



THE FACTORS AFFECTING THE EB CURING OF EPOXY RESIN IN THE PRESENCE OF CATIONIC INITIATOR

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The factors affecting the radiation curing of epoxy resin in the presence of cationic initiator are briefly studied in this paper.

A weighed epoxy resin, cationic initiator and additive are mixed homogeneously in beaker. The prepared samples are irradiated under Electron Beam (EB), dose rate is 6kGy/m. After irradiation, the samples are extracted by acetone in Soxhlet, then dried in vacuum. Curing Percentage is measured by weighing the samples before and after extraction, curing degree is measured by FTIR method.

The EB curing of several epoxy resins in the presence of cationic initiator 1012 is shown in Fig. 1. In all the epoxy resin used, the epoxy resin 616, 331 are very easy to cure; whereas, the epoxy resin 771 is very difficult to cure.

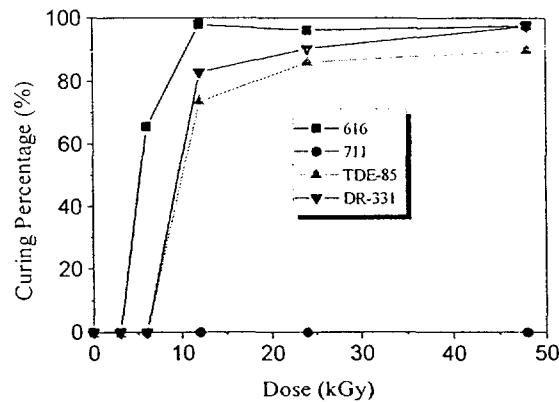


FIG. 1. The change of curing percentage of epoxy resins added cationic initiator 1012 with radiation dose.

As shown in Fig. 2, in all the initiators, diaryliodonium salt 1012 shows the best effect to initiate curing, triarylsulfonium salt 1010 can initiate the EB curing of epoxy resin also, iron arene complex 261 can not initiate the EB curing of epoxy resin 331. The reaction mechanisms of different cationic initiators are discussed. [1,2,3]

In all the additives, diphenylketone and iodine are helpful to the curing reaction; however, phenol and phenol and hydroquinone restrain the curing reaction.

The effect of solvent on the EB curing of epoxy resin is also studied. It is found that when benzene is added in the curing system of epoxy resin 616 added cationic initiator 1012 (shorten as 616+1012), the curing reaction is almost not affected, when alcohol is added, the system can not cure.

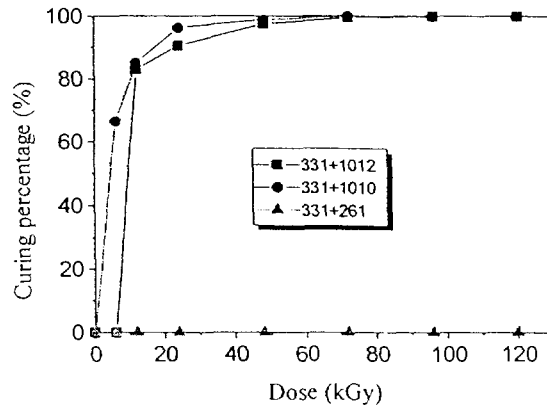


FIG. 2. The change of curing percentage of epoxy resin 331 added different cationic initiator separately with radiation dose.

The effect of reaction temperature on the radiation curing of 616+1012 is studied in the temperature range of -185°C to 92°C . The radiation curing is not affected by temperature greatly. The curing percentage of 616+1012 is almost the same when irradiated at different temperature. The curing degree of 616+1012 increases with temperature slowly (as shown in Fig. 3).

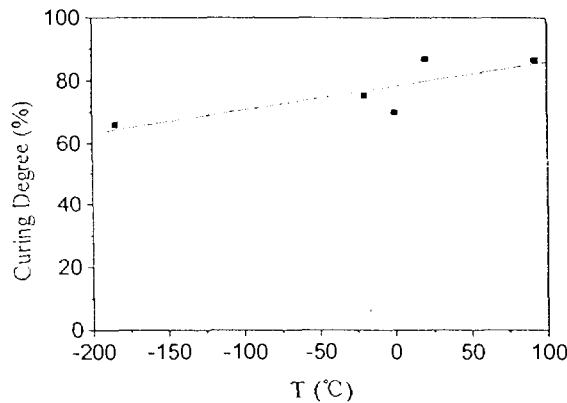


FIG. 3. The change of curing degree of 616+1012 with radiation temperature.

It is found that the curing percentage of curing system 616+1012 irradiated in Nitrogen is lower than that in air at the same radiation dose when the dose is lower than 24kGy. When the radiation dose is higher than 25kGy, the radiation curing is not affected by radiation atmosphere.

After effect is found in all the curing systems used above.

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