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"Role of chemist and polymer experts in the development of downstream plantation industries"

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UTILIZATION OF INDUSTRIAL WASTE PULP FIBERS WITH HEMP FIBERS TO BE CARDBOARD

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ABSTRACT

Fiber pulp industrial waste (sludge) and hemp fibers as lignocellulosic fiber material abundant in number and been widely used to indicate its use as raw material for cardboard industry. Flax stems made of flakes, processed pulp by using a closed warm soda chemical process in the digester with a cooking conditions: 2.5% NaOH concentration, the value of hemp stem the appeal of flakes with a solution of 1:6 cookers and cooking time is 2 rs maximum temperature 170 °C at 4-5 atm pressure. The yield of flax stems gained 44.34%. Carton made with position of hemp pulp (PR); pulp sludge (PS) of (100%: 0); (70%: 30%); (50%: 50%); (30%: 70%); (0 : 100%) tapioca adhesive filler kaolin 5% and 5%. Cardboard sheets obtained a grammage 302 to 338 gr/m², density 15 to 0.525 gr/cm³, thickness 0.455 to 0.525 mm, tensile strength ≤120 to 6880 N · m, bursting strength 220 to 1 kPa, ring crush 222 to 459 N, water absorption 572 to 921 gr/m², water content 5.09 to 5.67%. In composition 5% (30%) and (50%: 50%) hemp pulp cardboard sheets - pulp sludge (PR - PS) obtained by SNI 14-5-1996 compliant to class B linerboard.

Key words: Flax Fibre, Fibre Waste industry Pulp, Linerboard

Introduction

The development of Indonesian pulp and paper industry is very rapidly within the last five years. This is shown the increase in pulp production capacity to around 6.5 million tonnes per year, a paper to around 11 million tonnes per year of paper, or an increase of 1.5% for pulp production and 9% for paper production in 2007. Although years 2008-2009 shows a decrease slightly, according to reports Indonesia's pulp and paper associations, APKI. 9. Increased development of pulp and paper industry in Indonesia has had an impact on the increasing environmental problems caused by pollution, particularly wastewater sludge from pulp (Syamsudin et al, 2007). Fiber pulp industrial waste originating from the bell press mangadung water 20-30%, PT Toba Pulp Lestari. A pulp company's production performance of pulp per day 600 tons of solid waste sludge that produces 20 t per day (survey spaciousness, July 2009). Solid waste solid waste sludge is short fibers that still have high fiber content which during the solid waste sludge has not been optimized, a small portion used to be, an alternative fuel as substitute for coal (Syamsudin 2007), adobe (Selly Bambang Supriyadi, 2005), and as a landfill in an area that has provided, while the rest is simply dumped. This research aims to improve the quality of fiber waste from pulp paper from Toba Pulp Lestari-Porsea thus meeting the requirements of SNI 14-0095-1996 as the substitution of materials of cardboard.

Methodology

Making hemp pulp by chemical process heat sealed soda. 234 grams of flax stem fragments inserted in the ester, then add cooking condensation of NaOH 2.5% (1600ml) and then locked with a perfect cover. The cooking was done at a temperature of 170 °C, 4 -5 atm pressure for 2 hours and the time required to reach the temperature of 1 °C is one hour. Weigh the pulp of hemp (PR) and air dried pulp sludge (PS) according to the composition of the mixture of dry air. Before each mixed hemp pulp and pulp sludge disintegrator tool is inserted into the 2000 ml by ling water to as many as 3000 rounds of fiber separation, to obtain the smoothness of about 400 ml CSF. 1000 ml water used to rinse equipment added disintegrator and Hollander beater, then add tapioca pulp disintegrator with nogogeneous stock, then added water with stirring to 2000 ml of 5% has been cooked and 5% kaolin as filler, ring so happened to get the consistency of 1.5%. (Mazlan Ibrahim, Leb Cheu Peng, 2008).
Introduction and Discussion

Grammage Carton

Cardboard grammage is defined as weight divided by vast sheets of cardboard (m²).

Gramemage relation cardboard sheets PR-PS, the composition of fibers in the cardboard as shown in Figure 4.1.

![Graph 1](image1.png)

Figure 4.1. Grafik Grammage (g/m²) vs Fiber Composition in Carton (%)

From the graph in Figure 4.1 above can be analyzed that PR-PS cardboard grammage decrease when the addition of fiber composition, basis weight reduction obtained by each cardboard - each of grammage 302 to 338 g/m². Crease of grammage is also still in the range of SNI. Cardboard grammage influenced by water content and live humidity surrounding the carton. Basis weight is expressed as the total weight of paperboard including water content (Casey, 1981).

Density Carton

Average density relation cardboard sheet PR-PS cardboard sheets, the composition of fibers in the cardboard as shown in Figure 4.2.

![Graph 2](image2.png)

Figure 4.2. Density (gr/cm²) vs. Fiber Composition in Carton (%)

From the graph in Figure 4.2 above graph can be analyzed that the density cardboard sheet PR-PS board was released as linearly when the addition of fiber composition. Density is determined based on the value of a thick of cardboard divided by the grammage.

Tensile Strength

The relationship tensile strength average of cardboard sheets PR-PS, the composition of fibers in the board as shown in Figure 4.3. From the graph in Figure 4.3 above can be analyzed that the tensile strength of board PR-PS there is an increase in liner. This is due to the fine fiber from the waste sludge into fibrils, which is best for inter-fiber binding. Carton PR-PS can be classified into the linerboard.
From the graph in Figure 4.3 above can be analyzed that the tensile strength of cardboard PR-PS there is an increase in liner. This is due to the fine fiber from the waste sludge into fibrils, which is the best for inter-fiber bonding. Carton PR-PS can be classified into the linerboard.

Bursting Strength
The relationship bursting strength average cardboard sheets PR-PS, the composition of fibers in the cardboard shown in Figure 4.4.

From the graph in Figure 4.4 above graph can be analyzed that the crack resistance of paperboard PR-PS there an increase in the optimal mixture composition (70%: 30%). Bursting strength - average PR cardboard sheets - , the composition of the mixture (70%: 30%), amounting to 579 kPa.

Tearing Strength
The relationships tearing strength cardboard average sheets PR - PS, the composition of fibers in the cardboard shown in Figure 4.5. From the graph can be analyzed that the resilience of cardboard torn from PR-PS increased early. Resistance is torn - average maximum PR cardboard - PS occurs at the composition of the mixture (70%: %) greater for 15 691 mN.
Ring Crush
The relationship ring crush average PR-PS cardboard sheets on the composition of fiber in cardboard display as Figure 4.6.

From the graph in Figure 4.6, above can be analyzed that endurance ring crush cardboard PR-PS, increased nearly on the composition of the mixture (50%: 50%).

Conclusion
Utilization of fibers pulp industrial waste (sludge) with hemp pulp on the making of cardboard can be included:
Fiber pulp industrial waste from PT. Toba Pulp Lestari Porsea can be used a substitution material in the manufacture of hemp fiber board.
Physical and mechanical properties of paperboard made from hemp pulp (PR): pulp sludge (PS) of (70% : 30%) and (50%: 50%) obtained can be made into linerboard type B, SNI 14-0123 - 1998.
Fiber waste industrial pulp from PT. Toba Pulp Lestari - Porsea, has a fiber content of 44.34% with a classification of fibers into fine fiber types 60.3%.
References


