

E2-05: Volatility of stabilizers

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One of the causes of physical loss of stabilizers from polymers is their volatility which is a manifestation of thermal motion of molecules on the surface of the sample. The evaporation of a stabilizer decreases its concentration in the polymer, reducing its stability. Hence the volatility of stabilizers is an important aspect in determining the life time of a polymeric article as well as in choosing the suitable antioxidant for the polymer product according to its applications.

Some commonly used UV stabilizers and phenolic antioxidants were used for this study. A new apparatus was developed in which the volatilities could be measured without any decomposition of the compound, as the heating was carried out under nitrogen. Measurements were taken both under vacuum and in circulating air. The data obtained for vacuum was useful in determining the effectiveness of UV stabilizers in cosmic space at high temperatures. Volatility was found to be dependent upon temperature, molecular weight and melting point of the stabilizer, as well as on experimental conditions.

The stabilizers of a polar nature, which are capable of forming hydrogen bonds, have low volatility when compared to the non polar molecules of the same molecular weight.