EFFECTS OF mDMDHEU CONCENTRATION ON SELECTED TECHNOLOGICAL PROPERTIES OF *Neolamarckia cadamba* WOOD

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SUMMARY

Research on the effects of mDMDHEU concentration at 10, 20 and 30% on the finishing abilityby 4 types of paints: brown alkyd, PU, cerise Lasure classic and dark gray Lasure classic paints, and on the adhesive ability of *Neolamarckia cadamba*wood to 2 types of glue: Epoxy and PVA in room conditions and after outdoor weathering in within 12 months. The results indicates that the chemical concetration has an impact on adhesion of coating, whereas wood specimens treated with 10% concentration of mDMDHEU has lower adhesion of coating than specimens treated with 20% and 30% concentration. The adhesion of coating of wood specimens treated by chemicals decreases slightly compared to that before natural weathering. The color changing of coating of untreated wood specimens is higher than specimens treated by chemicals with 4 types of coatings. The color difference of wood surfaced coating of wood specimens treated with 10% concentration chemicals is considerably higher than specimens treated with 20 and 30% concentration chemicals.The color differences of wood surfaced finishing in treated samples with 20% and 30% concentration are trivial. *Neolamarckia cadamba* specimens treated with mDMDHEU have PVA and Epoxy bonding strength higher than untreated ones. PVA and Epoxy bonding strength increase of treated specimens, compared to control specimens after outdoor weathering within 12 months, is higher than that of treated specimens after keeping at room condition within 12 months or after gluing.

Keywords: Adhesive ability, adhesion of coating, bonding strength, mDMDHEU, Neolamarckia cadamba wood.

I. INTRODUCTION

Neolamarckia cadamba has straight round trunk and grows fast. It has bright color, regular, straight, smooth, easy to prepare but it has low natural durability, easily penetrated and destroyed by biological organisms. These disadvantages restrict wood usability and reduce the economical value. Therefore, it is neccesary to apply advanced modification solutions to increase *Neolarmarckia cadamba* quality. The modification of wood treated by methylate dimethylol dihydroxy ethylene urea (mDMDHEU) gives considerable performance at improving wood durablity. Domestic and international researchs confirmed that the process of treating wood by mDMDHEU can improve the dimensional stability, biological and weathring resistance. In Vietnam, enhancing biological durability, weather resistance and strength of *Neolamarckia cadamba* by mDMDHEU has been researched by various scientists (Lê Thành Công, Tạ Thị Phương Hoa, 2016; Tạ Thị Phương Hoa et al, 2013; Tạ Thị Phương Hoa et al, 2015; Vũ Thị Ngoan, Tạ Thị Phương Hoa, 2015).

During the preparation, for making wood products, it is necessary for coupling, sticking and linking wood details. Wood products are usually finished by coatings for the purpose of imcreasing the aesthetic value, these products are restricted to contact with water, moisture. Therefore, for any type of wood and material, it is obviously that the adhesive ability and the finishing ability of coatings has to be concerned. The research indicates the effects of mDMDHEU treating to the adhesive ability and the ability of wood finishing of *Neomarckia cadamba*.

II. MATERIAL AND RESEARCH METHODS

2.1. Research material

Material: Neolamarckia cadamba (Roxb) Booser, which is 12-13 years old, was exploited in Hoa Binh; methylate dimethylol dihydroxy ethyleneurea (mDMDHEU), magnesium chloride, distilled water, Epoxy, PVA glue; PU, dark grey, cerise Lasure Clasic paint, brown alkyd paint.

Equipment: Pressure vacuum equipment, drier; spray painting equipment; laboratory extractor; electronic clamps with a precision of 0.01 mm; MTS QTest/ 25 mechanical tester.

2.2. Research method

2.2.1. Experiment method

Changing factors: The concetration of mDMDHEU: 10%, 20%, 30% respectively.

Fixed input changing factors: Wood moisture content before treating with chemicals concentrations of 12-14%; the mass ratio of the catalyst $MgCl_2.6H_2O$ and mDMDHEU is 3%; impregnation method: vaccum- pressure; technological impregnation parameters: vaccum reaches 70 Pa, vaccum keeping time - 30 minutes, impregnation pressure: 0.8 MPa, pressure maintaining time – 1.5 hours. Curing treatment parameters: temperature: 100^{o}C, time: 16 hours.

Output factors:

- The adhesive ability, determined by bonding strength;
- The finishing ability, determined by adhesion of coating.

This methods take specimens based on Russian standards GOST 16483.21-72* edited in 1984 - "Wood–Sample methods for determining the mechanical and physical properties after technological process".

2.2.2. Wood specimens

Specimens were cut into sections of 1.4-1.5 m in length. From straight round timber, Specimens are converted to radial boards which have the thickness higher than the width at 10 - 15mm. From these boards, the tangent plane is parallel to the longitudinal axis of the board is created, and then this plane is set to be standard for cutting off tangent boards which have the thickness higher than the width at least 5 mm, mark the number of tree, timber and boards in radial direction from outside to inside: takes 4 - 5 Bar. Decrease wood moisturre content to 12-14% by keeping wood boards in temperature of keeping wood bars in temperature at (20±2)^{o}C and relative humidity at (65±3)%, drying at 45^{o}C. After that, carry out machining bar. The size of wood bars which are researched at the finishing ability of wood: 300x100x20mm while the others which are researched at the adhesive ability: 700x50x20 mm (length x width x thickness).

Carry out cutting and specimening (wood bars) in each group in the radial direction. From each specimen group, randomly specimened for each experimental mode (influenced by technological factors that need to be studied and not affected). In this article, three series of chemical and one (non-chemical) serie specimens are used. Denominator of specimens series: GD-control specimens; G1, G2, G3 - specimens treated by mDMDHEU with the concentration of 10%, 20% and 30%, respectively.

2.2.3. Research method of the finishing ability of wood

Wood specimens after chemical treatments are kept in room condition within 1 month. Carry on coating the surface of untreated specimens. After wood finishing and stabilizing with 1 week, take from experimental modes: 3 wood specimens for determining the paint adhesive ability after coating for a week; 3 wood specimens for determining the paint adhesive ability after outdoor weathering for 12 months; 5 specimens for determining color diffenrence after outdoor weathering, compared to before exposure.

Experimental finishing

The finishing stages are given in table 1, which implements the individual finishing with each type of paint according to the intended experimental layout.

Table 1. Finishing stages

No	Stage	Instrument, equipment	Material and execution mode
1	Smooth and clean wood surfaces, clean dust	Broom, wipe	Sandpaper N_o 240
2	Cover with the first paint layer	Paint gun	PU paint: 250 g/m^2 (Lassureclassic: 1 litre/15m^2); (Alkyd paint: 350 g/m^2)
3	Dry	Naturally dry	48 hours
4	Smooth wood surfaces	Wipe	Sandpaper N_o 320
5	Cover with the second paint layer	Paint gun	PU paint: 250 g/m^2 (Lassureclassic: 1 litre/15m^2); (Alkyd paint: 350 g/m^2)
6	Dry	Naturally dry	48 hours

Method of determining the adhesion of coating

Determining the adhesion of coating was according to the Russian standard ГОСТ 15140-78 edited in 2001 by slashing into squares. Number of samples: test 3 specimens sin each serie, three areas are slashed in each specimen, the edge of the specimen surface is at least 10 mm. Slash at least 6 parallel lines vertically, so that the knife touches the wood surface (the planks) and the distance between the two adjacent lines is 2 mm. Similarly, slash at least 6 lines perpendicular to the grain vertically. Therefore, the size of squares is 2x2 mm. After slashing, use a magnifying glass (x5) to determine the number of broken cells and the incision state. Slash (10 x 10) cells/area x 3 area/specimen x 3 specimens.

Evaluating the adhesion of coating based on the following points:

- 1 point: The cut lines are very smooth, with no sign of flaky squares (**1**);
- 2 points: There is a phenonemon that the finishing is flaky in the form of scales in some intersections between the lines which is no more than 5%. **(2)**;
- 3 points: The finishing is slightly flaky or vertically flaky to cuts or the distance to cross positions. The number of flaky squares is about 5%÷35% **(3)**;
- 4 points: The finishing is completely flaky or the number of squares is more than 35% **(4).**

2.2.4. Method of determining wood adhesive ability

Wood adhesive ability is determind by bonding strength, based on D905-98 standard.

Adhesives: Epoxy, PVA glue.

Wood specimens, which have the similar experimental mode, are coupling together. Clean dust sticking on the surface of wood bars and carry on lubricating glue on those bars. After that, couple and put them on the pressed surface and then, press them at 40^{o}C within 1 hour, with the pressure 0,8 MPa. After being pressed, the couples of wood bars, which are sticked to stabilize room temperature within 7 days. After stabilizing,the sticked couples are cut into 3 parts: one part is used for cutting bonding strength trial samples after gluing (SDD); one part is kept in room condition within 12 months (Home condition -TN); one part is outdoor exposure within 12 months (Outside -NT). Cut the trial specimens from arranged parts from experiments,

corresponding 3 experimental cases.

2.2.5. Method of testing the finishing ability and adhesive ability of wood in outdoor weathering

Test the finishing ability and adhesive ability of *Neolamarckia cadamba* wood in natural weathering, based on EN 927-36 standard.

- For wood specimens used for determining the finishing ability: After coating, the surface of wood specimens,which have the size of 300x100x20 mm, are scanned and measure the parameters L, a, b before weathering by Photoshop. After that, untreated specimens and treated chemicals which is finishing are put into the racks with the angle of 45^o horizontallyand kept outdoors.

- With wood specimens determined: Put a part (Outdoor- NT) cut from glued wood couples (2.2.4) and put them into the racks and keep outdoors.

Finishing and adhesive wood specimens are weathering in the racks which have the size of 1800 x 1500 x 1900 mm in outdoor conditions, the shapes of the racks are based on ISO 2810 with the angle of 45^o to the horizonal axis, in Xuan Mai, Chuong My, Ha Noi within 12 months, from May 2014 to June 2015.

- After outdoor weathering within 12 months, wood specimens are stabilized and determined the standards based on the finishing ability and adhesive ability.

a) Finishing wood specimens are scanned in the surface which is above the direct contact positions with sunlight and measured L, a, b after weathering.

+ Determine the degree of color change in the surface of finishing wood specimens through color difference. The color difference ΔE is determined by the following fomular:

$$\Delta E = \sqrt{\Delta L^* + \Delta a^* + \Delta b^*}\ ;$$
$$\Delta E = \sqrt{(L_x - L_0)^2 + (a_x - a_0)^2 + (b_x - b_0)^2} \quad (1)$$

In this formula: L_0 and L_x - The average value of finishing wood samples brightness before and after weathering;

a_0 and a_x - The average value of the chromatic index on the axis of rotation varies from green to redof finishing wood specimens brightness before and after outdoor exposure;

b_0 and b_x - The average value of the chromatic index on the axis of rotation varies from blue to yellowof finishing wood specimens brightness before and after weathring.

The parameters L, a, b are determined in positions (10 positions) in the specimen surface by Photoshop CS 6, take the average value to calculate the color difference.

+ Visually observe the cracks in the coating surface.

b) Glued wood bars are cut for testing the bonding strength in mechanical and physical testing equipment MTS QTest/25.

III. RESULTS AND DISCUSSION

3.1. Effects of mDMDHEU concentration on the finishing ability of *Neolamarckia cadamba* wood

3.1.1. Effects of mDMDHEU concentrations on the adhesion of coating of Neolamarckia cadamba wood

The determined results of adhesion of coating of treated and untreated wood are figured in the table 2.

Table 2. Adhesion of coating after painting

Experimental mode	Adhesion of coating (points)			
	Brown alkyd	PU	Dark gray Lasure classic	Cerise Lasure classic
GD	2	2	2	2
G1	2	2	1	1
G2	2	1	1	1
G3	1	1	1	1

Wood specimens treated with mDMDHEU have the strength of painted adhesion as equal or better than untreated specimens. It is can be explained that treated specimens have certain amount of chemicals, the density of wood is increased, the porosity is decreased while the surface smoothness is increased.

According to Ta Thi Phuong Hoa (2013), the contact angle of *Canarium album* wood treated with DMDHEU is lower than the angle of untreated wood, this means that the wet and spread water abilities on the surface of treated specimens are higher than the abilities of untreated ones (Tạ Thị Phương Hoa, 2013). Because the mechanisms of action of DMDHEU and mDMDHEU with wood have similarities, it can be deduced that wood specimens treated with mDMDHEU also have better wet ability than untreated wood. Therefore, treated specimens have better strength of painted adhesion than untreated specimens.

The results obtained in this article are also suitable with the results of Y. Xie et al. (2007). They determined the adhesion of the alkyd-derived coating and the acrylic origin of the wood treated by mDMDHEU and of the wood treated. They concluded that mDMDHEU wood treatment significantly increases the adhesion of wood coatings (Xie Y., Krause A., Militz H., Mai C. , 2008).

3.1.2. The finishing ability of Neolamarckia cadamba modified wood to outdoor exposure

a) The adhesion of coating

The results determined the adhesion of coating after outdoor eposure, are figured in table 3.

Table 3. Adhesion of coating after natural weathring for 12 months

Experimental Mode	Standard	Adhesion of coating			
		Brown alkyd	PU	Dark gray Lasure classic	Cerise Lasure classic
GD	Points	2	2	2	3
	Visual observation	No crack	Have cracks, contamination, local peeling	No crack, local peeling	No crack, local peeling
G1	Points	2	2	2	2
	Visual observation	No crack, no localized scale.	Have cracks, contamination, local peeling	No crack, local peeling	No crack, local peeling
G2	Points	2	1	2	1
	Visual observation	No crack, no local peeling	No crack, no local peeling	No crack, no local peeling	No crack, no local peeling
G3	Points	1	1	1	1
	Visual observation	No crack, no local peeling	No crack, no local peeling	No crack, no local peeling	No crack, no local peeling

The results of the surface of wood finishing specimens after natural weathering for 12 months indicate that the adhesion of coating is hardly reduced, compared to specimens before exposure if it is calculated by the number of squares on total number of incisions, expect specimens which are untreated with cerise Lasure classic have lower adhesion than specimen before natural weathering.

On wood specimens which is untreated with these types of paint, there are some local. The concentration has an effect on the adhesion of coating, specimens treated with 10% concentration of mDMDHEU have lower adhesion of coating that specimens treated with 20 and 30% concentration.

b) Color difference

The results determining L, a, b and color difference of wood finishing surface with brown alkyd, PU, Lasure classic are figured in table 4.

Table 4. Determined color difference results of finishing *Neolamarckia cadamba* surface after natural weathering for 12 months

Experimental mode	Color difference of coating wood surface			
	Brown alkyd	PU	Dark gray Lasure classic	Cerise Lasure classic
GD	7.72	14.95	20.93	29.71
G1	5.32	12.86	14.39	20.87
G2	4.85	11.24	11.81	15.28
G3	4.15	10.90	11.36	14.61

The degree of color change of untreated wood specimens is higher than specimens treated with 4 types of coating. There is a considerable difference in color difference between treated and untreated specimens. Color difference in wood specimens treated with 10% concentration is significantly higher than specimens treated with 20% and 30% concentration. Additionally, there is hardly difference between specimens treated with 20 and 30% concentration. The degree of color change of 4 diffenrent types of paint is ranked in descending order, cerise Lasure Classic, dark gray Lasure classic, PU, brown alkyd.

3.2. Effect of mDMDHEU concentration on the adhesive ability of *Neomarckia cadamba*

3.2.1. PVA bonding strength

The determined results of PVA bonding strength of *Neolamarckia cadamba* specimens treated and untreated with mDMDHEU in these cases: testing after gluing, testing after keeping in room condition within 12 months and after natural weathering within 12 months are figured in table 5.

Table 5. PVA bonding strength of Neolamarckia cadamba wood

No	Serie	PVA bonding strength in testing conditions						
		After gluing		Keeping at room conditions within 12 months		Keeping outdoor within 12 months		
		Value, MPa	The changing rate compared to untreated samples, %	Value, MPa	The changing rate compared to untreated samples, %	Value, MPa	The changing rate compared to untreated samples, %	The changing rate compared to samples after gluing, %
1	GD.PVA	5.98 (±0.46)	0	5.87 (±0.30)	0	2.86 (±0.27)	0	-52.10
2	G1.PVA	6.47 (±0.47)	8.21	6.34 (±0.43)	8.05	3.43 (±0.36)	19.82	-46.95
3	G2.PVA	6.87 (±0.48)	14.96	6.72 (±0.46)	14.52	3.64 (±0.39)	27.03	-47.06
4	G3.PVA	6.92 (±0.84)	15.76	6.81 (±0.67)	16.12	3.71 (±0.37)	29.72	-46.32

The experimental results indicate that *Neolamarckia cadamba* specimens treated with mDMDHEU have higher bonding strength than untreated specimens in 3 experimental conditions (after gluing, keeping at room conditions within 12 months, outdoor weathering within 12 months). Results of the analysis of variance indicate that there is a difference between the bonding strength of treated and untreated specimens. When testing after gluing and keeping samples at room conditions, there is a difference in bonding strength of treated wood specimens with 10, 20 and 30% concentration, but there is no difference in bonding strength of treated wood specimens with 20 and 30% concentration. For specimens kept outdoor within 12 months: there is a difference in bonding strength of treated wood specimens with 10, 20 and 30% concentration because PVA is a type of glue which has low weather resistance, so the adhesion of this glue can decrease and does not depend on the concentration of treated chemicals under the influence of outdoor environmental factors.

The increased degree of bonding strength of treated wood specimens compared to untreated specimens in the same experimental conditions are figured in table 3.8. In case of testing bonding strength after gluing and keeping at room conditions withing 12 months, bonding strength increases from 8.05% to 16.12% compared to untreated specimens. However, after outdoor exposure within 12 months, PVA bonding strength of treated specimens is much higher than untreated specimens, compared to specimens kept at room conditions, increasing from 19.82% to 29.72%. It can be explained that, under the factors of outdoor weathering which always have the change in moisture content and temperature, specimens treated with mDMDHEU have better resistance, better dimensional stability in outdoor weathering, better microorganisim resistance, wood surface is less eroded and less cracking, which leads to higher bonding durability.

3.2.2. Epoxy bonding strength

The determined results of Epoxy bonding strength of *Neolamarkia cadamba* wood treated and untreated with mDMDHEU are figured in table 6.

Table 6. Epoxy bonding strength of Neolamarckia cadamba wood

No	Serie	Epoxy bonding strength in testing conditions						
		After gluing		Keeping at room conditions within 12 months		Keeping outdoor within 12 months		
		Value, MPa	The changing rate compared to untreated samples, %	Value, MPa	The changing rate compared to untreated samples, %	Value, MPa	The changing rate compared to untreated samples, %	The changing rate compared to samples after gluing, %
1	GĐ.Epoxy	7.89 (±0.52)	0	7.66 (±0.52)	0	4.98 (±0.37)	0	-36.90
2	G1.Epoxy	8.86 (±0.65)	12.31	8.68 (±0.55)	13.28	6.31 (±0.44)	26.75	-28.79
3	G2.Epoxy	9.22 (±0.62)	16.78	8.99 (±0.42)	17.39	6.84 (±0.50)	37.33	-25.79
4	G3.Epoxy	9.08 (±0.65)	15.01	8.83 (±0.50)	15.25	6.69 (±0.54)	34.41	-26.26

Epoxy bonding strength of *Neolamarckia cadamba* specimens treated with mDMDHEU is higher than that of untreated specimens. When treating with 10, 20, 30% concentration of chemicals Epoxy bonding strengths are increased to 12.31%; 16.78% and 15.01% respectively when testing after gluing. In case of keeping outdoor within 12 months and testing bonding strength, this value of treated specimens with 10%, 20% and 30% concentration are increased to 26.75%; 37.33% and 34.41% respectively.

The results of the analysis of variance show that in all three cases there is a difference in Epoxy bonding strength of wood specimens treated with chemicals and untreated specimens.

When testing bonding strength after gluing and keeping at room condition, there is no difference in bonding strength of wood treated with 10%, 20% and 30% concentration chemicals. However, for testing bonding strength case after keeping outdoor, there is a significant difference in bonding strength of wood treated with 10, 20 and 30% concentration chemicals, but no difference in bonding strength of wood treated with 20 and 30% concentration.

Similar to PVA, Epoxy bonding strength increase of treated specimens, compared to control specimens after outdoor exposure within 12 months, is higher than that of treated specimens after keeping at room condition within 12 months or after gluing. It can be noticed that wood specimens treated with mDMDHEU after keeping in natural weather conditions have better weather resistance, so that the decrease in wood quality and Epoxy adhesive durability is lower than that of untreated specimens.

Therefore, when being affected by outdoor environmental factors, the modification efficiency of *Neolamarckia camdamba* wood with mDMDHEU is more clear. That is the ability to improve the dimensional stability, the resistance against the impact of organisms, that has been confirmed by the results of many researchers (Lê Thành Công, Tạ Thị Phương Hoa, 2016; Tạ Thị Phương Hoa et al, 2013; Tạ Thị Phương Hoa et al, 2015; Vũ Thị Ngoan, Tạ

Thị Phương Hoa, 2015). Improving dimensional stability, natural weathering resistance has contributed to the increase in PVA and Epoxy bonding strength. PVA bonding strength when keeping adhesive wood specimens is decreased 52.1% for untreated wood, down to 46.32 - 47.06% for treated wood because PVA has low weather durability. This glue is usually used only in interior products.

The experimental results indicate that wood samples treated with mDMDHEU has bonding strength than untreated samples, treated samples with PVA and Epoxy bonding strength higher than untreated wood. It can be explained that, during wood treatmentby mDMDHEU, chemicals partially reacts with wood composition which in turn condenses the polymer film in wood specimens, resulting in a reduction in wood porosity and making better adhesion. The adhesiveness of wood specimens treated with mDMDHEU compared to untreated specimens can be explained by the increase in permeability of treated wood specimens.

When the concentration of mDMDHEU increases, the amount of chemicals also increases, the hollowness decreases, the density increases, and the surface is smoother, resulting in the increase of wood adhesion. However, when the concentration increases from 20 to 30%, the amount of chemicals hardly increases so there is hardly a difference in the adhesion of treated specimens with 20 and 30% concentration..

IV. CONCLUSION

The process of treating mDMDHEU does not negatively affect to alkyd, PU and Lasure classic paint of *Neolamarckia cadamba* wood.

After natural weathering within 12 months, the adhesion of coating of treated specimens is hardly decreased in comparison with specimens before weathering when calculating the squares on the total number of incisions. The chemical concentration has an impact on the adhesion of coating, wood specimens treated with10% concentration mDMDHEU have lower adhesion than that treated with 20, 30% concentration.

The degree of color change in wood finishing surface of untreated specimens is much higher than specimens treated with 4 types of coating: Brown alkyd, PU, ceriseand dark gray Lasure classic. The color change of coating on wood specimens treated with 10% concentration is considerably higher than that treated with 20, 30% concentration. There is a slight difference in the color change of coating on wood specimens treated with 20% and 30 % concentration

Neolamarckia cadamba treated wood with mDMDHEU have higher PVA and Epoxy bonding strength than untreated wood.

For PVA glue, when testing after gluing and keeping specimens at room conditions: there is a difference in bonding strength of wood specimens treated with 10% and 20%, 10% and 30% concentration. However, there is no difference in bonding strength in wood specimens treated with 20% and 30% concentration. When keeping specimens outdoor within 12 months, there is no difference in bonding strength in wood specimens treated with 20% and 30% concentration.

For Epoxy glue, when testing after gluing and keeping samples at room conditions: there is no difference in bonding strength of wood specimens treated with 10%, 20% and 30% concentration. However, when keeping specimens outdoor, there is a significant difference in bonding strength in wood specimens treated with 10% and 20%, 10% and 30% concentration. Additionally, there is no difference in bonding strength in wood specimens treated with 20% and 30%

concentration.

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ẢNH HƯỞNG CỦA NỒNG ĐỘ HÓA CHẤT mDMDHEU ĐẾN MỘT SỐ TÍNH CHẤT CÔNG NGHỆ CỦA GỖ GÁO TRẮNG

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[2]Trường Đại học Lâm nghiệp

TÓM TẮT

Nghiên cứu ảnh hưởng của nồng độ hóa chất mDMDHEU ở 10%, 20%, 30% đến khả năng trang sức bởi 4 loại sơn: sơn alkyd màu nâu, sơn PU, sơn Lasure classic màu hồng đỏ; sơn Lasure classic màu xám đen; khả năng dán dính của gỗ Gáo trắng đối với 2 loại keo Epoxy và PVA ở điều kiện trong nhà và sau khi phơi ở điều kiện tự nhiên 12 tháng. Kết quả cho thấy nồng độ hóa chất có ảnh hưởng đến độ bám dính màng sơn, trong đó gỗ xử lý mDMDHEU nồng độ 10% có độ bám dính màng sơn thấp hơn gỗ xử lý hóa chất này nồng độ 20, 30%. Độ bám dính màng sơn của gỗ xử lý hóa chất sau khi phơi ngoài trời 12 tháng hầu như không bị giảm so với trước khi phơi. Mức độ thay đổi màu sắc bề mặt màng trang sức của gỗ không xử lý hóa chất lớn hơn mẫu gỗ xử lý hóa chất với cả 4 loại sơn. Độ lệch màu của màng trang sức trên gỗ xử lý hóa chất nồng độ 10% lớn hơn rõ rệt so với gỗ xử lý hóa chất nồng độ 20, 30%. Độ lệch màu màng trang sức trên các mẫu xử lý hóa chất nồng độ 20% và 30% có sự khác biệt không đáng kể. Gỗ Gáo trắng xử lý hóa chất mDMDHEU có độ bền trượt màng keo PVA và Epoxy cao hơn gỗ không xử lý. Mức độ tăng độ bền trượt màng keo PVA và keo Epoxy của gỗ xử lý hóa chất so với mẫu đối chứng khi lưu giữ gỗ dán dính ngoài trời 12 tháng lớn hơn mức độ tăng đại lượng này của gỗ xử lý khi lưu giữ trong nhà hoặc thử ngay sau dán dính.

Từ khóa: Độ bám dính màng sơn, gỗ Gáo trắng, khả năng dán dính, khả năng trang sức, mDMDHEU.

Received : 15/3/2017
Revised : 20/3/2017
Accepted : 31/3/2017