



HYGROSCOPICITY WOOD PLASTIC BOARDS BY USING DIFFERENT TYPES OF THERMOPLASTICS

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ABSTRACT: The thickness swelling was evaluated in the wood plastic composites, elaborated by means of I model for extrusion in constant dosages of sawdust (50%), where you uses the sawdust of *Pinus caribaea*, and they were varying the dosages of recycled termoplástico (PEAD, PEBD, PP) and then they were mixed until completing 50 % remaining of the composite, by four treatmet. The procedure you development submerging the test tubes in water to ambient temperature (25-30 °C), supervising the swelling changes during several weeks, according to the methodology used by Shi and Gardner. The parameter KSR was studied to quantify the proportion of the swelling. The results indicated that the dosages where the mixture was used with the different termoplástico types the one that showed the best behaviors as for the swelling. A mathematical model was obtained that facilitates to estimate the effect of the action of the water on the thickness swelling with relationship at the time, by means of him can be considered the resistance that will provide the board obtained until reaching her balance state. Giving as guarantee their use to the bleakness.

Keywords: Board, swelling, resistance

RESUMO: O objetivo do trabalho foi avaliar a porcentagem de inchamento dos compostos de madeira plástica, fabricado a partir da extrusão, utilizando doses constantes de serragem *Pinus caribaea* (50%) e de termoplásticos reciclados (PEAD, PEBD, PP), que foram misturados até completar os 50% restantes para completar o composto, resultando em quatro tratamentos diferentes. Estes compostos foram submergidas em água a uma temperatura entre 25-30 °C, sendo o inchaço foi monitorado durante várias semanas, de acordo com a metodologia usada por Shi e Gardner. Para quantificar a porcentagem de expansão o parâmetro estudado foi KSR. Segundo os resultados obtidos, a mistura que utilizou os três diferentes tipos de termoplásticos apresentou os melhores comportamentos como para o inchaço. Foi obtido um modelo matemático que facilita estimar o efeito da ação da água sobre o inchamento em espessura com relação ao tempo. Por meio deste, pode-se prever a resistência que o painel conseguirá alcançar o seu estado de equilíbrio, podendo garantir que esse seja exposto a condições de intempéries.

Palavras-chave: painel, inchaço, resistência

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1. INTRODUCTION

The swelling is one of the most important physical properties for the boards. Evaluate your behavior is fundamental to the development of industry in Cuba board as possible to create stronger and higher quality boards that meet the growing needs in the construction sector. This favors the decision-making about the use that can be given to each type of board; there is also a good relationship between the physical properties regarding the mechanical behavior (POBLETE *et al.*, 2000; WIELAGE *et al.*, 2003; GUO *et al.*, 2007; ÁLVAREZ, D; BETANCOURT, 2009)

Controlling the physical properties ensures product quality for a particular use, because many boards as conventional (MDF, OSB, and others) suffer considerable dimensional deformation which limits its application in outdoor conditions, without clutch, for plastic wood panels (MP) weathering conditions do not cause significant damage, allowing a wide range of applications (KOLLMANN *et al.*, 1975; KELLY, 1977; WANG *et al.*, 2000; ROSS *et al.*, 2000; BODIG, 2001; POBLETE, 2001; SASAKI, 2001; CASTELLANOS, 2003).

Recycled thermoplastics used for processing because of its compatibility with the wood particles favors the formation of plastic wood panels, achieving a highly efficient encapsulation of the wood particles, which ensures low penetration of water into the composite. Hence, the dosages should be adequately studied to avoid fault zones in the technological process that could be caused by the lack of recycled thermoplastic. Thus providing the board produced has good quality in terms of its physical and mechanical properties. (WOLCOTT and ENGLUND, 1999; WAMBUA *et al.*, 2003; MUTJE *et al.*, 2007; RENNER *et al.*, 2010; CLEMONS, 2010).

Some of the formulations obtained may have similar or better properties than the same synthetic plastic, with the help of certain chemical additives, such as plasticizers and coupling (CLEMONS, 2002; GUO *et al.*, 2007; LUCCHETTA *et al.*, 2009; YEH *et al.*, 2009; NGUEHO *et al.*, 2010; ASHORI and NOURBAKSH, 2010).

In this research the effects of swelling wood plastic boards to determine the hygroscopicity thereof at room temperature according to the Cuban tropical climate, using different blends of thermoplastic recycled and mixed together are evaluated. KAZEMI (2008) carried out similar studies.

2. MATERIALS AND METHODS

The dosages used (Table 1) allow you to group all possible variants, which facilitate conducting assessments related to thickness swelling for each of the boards obtained. You were processed five specimens for each board with square dimensions of 50 ± 1 mm, and a thickness of 16 mm according to the NC-EN 317: 2003. These were dried in an oven at a temperature of 103 ± 2 °C for one period of 24 h. The thickness of the specimens was then evaluated with an accuracy of 0.001 mm prior to immersion in water, whose temperature ranged between 25 and 30 °C.

Table 1. Composition of the formulations.

Fórmulas	Contenido de aserrín (%)	Termoplásticos reciclados		
		PEAD	PEBD	PP
F1 (PEAD)	50	50	-	-
F2 (PEBD)	50	-	50	-
F3 (PP)	50	-	-	50
F4 (Mezcla)	50	16,6	16,7	16,7

Source: own elaboration.

Evaluation of the thickness swelling for the samples was obtained at different times (4, 8, 16, 32, 48, 64, 96, 128, 192, 256, 320, 384, 448, 576, 640, 768, 832, 960, 1216, and 1500 h)