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NOTE

Anti-Corrosive Coating Prepared from Hydroxy Terminated Polybutadiene

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Hydroxyterminated polybutadiene coating has good properties as strong adhesion, resistance against bases and dilute acids, salty water, and solvents. The coating also has insulating properties against electricity and use to varnish coating.

Key Words: Anti-corrosive coating, Hydroxyterminated polybutadiene.

Hydroxy-terminated polybutadiene (HTPB) is an important prepolymer that makes another products as foams, vibration damper, asphalts, especial cement, adhesive, coating, abrasive materials and so on[1-3]. In 1981, the coatings industry was developed and many protective coatings were made with using HTPB. After few years, many things were coated for navy industry in Japan, USA, UK and Germany[4,5]. All of things with this coat had good protection against sea water, hot and cool weather (especially below -100°C). Because of unsaturated HTPB skeleton (Fig.1) and presence of two alcoholic OH groups (two OH groups exist in one average chain of HTPB), many products such as polyesters, polyepoxides, halogenated HTPB and polyurethane can prepare.

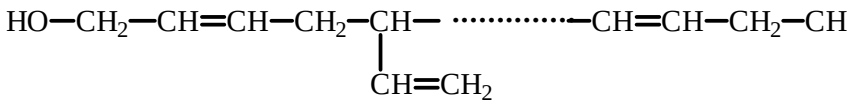

Fig. 1. Molecular structure of hydroxyterminated polybutadiene

Herein, the samples of HTPB were coated on the iron plates and tested against corrosion.

All of samples were prepared *via* radical polymerization. Binding tests were done by Malek Ashtar university research laboratory. Corrosion tests were done by SAPCO company (salt spray test, NSS, in according to Standard LW4010). Viscosity of HTPB was 40-70 poise and Mn was 2000-5000 g mol^{-1}. Toluene diisocyanate (TDI), 2,4-TDI 80% and 2,6-TDI is *ca.* 20%) was used as reactant. Curing catalyst was dibutyltindilaurate (98%)

and 1,2-dichloro-ethane was as solvent. Maleic anhydride (99%) is as additives for modifing coating properties. All of reagent (except HTPB) were purchased from Merck chemical company. After mixing filler and HTPB in a mixer, the solvent was added. Before mixing maleic anhydride with HTPB it must be heat and mixed vigorously to be able to make uniform solution, then the catalyst and TDI were added. By three ways, dipping, spraying and brushing the coated samples could be obtained. The spraying ways for having uniform and thin coating were used. Iron plates that were used had 15 × 10 cm and polished with sandblast instrument for polishing. After coating, the iron plates for half an hour was allowed to be at ambient temperature to settle down and form a uniform layer, the coated plates were cured in 150-180°C in oven for 2-3 h and then were allowed to be at ambient temperature for one night. The yellow-bright, transparent and very uniform polymeric surface was prepared. For making anti-corrosion dyes, the organic or ultra-fine inorganic pigments can be mixed with HTPB before adding catalyst and TDI.

After preparing coated iron plates, the samples were tested by salt spray test and the exposure time was found to be 1080 h. After that time the samples began to get destroyed. The thickness of coating was measured *ca*. 1.25-1.34 mm in all of area of plates. The samples were also tested against few bases, acids and solvents (Table-1).

TABLE-1
EFFECT OF CHEMICALS ON COATING PREPARED FROM HYDROXY TERMINATED POLYBUTADIENE

Materials	Exposure time (d)	T (°C)	Results
Saturated salty water	40	80	After 28 d the sample begin to destroy
Saturated salty water	45	25	After 40 d the sample begin to destroy
H_2SO_4 (50% wt.)	35	25	Coating swallowed
NaOH solution (2N)	30	25	Nothing observed
NaOH solution (1N)	30	25	Nothing observed
Toluene	7	25	Coating swallowed
Tetrahydro furan	7	25	Coating swallowed
Salty water (5% wt.)	50	25	After 49 d the sample begin to destroy
Salty water (5% wt.)	50	80	After 35 d the sample begin to destroy
HCl (18% wt.)	35	25	Nothing observed
H_3PO_4 (50% wt.)	35	25	Nothing observed

In order to testing of binding strength, the HTPB and other additives solution were coated on 1 × 10 cm Fe plates and the same size glasses.

Because of fluid character of HTPB coating solution, the silica powder was added to solution in 25, 50, 75, 100 and 200 % wt. of HTPB amount and the best result was obtained by 200 % wt. of HTPB amount. The sample in this test showed that F_{max} for samples is 944.2 psi (7408.8 N for force at fracture). The solution was applied on glass, the glass after curing in oven was transparent but when the glasses were determined for the binding strength of HTPB solution, the glasses were broken, but the pieces of glasses were not disunited. Thus, could be prove good for making safety glasses in automobiles.

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