HASIL CEK_Charles Banon

by Charles Banon Ijbas

Submission date: 06-Jan-2023 11:34AM (UTC+0700)
Submission ID: 1989078888
File name: 2012-IJBAS-Charles_Banon[1].pdf (276.84K)
Word count: 2310
Character count: 13789

ISSN: 2077-1223 (Online) 2227-2720 (Print)
International Journal of Basic & Applied Sciences IJBAS-IJENS Vol:12 No:06

The Effect Of The Blending Method and Polyisoprene Concentration On The Mechanical Properties Of Lignocellulosicfoam

Charles Banon[a*], Widia Rahmi[b], Bambang Setiaji[c], Ria Armunanto[c], Totok Eka Suharto[d]
[a]Postgraduate Student of Chemistry Department, Faculty of Mathematic and Natural Sciences, University of Gadjah Mada, Sekip Utara, Kotak Pos 21 Bls Yogyakarta, Indonesia
+6285664912774 email: banon_charles@yahoo.co.id / banonc89@yahoo.com
[b]Graduate Student of Chemistry Department, Faculty of Mathematic and Natural Sciences, University of Gadjah Mada / Madrasah Aliyah Negeri I Bengkulu.
[c]Department of Chemistry, Faculty of Mathematic and Natural Sciences, University of Gadjah Mada, Sekip Utara, Kotak Pos 21 Bls Yogyakarta, Indonesia
[d]Department of Chemistry, Faculty of Mathematic and Natural Sciences, University of Bengkulu, Kandang Limun Bengkulu, Indonesia

***Abstract*--** **Researches about the effects of blending method and polyisoprene concentration on the mechanical properties of lignocellulosicfoam have been done. Preparation of lignocellulosicfoam was Blended lignocellulosic and polyisoprene by spraying and stirring method with various concentration of polyisoprene 5. 10 to 45% (v/v). The study begins by getting the lignocellulosic from coconut husk using counter machine, a separator and sifting. Lignocellulosic as dried sieved with 10 mesh size. Total of 30 g of lignocellulosic mixed with 100 mL of polyisoprene, molded and dried in an oven ± 90 °C until dry. The mechanical properties (strength and elasticity) were characterized by bending testing using Torsee-Tokyo testing machine. Bending strength and elasticity properties stated in the Modulus of Rupture (MOR) and Modulus of Elasticity (MOE). Lignocellulosicfoam density determined by pycnometer method. Lignocellulosicfoam morphology observed with a microscope.**

The results showed blending lignocellulosic and polyisoprene in the preparation lignocellulosicfoam using the stirring method is better than spraying method with optimum conditions at a polyisoprene concentration of 30%. The values of MOR and MOE of lignocellulosicfoam prepared by spraying method at a polyisoprene concentration of 30% was 19.01 g/mm^2 and 29.65g/mm^2 and stirring method was 52.49 g/mm^2 and 64.09 g/mm^2.

***Index Term*--** **lignocellulosic, polyisoprene, lignocellulosicfoam.**

I. INTRODUCTION

Indonesia is the center of some commodities. One of the major plantation commodities in Indonesia is the coconut (*Cocos nucifera L*). Luntungan [1] reported that the amount of coconut production reached 16.66 billion or copra equivalent to 3.33 million tonnes with export value of coconut and processed products reached U.S. $ 427 million in 2004. One by product of the coconuts crop is coconut coir. Coconut coir is skin that frames and into the retaining coconuts from knocks and shocks. Now coconut coir still classified as farm waste has not been used optimally. Primary products of coconut coir processing consists of fiber (fiber length), bristle (fine and short fibers) and lignocellulosic. Lignocellulosic also known as cocopeat can be used as hydroponic growing media material [4], extra material on the compost [8], peatlands substitute material for the flower industry, coating golf courses and and with the bristle can be processed into hardboard [2] and material for preparation particle board [6].

Development of knowledge and technology make people more easy to solve the problem. Technology combining two or more materials can enrich the variety of new materials. Composite is a material formed from a combination of two or more constituent materials through the mixture is not homogenous, where the mechanical properties of each constituent material is different [9].

Researchs on the preparation of composites has been reported. Subiyanto et al. [6] have made particle board from lignocellulosic with urea formaldehyde adhesives. Sunariyo [7] and Setyawati et al. [5] made of thermoplastic polypropylene composites with coconut coir fiber as a substitute for wooden pallets. Characteristic of a light lignocellulosic form of granules (particles) like foam then the research was prepaired of particles foam composite by using lignocellulosic materials.

Commodities in Indonesia that is important is natural rubber. Indonesia is one country that has the the widest rubber plantations in the world. Natural rubber is obtained by tapping the rubber tree sap (polyisoprene) Hevea brasiliensis. Polyisoprene is a colloid of rubber particles in water and can be used as adhesives.

Charles Goodyear at 1839 found that if sulfur is added to the rubber and the mixture is heated then the rubber will harden, become more supple and does not melt, this process is called vulcanization. Sulfur in small amounts (<5%) will result in an elastic material, whereas in large quantities produces a very hard material and inelastic called ebonite [3].

In this research, preparation of particles foam by mixing lignocellulosic natural rubber (polyisoprene) and polyisoprene-sulfur mixture as adhesives. Particles foam popularized with the name lignocellulosicfoam. Mixing lignocellulosic and polyisoprene made with 2 methods of spraying and stirring. Additionally, it will be studied the influence of variations in the concentration of polyisoprene and the addition of sulfur into the polyisoprene on the mechanical properties (strength and elasticity) and density lignocellulosicfoam.

II. MATERIALS AND METHODS

Materials and Instrument

Lignocellulosic prepared in PT. Tropica nucifera Industry Yogyakarta. Lignocellulosic derived from coconut coir processing. Coconut coir consists of coir fiber and lignocellulosic. Fibers composed of long fibers, midlee fiber and short fiber . The separation performed in a modern fiber components using a counter and separator machine and sieving. polyisoprene and Sulfur were used as adhesives. The tools used are counter machine, separator, coarse sieve, sieve 10 mesh, glass molds 10 cm x 5 cm x 3 cm, analytical balance (Metler U.S. 200), oven, glassware, Torsee (Tokyo testing machine made in Japan), microscope (Olympus Optical CO. LTD Made in Japan).

Procedure

Preparation of lignocellulosicfoam with polyisoprene using a spraying method

Preparation of lignocellulosicfoam from lignocellulosic and polyisoprene as adhesives with the spraying method performed varying the concentration of polyisoprene from 5. 10 and 45% (v/v). Lignocellulosic dried at room temperature for 1 week and then sieved with a mesh size of 10. Total of 30 g of lignocellulosic added little by little into a mold that has been coated with aluminum foil, then sprayed with 100 mL of polyisoprene. Samples removed from the mold and then dried in an oven ± 90 ° C until dry.

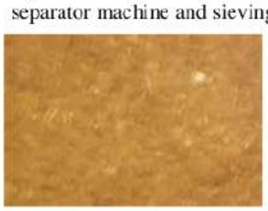
Analysis of mechanical properties (strength and elasticity) lignocellulosicfoam done by testing three-point bending method. In the test data consists of a maximum load of up to sample fracture and deflection. MOR values of the calculated data as a parameter lignocellulosicfoam strength and MOE values as parameters lignocellulosicfoam elasticity.

Preparation of lignocellulosicfoam with polyisoprene using a stirring method

Preparation of lignocellulosicfoam with stirring methods and variations of the concentration of polyisoprene are 5. 10 to 45%.). Lignocellulosic dried at room temperature for 1 week and then sieved with a mesh size of 10. Into 100 ml of polyisoprene added 30 g lignocellulosic and stir until blended. Then the sample molded and dried in an oven ± 90 °C until dry. Strength and elasticity of lignocellulosicfaom analyzed by bending test. Lignocellulosicfoam density is determined by pycnometer method and lignocellulosicfoam morphology observed with a microscope.

III. RESULT AND DISCUSSION

The results of the first work is lignocellulosic separate from coconut coir fiber using counters and separator machine and sieving.


a


b


c


d

Fig. 3. 1a) Lignocellulosicfoam with polyisoprene of 30%
b) porous lignocellulosicfoam (magnification 10 x 16)
c) Lignocellulosicfoam with polyisoprene of 5%
d) Lignocellulosicfoam with polyisoprene of 30% (magnification 10 x 40)

Lignocellulosicfoam prepared from lignocellulosic and polyisoprene (Fig. 3.1a). If lignocellulosicfoam observed using a microscope (Fig. 3.1b) looked pores size are not the same. Lignocellulosicfoam prepared of lignocellulosic and polyisoprene of 5% produce a fragile lignocellulosicfoam (Fig. 3.1c) where lignocellulosic particle easily separated from the gluing. This shows polyisoprene particles has not been strong enough to glue the particle lignocellulosic. This conditon as consequence concentration influence polyisoprene towards hydrogen bond total between lignocellulosic with polyisoprene.

Mechanical properties (strength and elasticity) Lignocellulosicfoam

Bending strength of lignocellulosicfoam

Effect of polyisoprene concentration on the bending strength of lignocellulosicfoam expressed in the Modulus of Rupture (MOR) with varying the concentration of polyisoprene is shown in Fig. 3.2.

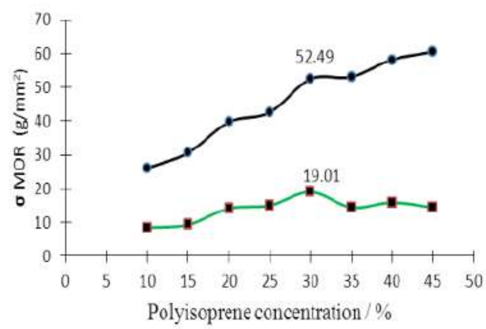


Fig. 3.2. The effect of polyisoprene concentration on MOR lignocellulosicfoam green line by the spraying method and black line by stirring method.

In Fig. 3.2 green line (prepare by spraying method) can be seen that the MOR increased until the polyisoprene concentration of 30%, the higher the concentration of polyisoprene that used, stronger adhesion thus incresed bending strength. MOR tended to decrease after the polyisoprene concentration of 30%, liquid polyisoprene used more viscous and harder to flow toward the lignocellulosic particle so that not all particles can be bonded with polyisoprene then lignocellulosicfoam bending strength is lowered. Lignocellulosicfoam MOR values at a polyisoprene concentration of 30% is 19.01 g/mm^2.

Black line (prepare by stirring method) can be seen that the MOR increased along with higher concentrations of polyisoprene. In the process of mixing lignocellulosic and polyisoprene with stirring, the particles can be wetted by polyisoprene lignocellulosic so as to increase the bending strength. MOR but not significant increase after the polyisoprene concentration of 30%, polyisoprene probably already be a laminate. Lignocellulosicfoam MOR values at a polyisoprene concentration of 30% was 52.49 g/mm^2.

Mixture polyisoprene with lignocellulosic use stirring method perfecter, so that bonding total between polyisoprene with lignocellulosic more than spraying method and foam be stronger.

Elasticity of lignocellulosicfoam

Effect of polyisoprene concentration on the elasticity of lignocellulosicfoam expressed in the modulus of elasticity (MOE) by varying the concentration of polyisoprene is shown in Fig. 3.3.

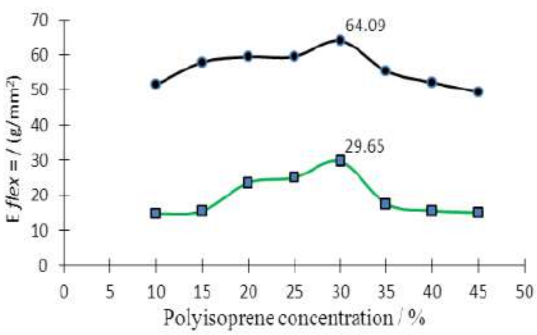


Fig. 3.3. The effect of polyisoprene concentration on MOE lignocellulosicfoam green line by the spraying method and black line by stirring method.

In Fig. 3.3 green line (prepare by spraying method) can be seen that the MOE increased until the polyisoprene concentration of 30%. The higher the concentration of polyisoprene that used, the more polyisoprene particle is used to glue lignocellulosic and produce more elastic lignocellulosicfoam. After the polyisoprene concentration of 30% MOE tends to decrease, the higher the concentration of polyisoprene, the resulting lignocellulosicfoam already hard and dense that lignocellulosicfoam elasticity decreases. MOE value of lignocellulosicfoam at a polyisoprene concentration of 30% is 29.65 g/mm^2.

Black line is MOE of lignocellulosicfoam prepared by mixing lignocellulosic and polyisoprene with stirring method, the polyisoprene concentration increases to 30%. MOE decreased after the polyisoprene concentration of 30%. MOE value of lignocellulosicfoam at a polyisoprene concentration of 30% is 64.09 g/mm^2. Lignocellulosicfoam prepared by stirring method has the MOR and MOE values greater than lignocellulosicfoam prepared by spraying method, it is influenced by the distribution and flowing of polyisoprene on lignocellulosic. The stirring method in the preparation lignocellulosicfoam better than spraying methods.

Density of lignocellulosicfoam with polyisoprene adhesives

Lignocellulosicfoam density was determined using the pycnometer method. The effect of polyisoprene concentration on the lignocellulosicfoam density shown in Fig. 3.4.

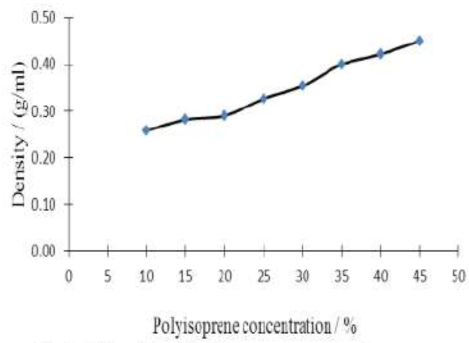


Fig. 3.4. The effect of polyisoprene concentration on the lignocellulosicfoam density

Based on Fig. 3.4 can be seen that the higher the concentration of polyisoprene that is used to glue lignocellulosic, causes increased density lignocellulosicfoam. Lignocellulosicfoam density obtained is 0.2851 to 0.4500 g / mL. Lignocellulosicfoam density increased with increasing concentration of polyisoprene, because lignocellulosicfoam more solider.

IV. CONCLUSIONS

Preparation of lignocellulosicfoam with the stirring method is better than the spraying method with optimum conditions at a polyisoprene concentration of 30% (v/v). The values of MOR and MOE of lignocellulosicfoam prepared by the spraying method on polyisoprene concentration of 30% are19.01 g/mm^2 and 29.65 g/mm^2 and the stirring method are 52.49 g/mm^2 dan 64.09 g/mm^2. Lignocellulosicfoam density increases with increasing concentration of polyisoprene that is 10% to 45%. Lignocellulosicfoam density obtained is 0.2851 to 0.4500 g/mL. Lignocellulosicfoam density increased with increasing concentration of polyisoprene.

This research focuses on finding the best methods and the optimum concentration. This study can be continued with the addition of additives and coloring of the lignocellulose polyisoprene.

ACKNOWLEDGMENT

This investigation was supported by PT. Tropical Nuciferra Industry Yogyakarta Indonesia, and by Laboratory Facilities from the Department of Physical Chemistry and Engineering Laboratory, University of Gadjah Mada, Indonesia.

REFERENCES

[1] Luntungan, H.T., 2008. Coconut Genetic Resources Preservation For Commodities in Tidal Swamp Land Development and Lebak. *Development of Agricultural Innovation*. 1. 4. 243-258.

[2] Nur,I.I, Kardiyono, Umar and Aris, A..2003. Waste Utilization of Coconut Coir Dust in Tidal Rice Farm, Coconut Institutional in the Era of Regional Autonomy. *Proceedings of the National Conference of Coconut V*. Tembilahan 22-24 October 2002.160-165.

[3] Oxtoby, D.W., Gillis, H.P. and Nachtrieb, 1998, Principles of Modern Chemistry (translated by Suminar), 4th edition, volume 2, Erlangga publisher, Jakarta.
[4] Putra Sinly E., 2008. *Coconut as a Potensial Bioindustry of Indonesia*. *http://www.chem-is-try.org* accessed February 15, 2011.
[5] Setyawati, D., Hadi, Y.S., Massijaya, Y. and Nugroho, N., 2008, he characteristics of Composite Panel from Coconut coir fiber and Plastik Polypropylene Recycling Layered Bamboo Matting, Journal of Research University Tanjungpura, X, 2, 88-101.
[6] Subiyanto, B., Saragih, R. and Husin, E., 2003. The Utilization of Coconut Coir Dust as Water Absorbent Material dan Oil form of Particle Board Panels, *J. Tropical Wood Science and Technology*, 1, 1, 26-34.
[7] Sunariyo, 2008, The characteristics of Polypropylene Thermoplastic Composites with Coconut Coir Fiber as Wood Substitute Material Pallets, *Thesis*, Graduate School of USU, Medan.
[8] Treder, J., 2008, The Effect of Cocopeat and Fertilization on the Growth and Flowering of Oriental Lily 'Star Gazer', *J. Fruit ornam. Plant Res.*, 16, 361-370.
[9] Matthews, F.L. and Rawling, RD., 1993, *Composite Material Engineering And Science*, Imperial College of Science, Technology And Medicine, London, UK.

HASIL CEK_Charles Banon

ORIGINALITY REPORT

15%	13%	5%	5%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	repository.ugm.ac.id Internet Source	6%
2	docplayer.net Internet Source	4%
3	Submitted to Universitas Brawijaya Student Paper	2%
4	Submitted to Universitas Mataram Student Paper	1%
5	ijensonline.blogspot.com Internet Source	1%
6	Teja Dwi Sutanto, Charles Banon, Bambang Trihadi. "Effect of Liquid Rubber Compound on the Physicochemical Properties of Particle Board from Coconut Frond Powder", RAFFLESIA JOURNAL OF NATURAL AND APPLIED SCIENCES, 2022 Publication	1%
7	panafrican-med-journal.com Internet Source	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		