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POLYMERIZATION OF BITUMEN

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The present invention concerns a process, by which the field of employment of bitumen is enlarged.

Owing to their chemical and physical qualities bitumen and alike products, such as asphalts and pitches, hitherto could only be employed for certain industrial purposes. One has tried to improve them by chemical transformations and thus enlarge their field of employment. Except for oxidation and sulphurizing these experiments, however, were unsuccessful. Although the bitumina were improved in physical respect, by taking up oxygen (blowing) or supplying with sulphur, this would not enable them to be employed for more and useful purposes. Sometimes this oxidation or sulphurizing has been called "polymerization" of bitumen. There is, however, no doubt about this "polymerization" not being a real polymerization. What is to be observed are only oxidation or dehydrogenation processes. The characteristic molecular enlargement, which takes place in the case of a true polymerization, is missing. This follows plainly from the comparison of the coefficients of viscosity of blown or sulphur containing bitumen on the one hand and normally distilled products on the other hand.

According to the present invention it has been found that mineral oil bitumina, tar pitches and such like products under certain conditions may be polymerized, if polymerized together with one or more compounds, which are polymerizable in themselves. By this so-called heteropolymerization products with new and specific qualities are obtained. Bitumen, may, for example, be polymerized together with vinylic derivatives, acrylic acid or its derivatives, as well as with dien compounds, such as butadiene, isoprene, as well as their derivatives, with or without a polymerization accellerator. The fact that the resulting products neither show a bitumeneous character nor the qualities of the pure polymerics of the second compound taking part in polymerization gives a proof of this process being a real polymerization. According to the components products are obtained, the chemical and physical properties of which are different from those of bitumen or the polymerics of the second compound taking part in reaction. All products show a considerably increased viscosity so that one came to the conclusion that they are of long-chained macromolecular structure. In many cases the final products are of utter resistancy against chemical influences. For example the heteropolymeric obtained from bitumen and monomeric chloroprene withstands both 60% sulfuric acid and concentrated nitric acid. Some of the products solve under conditions different from those under which pure bitumen on the one hand and the pure polymerics on the other hand do solve. For example the heteropolymeric from bitumen and monoacrylic methylester solves completely in acetone.

All these observations show that obviously the described reactions are true polymerizations, the olefin bonds existing in the bitumen probably representing the preliminary condition, under which the chain polymerization may form. This opinion is being supported by the fact that, as has been observed, it is much more difficult to polymerize blown bitumina than distilled bitumina.

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