Studies of the Oxidation of Hydrocarbon Oils by Means of Infrared Absorption Spectra

Pempei GOTOH, Tohru TAKENAKA and Soichi HAYASHI

Kogyo Kagaku Zasshi (Journal of the Chemical Society of Japan, Industrial Chemistry Section), **63**, 729 (1960)

Liquid paraffin was heated at temperatures between 100°C and 450°C, and for less than 450 minutes under three different supplies of gases; (a) bubbling of N_2, (b) exposing in air, and (c) bubbling of air. The infrared analysis of the liquid products obtained in the reaction vessel at temperatures higher than 100°C showed formation of hydroperoxide, ketone, acid, aldehyde and ester, and at temperatures higher than 300°C, the absorption bands of three kinds of double bonds, namely, transvinylene, vinyl and vinylidene groups were observed. The dependence of the amount of the oxygenated group and double bond formation on the heating condition, temperature and time was observed, and compared with the results which have been reported on the effect of irradiation of hydrocarbons with various radiation of different linear energy transfer. Gaseous products trapped by the freezing mixture of dry ice-ethanol consisted of acetone, acetaldehyde and unsaturated molecules which were mainly *n*-bntylene (1) and isobutylene, whereas those trapped by liquid air consisted of carbon monoxide, carbon dioxide, methane and ethylene, The amount of these gaseous products increased linearly with the increase of heating temperature, except acetone and acetaldehyde which were saturated at a certain temperature.

Critical Conditions for Brittle Fracture of Asphalts in Extension

Rempei GOTOH and Hiroshi AIDA

Zairyo Shiken (Journal of the Japan Society for Testing Materials), **9**, 331 (1960)

The change in the tensile force of several kinds of blown asphalts was recorded at various temperatures and rates of extension. The critical velocity for brittle fracture, V_B, was defined by discontinuous break-down of the tensile force followed by no deformation. The relation between V_B and the temperature, T, was given empirically by a relation as follows:

$$V_B = A\,\exp(-E_B/RT) \qquad (1)$$

where A is an experimental constant, E_B the apparent activation energy and R the gas constant.

It was assumed that brittle fracture occurs when the viscous resistance exceeds the cohesion of the viscous materials locally. Following the rate process theory of viscous flow and from the relation (1), we have