

TEMPERATURE DEPENDENCE OF OXIDATIVE THERMAL DEGRADATION OF ELASTOMER

Masayuki Ito

Waseda University

e-mail: masayuki@kurenai.waseda.jp

Abstract

The temperature dependence of thermal degradation of elastomer was studied with focusing the relationship between a method of measurement and a phenomenon occurred in the sample during thermal aging. Crosslinked ethylene-propylene elastomer (EP07P, JSR) without any filler was used as a simple system to demonstrate this relationship.

The count of chemiluminescence (CL) during thermal aging was measured from 60° to 160°. Three methods were attempted to obtain the temperature dependence of counts of CL. The most valid activation energy obtained by Arrhenius plot was 82.7 kJ/mol.

The rate of molecular chain scission on the course of thermal aging was measured by chemical stress relaxation from 80° to 140°; activation energy was 116 kJ/mol. The increase in C=O group by thermal aging showed the activation energy 95.8 kJ/mol.

The induction period and the rate of weight increase along with thermal aging were studied. The sample was aged in air at various constant temperature ranged from 90° to 130°. The weight increased after a certain induction period at the early stage of aging by the addition of oxygen. The activation energy of weight increase was 113 kJ/mol.

We would like to discuss, in the symposium, the relationship between a method of measurement and a phenomenon occurred in the sample during thermal aging.