to mix the said 4 components at from 50°C to 80°C. In this variant, the mixture is cooled to from 20 to 25°C, and then DIBAH is added. There is no mention of ageing.

EP 1 176 157 B1 discloses a process for the production of polybutadienes with reduced solution viscosity/Mooney viscosity ratio, in which catalyst production uses a preforming process. Here, the neodymium versatate is first mixed at 50°C with DIBAH and isoprene, this mixture is then cooled to 5°C, and then ethylaluminium sesquichloride (EASC) is added. The ageing can take from a number of minutes to a number of days at a temperature of from 10°C to -80°C. During the polymerization process, comonomers, for example a bisdiene, are added in order to increase the degree of branching of the polymer and thus also to obtain the very restricted solution viscosity/Mooney viscosity ratio. Because of the coupling by way of the bisdiene, the number of free chain ends per molecule in the resultant branched polymer is at least 4, whereas in linear molecules it is only 2.

EP 1 123 940 A1 relates to a proces for the production of a copolymer based on vinyl aromatic compounds and conjugated dienes, in which after polymerization, the copolymers are treated with multi-functional sulfur halides.

EP 0 707 017 A1 relates to the production of diene rubbers polymerized by means of Nd catalysts and having reduced cold flow and low intrinsic odor in which there includes a treatment with disulphur dichloride, sulphur dichloride and/or thionyl chloride.

EP 1 650 227 A2 describes a process for the preparation of low branch content polybutadiene wherein there is included a treatment of polymer solution with a coupling, such as an unsaturated natural oil.

The number of chain ends in the polymer is directly correlated with energy dissipation. As the number of free chain ends increases, energy dissipation through the polymer also increases. However, as energy dissipation in the polymer decreases, the rolling resistance of the polymer also decreases by way of example, and its rebound resilience improves. For identical molar mass, therefore, the final properties of a linear polymer having only 2 chain ends per molecule are accordingly always better than those of a branched polymer.

Commercially produced polymers are known to have a statistical molar mass distribution, and the breadth of the molar mass distribution here is influenced by the catalyst-production process.

The expression "step increase in Mooney viscosity" and similar expressions such as "step increase in Mooney value" or "Mooney jump" refer to techniques which significantly increase the Mooney viscosity of the polymers.

Capability to increase the molecular weight of elastomeric unsaturated diene polymers is important for various reasons. This permits initial production of low-molecular-weight parent polymers, with the great advantage, in the solution polymerization techniques usually used, of introducing lower viscosities in the "cement" (solution of the polymer in the organic-solvent medium used in the polymerization process), and of permitting operation with higher solids contents in the "cement", since better heat transfer is achieved. It is also possible to reduce the cold flow of these diene polymers, thus increasing their capability for oil-extension.

It is well known from the prior art that use of solution polymerization methods for direct production of high-molecular-weight polymers, in particular high-molecular-weight neodymium-catalysed