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THE PRODUCTION OF GOOD QUALITY SOLID FUEL FROM LOW GRADE LIGNITE AND WASTE TYRE CO-CHEMICAL PROCESS

Senay BALBAY and Caglayan Acıkgoz

Bilecik Seyh Edebali University, Faculty of Engineering, Chemical and Process Engineering Department,Bilecik, TURKEY
senay.balbay@bilecik.edu.tr

By the year 2013 the lignite mine reserves in Turkey were determined to be 13.8 billion tons. These lignite contain high levels of ash, humidity, and sulphur. Because of their high ash, humidity, and sulphur contents such coals deemed as low quality when burned or gasified for electricity production are known to cause environmental problems. The rubber based wastes such as expired tires and the scrap side products during their production that may be vulcanized or not, are qualified as biomass. The quantity of the expired tires produced in Turkey is around 300,000 tons per year. In this study, chemical degradation studies of the waste tyre rubbers crumb-Low Rank Lignite mixture were carried outusing oxidative cleavage by inorganic and organic chemicals to decompose easily on account of cross linking and stabilizers.it is aimed that both the waste tire degradation, and the scraping of ash and sulfur from the lignites have been performed with a co-process and obtained the high caloric value coal resembling solid products. Experimental studies were performed in these stages; 1)The preparation of waste tires and lignite samples and analysis, 2) Chemical degradation of the waste tire and lignite together and obtain a solid product, 3)characterisation of the solid product and the analysis of sulfur and ash removal efficiency.Elemental analysis of the waste tyre rubbers crumb, lignite and solid products was performed on a LECO CHNS 628 modelelemental analyzer. The HHV values were calculated by Beckman's Formula HHV (MJ/kg) = 0.352C + 0.944H + 0.105(S–O). C, H, S, O represent carbon, hydrogen, sulphur and oxygen content of material, respectively, expressed in % by mass on dry basis. Determination of ash, moisture and volatile matter was performed according to ASTM Standards The surface morphology of solid product was performed by means of a scanning electron microscope (SEM-ZEISS Supra 40VP). BET surface area measurements using N_2 gas adsorption isotherms were completed with a Micromeritics ASAP 2020 gas adsorption porosimeter. The Infrared analyses were obtained using Perkin Elmer Spectrum 100 modal FTIR spectrometer with (ATR). Density measurements by Automatic Gas pycnometer (Micromeritics Accupyc II 1340).As a result, the reduction of ash and sulfur content was found approximately 60% and the idea of the utilization of low quality coal together with the waste tire by the application of the chemical degradation results obtained are promising.

Keywords: Lignite, desulphurisation, ash removal, waste tyre, chemical degradation.