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COMPANIES

COMPAGNIE GENERALE DES ETABLISSEMENTS MICHELIN

KNOWN AS:

Michelin Recherche et Technique S. A.

TITLE:

Continuous synthesis method for a modified diene elastomer, facility for implementing same.

ABSTRACT

The present invention relates to a continuous method for synthesizing a diene elastomer that incorporates a step of modifying the diene elastomer in a functionalizing device, this step being characterized by:

- a kinetic model according to which the ratio of the rate constants is greater than 1, and
- a flow represented by a residence time distribution in the functionalizing device that is expressed according to equations 1 or 3:

(i) in a functionalizing device having at least one tubular continuous reactor or having at least one cascade of at least two stirred reactors,

$$E_1(t) = \frac{1}{2} \left(\frac{P}{\pi \theta_1 t} \right)^{\frac{1}{2}} e^{-\frac{P(\theta_1 - t)^2}{4 \theta_1 t}} \quad \text{Eq 1}$$

(ii) in a functionalizing device that is a combination of the device (i) and of a device having at least one continuous stirred reactor, having a residence time distribution characterized by the following equation:

$$E_2(t) = \frac{e^{\left(-\frac{t}{\theta_2}\right)}}{\theta_2} \quad \text{Eq 2}$$

the device (ii) having a residence time distribution characterized by the equation 3 below, which is the result of the convolution of equations 1 and 2:

$$E_{12}(t) = \int_0^t E_1(t-T) E_2(T) dT \quad \text{Eq 3}$$
$$E_{12}(t) = \int_0^t \frac{1}{2} \left(\frac{P}{\pi \theta_1 (t-T)} \right)^{\frac{1}{2}} e^{-\frac{P(\theta_1 - (t-T))^2}{4 \theta_1 (t-T)}} \frac{e^{\left(-\frac{T}{\theta_2}\right)}}{\theta_2} dT$$