

Extraction of phenols from coal tar by Ionic liquids

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INTRODUCTION

Coal tar is usually found in the industry as a by-product of coal gasification or pyrolysis. It is an important source for producing fuel oil and chemicals, and consists of 10 wt% aromatics, 70 wt% hydrocarbons and 20 wt% phenolic compounds. In the production of fuel oil, it is necessary to remove the phenolic compounds from coal tar for following reasons: firstly, it can decrease the oxygen content in oil, thus increases the heat capacity. Secondly, removing the phenolic compounds before hydrogen treating process can reduce the consumption of hydrogen. Moreover, it decreases the acidity and corrosivity of the oil. For the phenols compounds, it is useful in organic chemical industry for producing phenolic resins, engineering plastics, medicines etc.

In our work, we focus on extracting the phenol compounds from the coal tar by Ionic liquid to get a cleaner tar oil and to extract the phenols in a greener way than the present methods available.

METHOD

Firstly, we have created a model oil containing phenol and o-, m-, p-cresols (phenol compounds) in a mixture of hexane/toluene, to represent coal tar. The model oil was then mixed with ionic liquid in a conical flask for half an hour at room temperature under stirring. A phase separation was observed and both phases were analyzed for chemical compositions. Afterwards the phenol was extracted from the ionic liquid, by using an extracting solvent of diethyl ether. The concentration of phenols was measured with high performance liquid chromatography (HPLC). The experiments were performed several times with different ionic liquids. The best suitable ionic liquid was chosen based on the phenols concentration results. The ionic liquid was recycled to minimize waste and cost.

RESULTS

The results will be presented at the Green Challenge event in Denmark.

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