DEVELOPMENT OF ENVIRONMENT FRIENDLY KILNS FOR PRODUCTION OF CHARCOAL

BY

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ABSTRACT

The aim of this study is to develop an environment friendly kiln to reduce emissions and the energy used in carbonization process. The studied factors are two types of wood namely “casuarina and citrus”: (a) casuarina: with four moisture contents of 6.8, 8.7, 11.8 and 13.1 %. (b) citrus: with constant moisture-content of 7 %, pyrolysis temperatures of 300, 350, 400 and 450 ^{o}C and emissions treatment by burning, “burning and chemicals” and without emission treatment. The summarized results were the maximum charcoal yield of 50.38 % was obtained with wood moisture content of 6.8 % and kiln temperature of 300 ^{o}C. Meanwhile, the minimum charcoal yield of 32.19 %. was obtained with wood moisture-content of 13.1 % and kiln temperature of 450 ^{o}C. The maximum volatile matter of 21.25 % was obtained using citrus charcoal at kiln temperature of 300 ^{o}C. Moreover, the minimum volatile matter of charcoal of 4.13 % was obtained using casuarina charcoal at kiln temperature of 450 ^{o}C. The maximum fixed carbon of charcoal of 84.81 % was obtained using citrus branches at kiln temperature of 450 ^{o}C. Meanwhile, the minimum fixed carbon of charcoal of 65.13 % was obtained using casuarina at kiln temperature of 300 ^{o}C. The maximum CO of 2153.6 mg.m^{-3} was obtained without emission treatment at kiln temperature of 350 ^{o}C. Moreover, the minimum CO of 171.2 mg.m^{-3} was obtained using emission treatment by burning and chemicals at kiln temperature of 50 ^{o}C. The maximum production-cost of 8.26 L.E./kg was obtained by using “burning + chemical” emissions-treatment at kiln temperature of 450 ^{o}C and moisture content of 13.1 %. Meanwhile, the minimum production cost of 2.90 L.E./kg was obtained by using burning emissions-treatment of kiln temperature 300 ^{o}C and moisture content of 6.8 %.

Keywords: Carbonization, charcoal quality, wood moisture-content, citrus branches, casuarina wood and emission treatment