

Production and combustion evaluation of refuse-derived fuels from cow dung ⁽¹⁾

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Abstract

In this study, the solids of cow dung (CD) were collected from the mechanical scraper (MS), waterwheel solid-liquid separator (WSS), and inclined screen separator (ISS) of a dairy farm, which produced into CD solid derived fuels using solar drying. The particle size, calorific value, and combustion pollutants (particulate pollutant, sulfur oxides, nitrogen oxides) from the fuels were analyzed for the traits and composition. The results showed that the percentages of particle size over 3.8 mm after the solid-liquid separation were 94.3, 71.8 and 43.9%, respectively, for MS, WSS and ISS of cow dung derived fuels. The calorific values of the fuels were between 3,974-4,195 kcal/kg, which were feasible for utilization as the alternative fuel. These 3 solid-derived fuels of CD included C (35.1-42.7%), H (5.39-6.08%), O (30.8-36%), N (1.37-2.37%), and S (0.23-0.51%). After combustion, the corrected concentration ranges of SO₂, NO₂, and particulate pollutants in the exhaust pipe were (204-283 mg/Nm³), (617-701 mg/Nm³), and (1,564-3,873 mg/Nm³), respectively. Only SO₂ complied with the air pollutant emission standards of Taiwan. Therefore, this research suggests that in the future, means by adjusting the size of derived fuel particles, adding auxiliary ingredients, air supply, furnace geometry, combustion temperature, and type of combustion technology could be adopted to improve and reduce the air-pollutant concentration.

Key words: Cow dung, Refuse-derived fuels, Solid-liquid separation, Calorific value.

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