

Investigation of the Composition and Structure of Tar by Lignite Pyrolysis Using Thermogravimetry, Gas Chromatography and Mass Spectrum Coupled Instrument System

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Abstract : Understanding the macromolecular structure of low-rank coal is very important for its gasification and liquefaction. The pyrolysis is one of the methods of analyzing the macromolecular structure of coal. The gaseous products decomposed directly by the raw lignite at 500 °C and indirectly by tar products from raw lignite pyrolysis at 500 °C were investigated and compared by thermogravimetry, gas chromatography and mass spectrum coupled instrument system (TG/GC/MS) in this paper. The results show that 52 kinds of products were found from the raw lignite and 70 kinds of products from the tar. The pyrolysis products directly from the lignite appear more monocyclic aromatic hydrocarbons and less substituent groups or branch chain, compared with the products from the tar. There is less linear chain and double bonds structure in the tar, which can be speculated that linear chain and double bonds structure took part in the generation of condensed rings and other reactions. There are more kinds of phenol and furan in the tar, which indicate that these products may be generated from the secondary reaction. The formation process of phenol, phenol naphthalene, naphthene and furan are discussed.

Keywords : composition and structure, lignite, pyrolysis of coal, tar, TG/GC/MS

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