

Durability of P-MDI Adhesive Exposed to Ultraviolet Rays

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Formaldehyde emission from wood products utilizing formaldehyde resin adhesives has become a public concern. Recently, polymeric diphenylmethane diisocyanate (P-MDI) have been used gradually as a non-formaldehyde wood adhesive. Accordingly, the durability and degradation of P-MDI when used as a wood adhesive has become of interest. Generally, heat and moisture are thought to be the most important degradation factors for the durability of wood adhesives. The durability and degradation mechanism of P-MDI have been investigated concerning the degradation factors. Besides those factors however, various degradation factors would be acting in actual environment. Especially, P-MDI can be used as an adhesive for material surface such as overlay in recent years. In this case, P-MDI seems to be greatly affected by ultraviolet rays (UV). We investigated the effect of UV on durability of P-MDI.

First, water was added to an aqueous emulsion type P-MDI at an NCO/OH ratio of 0.5. The mixture was blended by vigorous stirring, and was applied to a bakelite plate (6×11×0.1cm). The plate was cured at 40°C for 24hr. As a wood specimen, Japanese cedar (*Cryptomeria japonica*) solid wood was used. The specimens were irradiated with UV in a UV long life fade meter. After irradiation, the surface color, chemical and mechanical properties were observed. As a control, the specimens were treated at the same temperature and humidity without UV.

Figure 1 shows the color changes of solid wood under UV irradiation. The color changed slightly to dark with increasing irradiation time. On the other hand, Figure 2 shows the color changes of cured PMDI. The color changed to dark drastically in short irradiation time and then reached an almost constant dark color. When the treatment without UV irradiation was performed, the color of cured PMDI did not changed so much. A similar trend was also observed for the wood. Based on the results obtained, it was clarified that the color of cured PMDI was drastically changed by UV in a short time. Therefore, when PMDI is used in material surface, it is necessary to pay attention to the color change. According to FT-IR measurement and dynamic mechanical analysis however, the degradation of main chemical structure and the lowering of mechanical properties were hardly observed. Now, we are performing the exterior exposure test to clarify the detail durability of P-MDI.

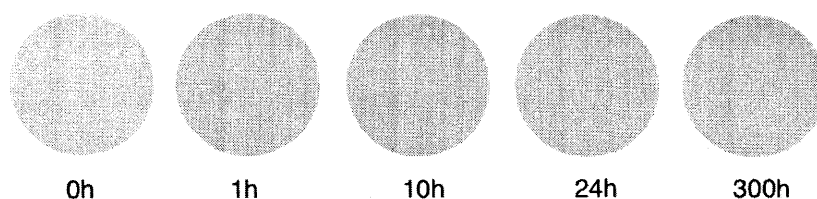


Fig.1. Color changes of Japanese cedar irradiated with UV light.

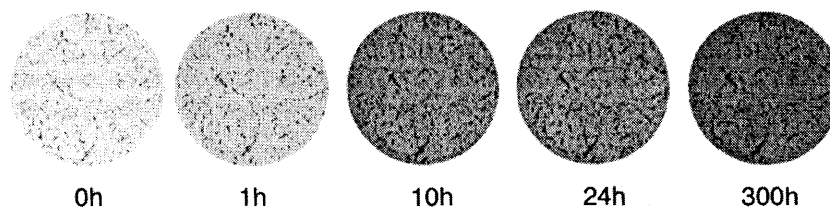


Fig.2. Color changes of cured PMDI irradiated with UV light.