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The effect of mixing ratio hardener to polymer on shear strength and percentage of elongation in the formulation of two-component adhesives based on MS polymer

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Introduction

The studies provide two component silyl terminated polyether modified sealant and a preparation method thereof. The obtained silyl terminated polyether can be quickly cured, the positioning time is short, the bonding strength is high, has the advantages of wide adhesion to a base material, environmental friendliness, high deformation displacement resistance, low pollution and the like, and are stirred and mixed at normal temperature, because of the existence of moisture in the components, the mixed interior and exterior are simultaneously cured, and the curing speed is obviously improved[1]. Although MS polymers have good adhesion to glass, they ate not recommended for that application because a long exposure to UV would degrade the adhesion[2].

Experimental

Mixed and stirred 33.5% by weight of a silyl terminated polyether polymer, 15% of plasticizer, 51% of filler, 0.2% of carbon black and 0.6% of fumed silica to obtain a component A. Added 56.66% by weight of filler, 31.8% of plasticizer, 0.71% of anti oxidant, 0.71% of anti UV in to tank B and dehydrated for 2hr under the condition that the vacuum degree is greater than 0.098 MPa and the temperature is 100-110 DEG C, then cooled to below 40C, added 2% of amino silane, 0.2% of water and 1.5% of catalyst, mixed and stirred to obtain component B (hardener).

Result and Discussion

In this study, three different ratios of hardener, namely, 2:1, 2:2 and 1:2 were used to obtain the best formulation for composites. The effect of hardener on shear strength and elongation shown in Figure 1. As shown in this figure, the maximum strength and elongation achieved by using ratio 1 hardener compared to composite with ratio 2 hardener. The curing reaction of thermosetting resins leads to a cross-linking after chemical reaction with an appropriate curing agent (hardener).

During curing process, a multiple complex chemical and physical changes occur as the material changes from a viscous liquid to a hard solid. The presence of hardener enhances the cross-linking thus increases the shear strength and elongation. There for, decrease in hardener also increased the shear strength and elongation as shown both in Figure 1.

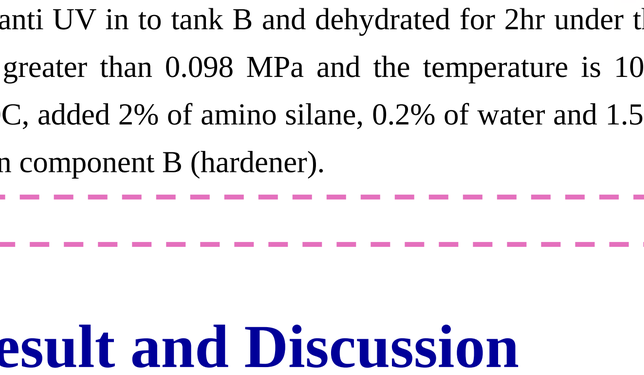

Fig.1. Effect of hardener on shear strength and elongation.

Hardness in a resistance to penetration, wear, a measure of flow stress and resistance to cutting and scratching. Figure 2 shows that increasing the hardener content has also improved the hardness value. Increase the hardener content restricted the percentage of resin available for the cross-linking and resulted in a rigid interface, this improved the hardness.

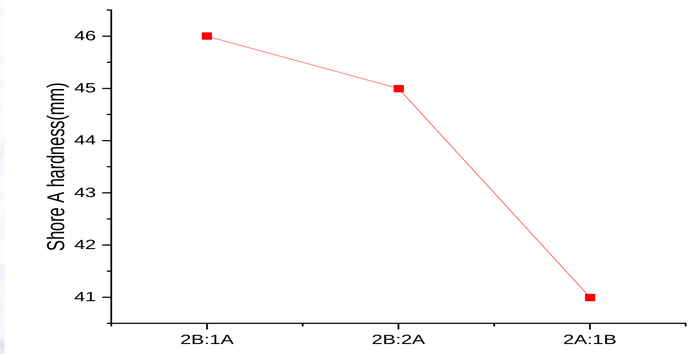

Fig.2. Effect of hardener on shore A hardness.

Conclusion

In this study, the effect of hardener on mechanical properties of silyl terminated polyether sealant has been examined. According to obtained results it can be concluded that in shear strength and elongation test analysis, decrease the hardener to ratio of 2A:1B are found to improve the strength and elongation. This shown that cross-linking between the resin and hardener are maximum at this ratio.

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