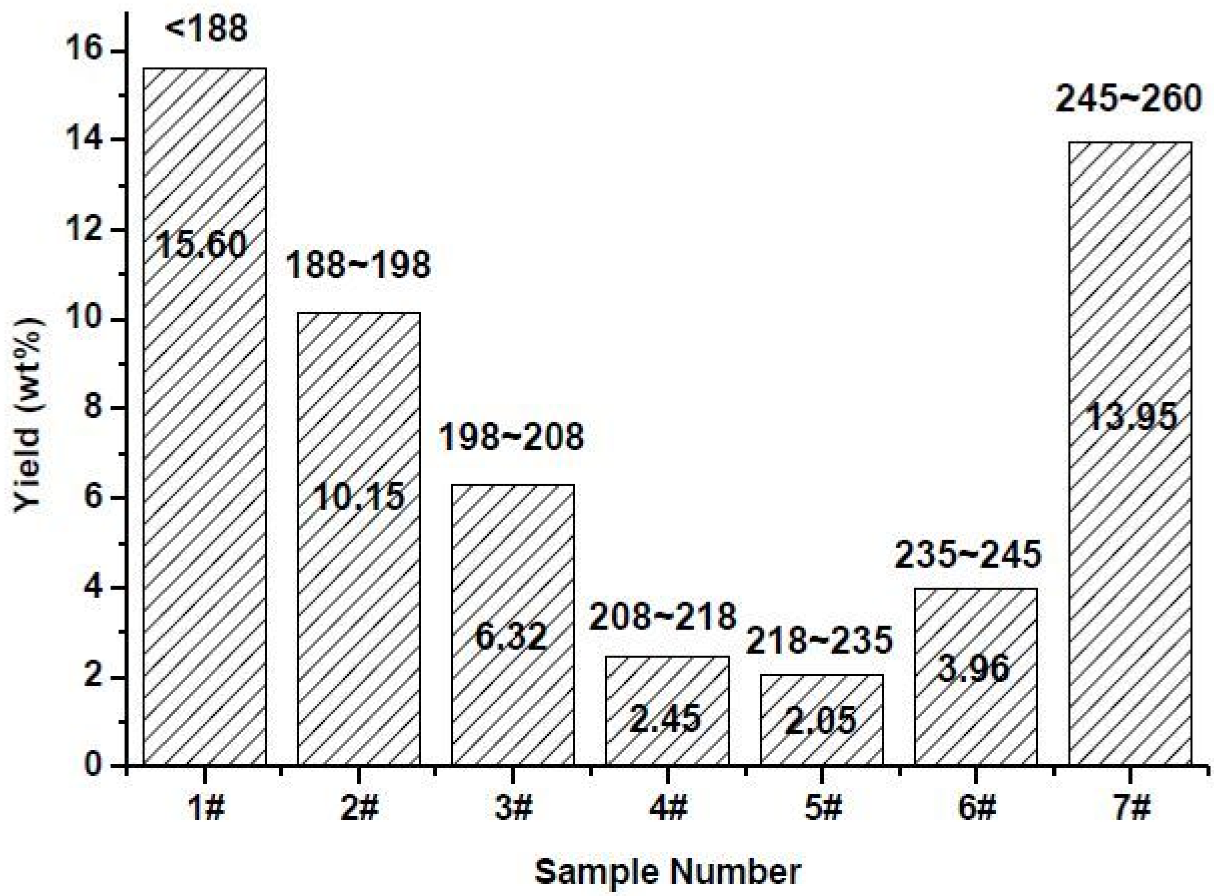

Figure 2

Narrow fraction analysis of raw material

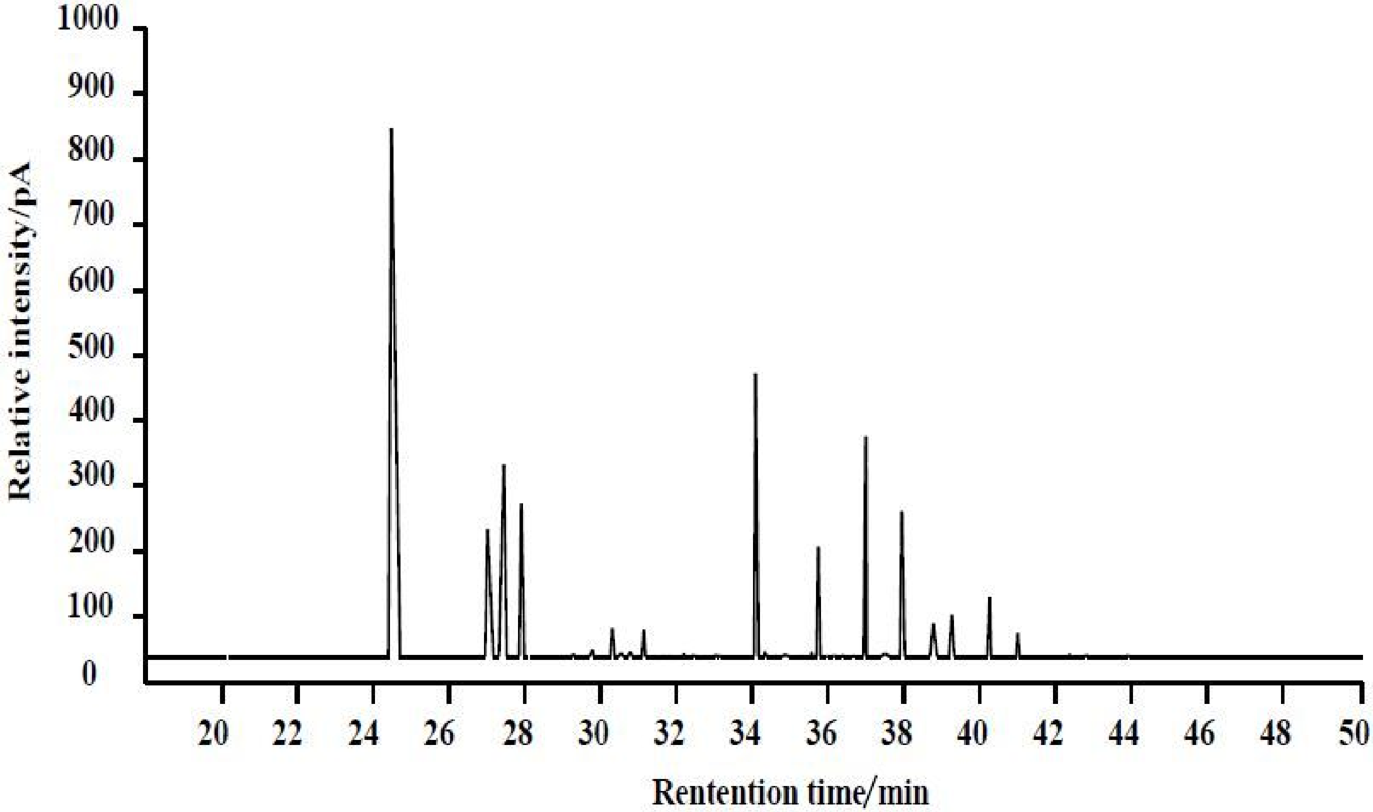

Figure 3

Gas chromatogram of <290°C fraction

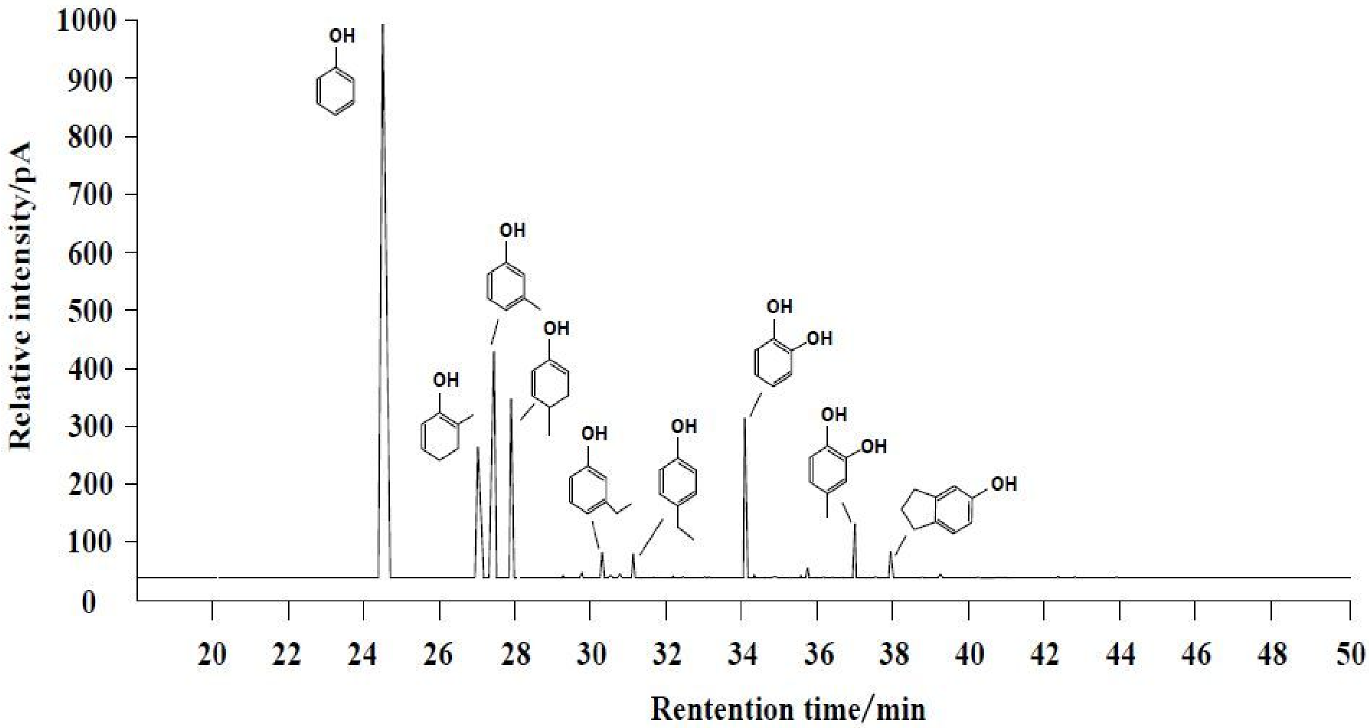

Figure 4

Gas chromatogram of <230°C fraction

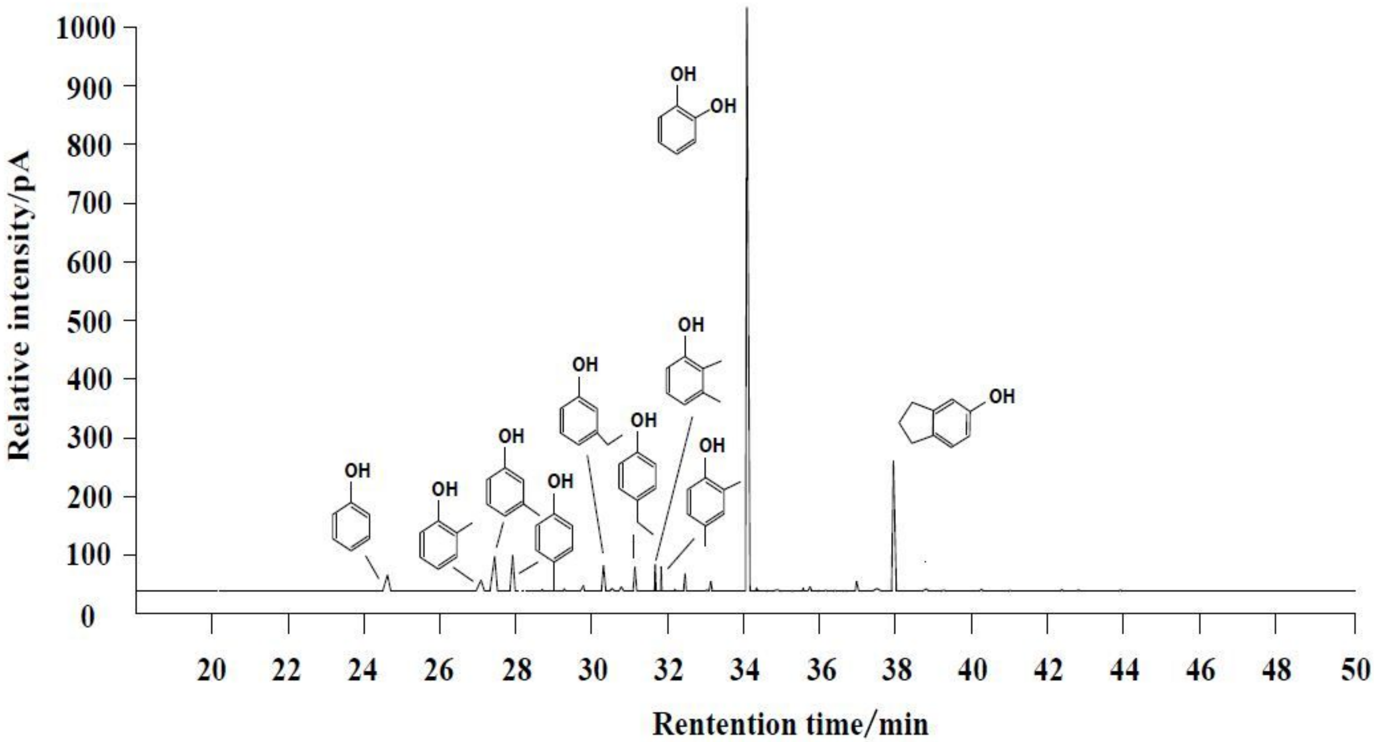

Figure 5

Gas chromatogram of 235~245°C fraction

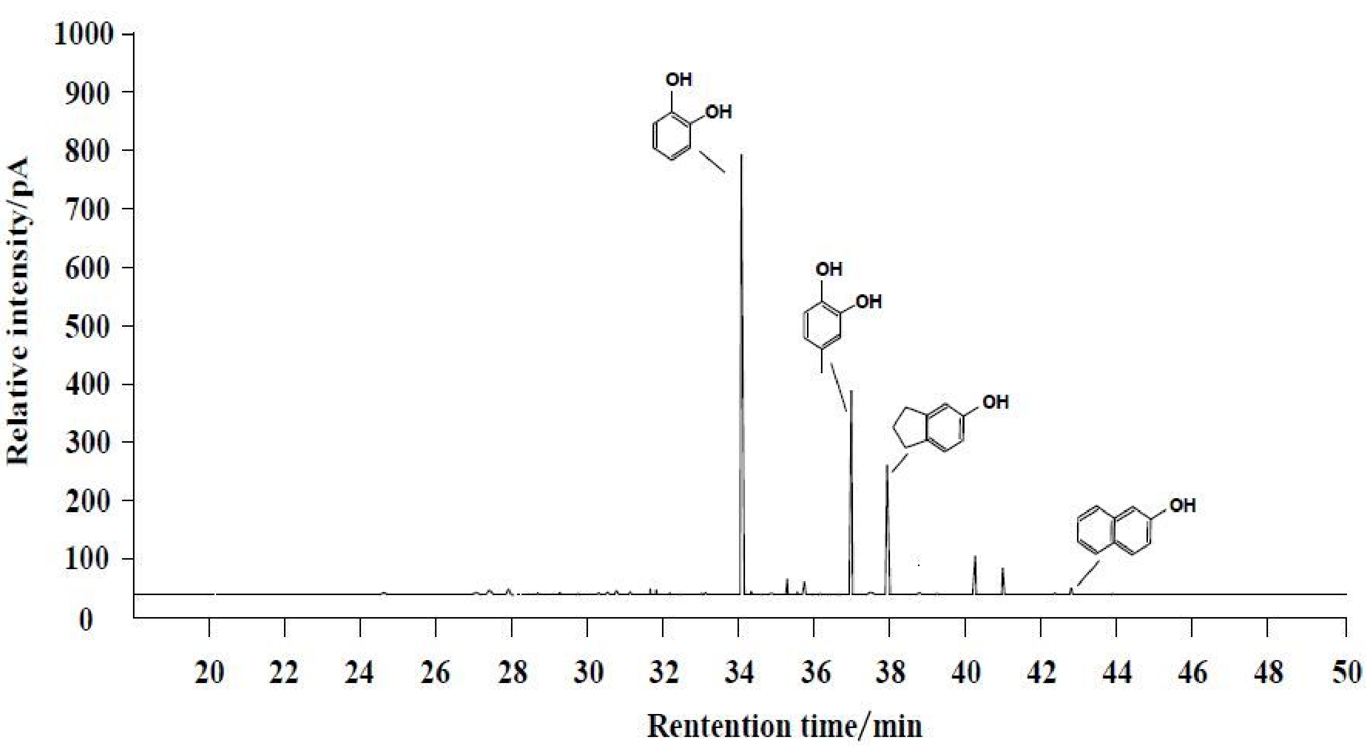

Figure 6

Gas chromatogram of 245~260℃ fraction