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Failure Mechanisms of Filled Rubber

Hiroyuki SHIMOJIMA*

Dependence of ultimate property of filled SBR rubber on the strain rate was measured using Time-Temperature equivalent rule. This results show that from ultimate strain, its master curve is made by rule of WLF equation. From this master curve, the ultimate strain can be predicted at any strain rate and temperature. However, from stress at break its master curve can't be made because of discontinuity below a certain temperature. And, under the temperature it indicates quite opposite strain rate dependence compared with unfilled rubber. Namely, at special temperature in the range, stress at break decreases with increasing strain rate. Then, it was suggested that the strain rate dependence of stress at break undergoes with the temperature. Moreover the author indicated that for ultimate properties of filled rubber the existence of filler was very important to polymer connection under low temperature. To detect its phenomenon swelling test was suggested and it was experimented preliminarily.

On the other hand valuation of dumbbell shaped specimen for constant strain rate test was discussed and also a few approaches to failure mechanism of this materials was preliminarily experimented.

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