

Effect of ZSM-5 catalyst/tyre ratio on product of Catalytic Pyrolysis of tyre wastes

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Abstract

In this study, the influence of ZSM-5 zeolite catalyst was examined on the product of thermal pyrolysis of catalysis of waste tyres. Discarded tyres of buses and trucks were thermally pyrolysed in a fixed bed reactor and the evolved pyrolytic gases were passed through a condenser. The ultimate aim of this research was to observe the influence of ZSM-5 catalyst on the chemical composition of pyrolytic oil of waste tyre. The impacts of pyrolysis temperature, catalyst-tyre (CT) ratio on derived products were also examined. As the pyrolysis temperature and the catalyst-tyre (CT) ratio were increased the production of oil and char increased at the same time the production of gas has been decreased. Additionally, as catalyst-tyre ratio of tyre pyrolysis was increased from 0.1 to 0.15 the results of elemental analysis discovered that the Carbon percentage increased from 86.81% to 88.60% and the Sulfur percentage reduced from 1.325% to 1.064%. It was also revealed from the GC-MS analysis data that area percentage of certain aromatic compounds has gone higher as the catalyst-tyre ratio increased. The presence of toluene, O-xylene, Naphthalene and Phenol in pyrolytic oil of waste tyres increased considerably with a CT ratio of 0.15 and this type of pyrolytic oil could be used potentially as chemical feedstock in various industries.

Keywords

Thermal Pyrolysis, Catalyst, Waste Tyre, ZSM-5 Zeolite, Aromatic Compounds