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Paper Converting by Polymer Particles

Yasushi KODAMA  (見 玉 靖)

The coalescence of polymer particles, which were larger than those of the polymer latex (below 1 µ), was investigated. And film formation mechanism was discussed.

Polymer particles used were the copolymer of methyl-methacrylate (MMA) and ethylacrylate (EA). They were prepared by suspension polymerization with anionic surfactant and poly-(sodium acrylate) as stabilizer. The particle sizes (L) were controlled by the sorts of surfactants. Particles of two different sizes, average 25 µ and 12 µ, were used. The compositions of the copolymers were as follows: EA/MMA=3/7, 2/8, 1/9, 0/10.

In order to determine the softening temperature (T_s), the tensile strength of films, made from copolymer solution in acetone, were measured at various temperatures. T_s was defined as the temperature at which the yield point in the stress-strain curve disappeared.

These polymer particles were spread on the filter paper and treated at various temperatures. At the temperature of T_1, which is slightly higher than T_s, particles begin to coalesce, but they do not deform and the tensile strength of the treated paper is the same as the original paper. At the temperature of T_2, which is higher than T_1, particles begin to deform and the strength of the treated paper increase. In the case of particles with EA/MMA=3/7, L=25 µ, the following results were obtained.

T_s=50°C, T_1=60°C, T_2=120°C.

With decrease of particle size, T_1 is lowered but T_s does not change. When the particles were treated in wet state, T_1 is lower than that in the case of dry state.

It may be assumed that T_1 corresponds to minimum film formation temperature (MFT) of polymer latex and that T_s corresponds to the treating temperature at which latex films have the maximum strength.

Oxidation of Gases for Gas Analysis

Yoshiaki MATSUTOMI  (松 富 義 昭)

Oxidation of carbon monoxide, hydrogen and hydrocarbons was studied as for the use of separation process in the analysis of these gases. The main oxidizing
agent used was CuO-MnO₂ heated in a temperature range up to 500°C from room temperature.

This research can be divided into three parts.

1) Selective oxidation of carbon monoxide and hydrogen.

It was found that carbon monoxide can be oxidized selectively by the oxidizing agent of CuO-MnO₂ below 70°C. This makes possible to shorten the time of analysis, as hydrogen can be collected by Pd tube while extraction and oxidation of carbon monoxide is being proceeded.

2) Determination of carbon monoxide in the exhaust gas from the automobile.

Composition of the catalyst and the temperature range applied for the catalyst to oxidize selectively carbon monoxide in the automotive exhaust gas was studied, and the optimum condition was set up for the purpose. Selective oxidation of carbon monoxide in the exhaust gases was effectively proceeded by the 40% CuO-60% MnO₂ catalyst at the temperature from 20 to 50°C.

3) Analysis of the gas mixture for the calibrating standard.

Carbon monoxide and dioxide, and hexane used for calibration of continuous gas analyser were determined by the constant volume method with condense-evaporation process. 15%-CO₂, 5%-CO₂, 10%-CO, 1%-CO and 874 ppm-C₆H₁₄ were determined and their standard deviation were 0.18, 0.15, 0.18, 0.037 and 11.7, respectively.

The Preparation of Mixed Acyloins, Starting Compounds of Pure Branched Hydrocarbons

Hideo MIYAUCHI (宮内秀雄)

2 moles of acid methyl esters were reacted in the presence of metallic sodium to give acyloin by Bouveault et al. and was called "acyloin condensation."

J. M. Snell and S. M. McElvain also studied about acyloin condensation and obtained C₄-C₁₆ low molecular weight acyloins. V. L. Hansley extended this condensation to high molecular weight acyloins from carbon number 12 to 36, then synthesized the corresponding acyloins in good yield.

This study is concerned with the synthesis of mixed acyloins, which have not yet been reported. These mixed acyloins are considered to be starting compounds for making branched chain saturated hydrocarbons.

The preparation of mixed acyloins from methyl acetate or butyrate and methyl-caprylate or laurate were examined according to J. M. Snell and V. L. Hansley, and the following four mixed acyloins were obtained: aceto-capryloin (C₁₀), butylo-capryloiu (C₁₂), aceto-lauroin (C₁₄), and butyro-lauroin (C₁₆).