ABSTACT

In this study, oil palm trunks of 25 year-old trees which cannot be extracted oil from fruit bunch were utilized as fibers to reinforce composite for sound absorption materials. Oil palm trunk fibers were extracted by chemical treatment using 25 %w/w NaOH and then bleached by 30% hydrogen peroxide by fiber dry weight. Yield of palm trunk fiber after extraction is 40.85%. Two formulas of sound absorption materials were formed as non-woven fabric by thermal bonding method. First sound absorber composed of oil palm trunk fibers and low melts polyester fibers at ratio of 60:40 with composite thickness of 30 mm and weight per area of 2000 g/m^2. Second one was composed of oil palm trunk fibers, polyester fibers and low melt polyester fibers in the ratio of 50:25:25 with composite thickness of 15 mm and weight per area of 1000 g/m^2. Two times increasing of thickness and density of the composite led to two times increasing of noise reduction coefficient (NRC) and thermal resistance. In addition, tensile strength, air permeability, sound transmission loss and sound absorption coefficient for all frequency also increased. Moreover, oil palm trunk fiber composites were compared with recycle cotton fiber composites (commercial one). The oil palm trunk fiber composites had all properties less than the recycle cotton fiber composites except for tensile strength due to thicker fiber diameter. Moreover, the effect of thickness and weight per area of the second formula of oil palm trunk fiber composite was studied by thermal bonding method. Increasing of weight per area of oil palm trunk fiber composites for 2 times led to reducing of thermal resistance and air permeability, but tensile strength of the composites increased. While increasing thickness of the second formula composite to be 2 times cannot improve all physical properties as in the case of increasing weight per area, but led to increasing of thermal resistance to be 2 times. Increasing weight per area of oil palm trunk fiber composites can improve sound absorption coefficient as well as increasing thickness of the composite. When 2 mm thickness and 260 g/m^2 polyester nonwoven composite were prepared as the top layer of oil palm trunk fiber composites, the bilayer composites of both formulas can improve thermal properties, air permeability, tensile strength and sound absorption coefficient of the single layer one. In conclusion, the appropiate palm trunk fiber composite for using as sound absorption material is bilayer composite between first formula of palm trunk fiber composite and 260 g/m^2, 2 mm thickness polyester nonwoven because it ensures the best mechanical, thermal and sound absorption properties.

Key words: Oil palm trunk fibers, composites for sound absorption materials, sound absorption, bilayer composite

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(1) *ฝ่ายเทคโนโลยีชีวมวลและพลังงานชีวภาพ สถาบันค้นคว้าและพัฒนาผลิตผลทางการเกษตรและอุตสาหกรรมเกษตร ม. เกษตรศาสตร์ (Biomass and Bio-energy Technology Division, Kasetsart Agricultural Agro-Industrial Product Improvement Institute (KAPI), Kasetsart University)*

(2) *ภาควิชาวัสดุศาสตร์ คณะวิทยาศาสตร์ ม. เกษตรศาสตร์ (Department of Materials Science, Faculty of Science, Kasetsart University)*

(3) *ภาควิชาวิทยาการสิ่งทอ คณะอุตสาหกรรมเกษตร ม. เกษตรศาสตร์ (Department of Textile Science, Faculty of Food Agro-Industry, Kasetsart University)*