

CONVERSION OF HDPE INTO HYDROCARBONS USING FLY ASH AS CATALYST

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Abstract

Hydrocarbons have been obtained by cracking waste plastic syringes, made of high density Polyethylene (HDPE), using lignite fly ash a catalyst. Waste plastic syringes were obtained from Raja Muthiah Medical College of our University. Fly ash was obtained from the thermal plant at Neyveli which is 30 km away from our university.

A plant was constructed for the conversion of 1 kg of the polymer. The reactor was made using stainless steel. Heating was done using cooking gas. The temperature inside the reaction chamber was measured using a thermocouple. The oil evolved was collected in a measuring jar. The uncondensed gas was analysed using AVL Di gas 444 analyser.

Cracking was done without catalyst, using 100 g catalyst, 150g catalyst and 200 g catalyst. The amount of hydrocarbons obtained increased with increase in the amount of catalyst used.

By analyzing the material remaining in the reactor after the complete evolution of the oil, it was found that the degradation was complete when the amount of catalyst used was 200g. The temperature at which the evolution of oil was complete decreases with increase in the amount of catalyst used. When 200g catalyst was used the evolution of the oil and gas was complete at 350°C. The yield of the oil was 65.3% which is higher than all the previously reported yields. Also when the amount of catalyst used was 200 g the catalyst was recovered in the pure form suggesting that the yield of the gaseous hydrocarbons is 34.7%.

The physical properties of the catalyst oil were evaluated using standard methods. The observed physical properties suggest that the oil obtained is a mixture of petrol and diesel.