

Analysis of Coal Tar Compositions Produced from Sub-Bituminous Kalimantan Coal Tar

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Abstract : Coal tar is a liquid by-product of coal pyrolysis processes. This liquid oil mixture contains various kind of useful compounds such as benzoic aromatic compounds and phenolic compounds. These compounds are widely used as raw material for insecticides, dyes, medicines, perfumes, coloring matters, and many others. The coal tar was collected by pyrolysis process of coal obtained from PT Kaltim Prima Coal and Arutmin-Kalimantan. The experiments typically occurred at the atmospheric pressure in a laboratory furnace at temperatures ranging from 300 to 550oC with a heating rate of 10oC/min and a holding time of 1 hour at the pyrolysis temperature. Nitrogen gas has been used to obtain the inert condition and to carry the gaseous pyrolysis products. The pyrolysis transformed organic materials into gaseous components, small quantities of liquid, and a solid residue (coke) containing fixed amount of carbon and ash. The composition of gas which is produced from the pyrolysis is carbon monoxide, hydrogen, methane, and other hydrocarbon compounds. The gas was condensed and the liquid containing oil/tar and water was obtained. The Gas Chromatography-Mass Spectroscopy (GC-MS) was used to analyze the coal tar components. The obtained coal tar has the viscosity of 3.12 cp, the density of 2.78 g/cm³, the calorific value of 11,048.44 cal/g, and the molecular weight of 222.67. The analysis result showed that the coal tar contained more than 78 chemical compounds such as benzene, cresol, phenol, xylene, naphtalene, etc. The total phenolic compounds contained in coal tar is 33.25% (PT KPC) and 17.58% (Arutmin-Kalimantan). The total naphtalene compounds contained in coal tar is 14.15% (PT KPC) and 17.13% (Arutmin-Kalimantan).

Keywords : coal tar, pyrolysis, gas chromatography-mass spectroscopy

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