Investigation of the Processing of Libyan Crude Oil Residues into Carbon Fibers

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Abstract

The high cost of the present carbon fiber precursors led researchers to investigate new and cheaper sources. Hence, the scientists all over the world have been making their efforts to develop materials suitable to their native country and attempting to find new ways to make carbon fiber. This study aims to investigate the processing of Libyan oil residues into high quality carbon materials. Samples from Bouri, Es Sider and Amna crude oils were processed by vacuum distillation and air blowing methods to produce pitch precursors. Softening point (SP), FT-IR, TGA, and SEM were performed to characterize the petroleum pitch, the as spun fibres, the stabilized fibres and the carbon fibres. Vacuum distillation markedly decreased atomic H/C ratio and increased aromaticity as well as the softening point. FT-IR analysis of the produced pitches showed that the relative intensities of the bands associated with aliphatic structure decreased with increased softening point, while the bands of aromatic structure were found to be slightly increased. The formation of the oxygenated compounds was the major feature of the air blowing technique. The softening point of the blown pitches could be raised to about 1750C, giving a relatively less weight loss (64%). Carbon fibres have been produced successfully from the Bouri oil residues. The Bouri Vacuum distilled pitch was successfully melt-spun into fibres. The resulting fibres were stabilized by oxidation with air. The morphology of the Bouri carbon fibers was studied by scanning electron microscopy (SEM).

Index Terms— Carbon Fibres, Chemical Structure, Petroleum Pitch

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