

Studiul procesului de piroliză aplicat componentelor și amestecului de fracții ligno-celulozice, organice și polimerice

Abstract

Scopul principal al acestei lucrari este de a valorifica energetic deseurile generate in zonele de food court din centrele comerciale, denumite generic Food Court Waste (FCW). Valorificarea energetica propusa este tratarea prin piroliza a deseului. Este prezentata o analiza sintetica a situatiei actuale deseurilor de tip FCW din Romania si Europa si legislatia in vigoare aferenta gestionarii corespunzatoare a acestora. Perspectiva producerii energiei din aceste deseuri este prezentata pe baza consumului foarte mare de surse conventionale de energie si a cantitatilor limitate ale acestora. In vederea realizarii caracterizarii energetice a deseului FCW au fost utilizate diferite instalatii si echipamente din laboratorul de Surse Regenerabile din cadrul facultatii de Energetica. Un aspect important al acestei lucrari este cercetarea fundamentala in ceea ce priveste cinetica de reactie. In vederea realizarii calcului energiilor de activare au fost abordate doua metode de calcul pe baza ecuatiei lui Arrhenius.

Compozitia deseului este foarte variabila si cuprinde mai multe componente (hartie, carton, lemn, mase plastice, fractie organica). In vederea realizarii unor esantioane omogene si reprezentative compozitia a fost redusa la fractie ligno-celulozica, fractie polimerica si fractie organica. Determinarile experimentale au fost realizate pentru fractiile componente si pentru deseul FCW in vederea stabilirii celei mai bune situatii. A fost determinat randamentul procesului de piroliza in fiecare situatie analizata pentru obtinerea unor parametrii optimi de proces.

Cuvinte cheie: piroliza, cinetici de reactie, ecuatiea lui Arrhenius, deseuri tip FCW, energie

Study of the pyrolysis process applied to the components and mixture of ligno-cellulosic, organic and polymeric fractions

Abstract

The main purpose of this paper is the energy recovery of the waste generated in the food court areas of the shopping centers called Food Court Waste (FCW). The study is structured around the pyrolysis process applied on the waste and the main components. Also, the work presents a synthetic analysis of the current situation of FCW waste from Romania and Europe and the legislation in force regarding their proper management. The perspective of energy generation from these wastes is presented based on the high consumption of conventional energy sources and their limited quantities. In order to achieve the energy characterization of the FCW waste and pyrolysis products, various equipments and instalations were used (from Renewable Sources Laboratory of the Faculty of Power Engineering). An important aspect of this paper is the fundamental research on reaction kinetics. In order to calculate the activation energies, two calculation methods were approached based on Arrhenius equation.

The composition of the waste is very variable and includes several components (paper, cardboard, wood, plastics, organic fraction). In order to reproduce homogeneous and representative samples, the composition was reduced to ligno-cellulosic fraction, polymer fraction and organic fraction. The yield of the pyrolysis process was determined in each analyzed situation in order to obtain optimal process parameters.

Key-words: pyrolysis, kinetics, Arrhenius, wastes (FCW), energy