THE IMPROVEMENT ON PREPARATION OF POLYMERIC PRECURSORS FOR DIAMOND AND DIAMOND-LIKE CARBONIC PHASES

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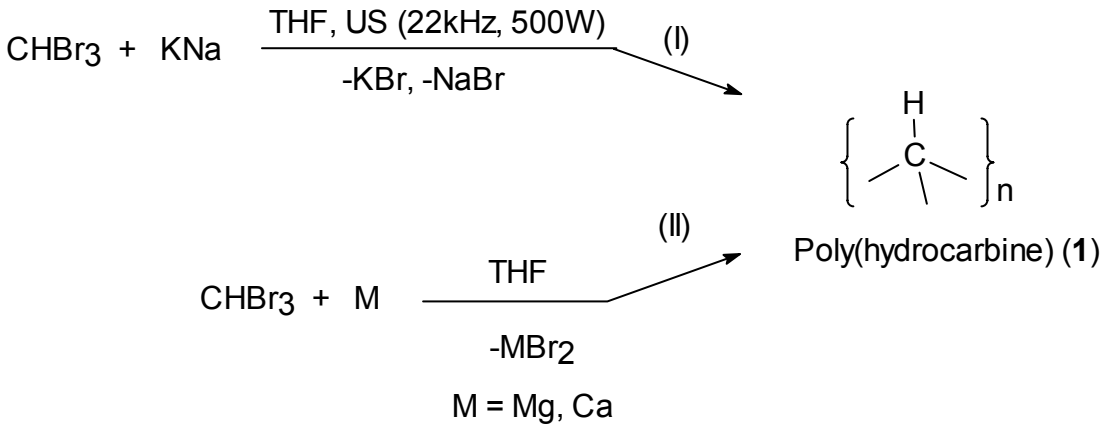
The classical syntheses of various modifications of carbon, including the diamond phase, require that the starting material be given some high-energy treatment. Arc discharge, laser radiation, microwaves, and high temperatures - these are the techniques most frequently used for this purpose. At the same time, interest in carbonic materials stimulates search for less energy-demanding and "softer" synthetic procedures. One of them employs polymeric precursors with a three-dimensional backbone consisting of sp^3-hybrydized carbon atoms. Each carbon atom in this backbone is bonded with a hydrogen atom or an alkyl (aryl) radical, and all of these fragments are linked by ordinary carbon - carbon bonds into an unordered three-dimensional network. This structure imparts unordinary properties to the precursors: they readily undergo thermal decomposition (photolysis) to yield high-quality diamond or diamond-like films at atmospheric pressure in the absence of hydrogen or any other reagent.

The known way of obtaining poly(hydrocarbine) (**1**), which is one of the best performing precursors, is by the reductive condensation of bromoform under the action of a liquid sodium--potassium alloy and intense ultrasound (Reaction I) [1].



Carrying out this reaction involves serious difficulties since it requires a source of intense ultrasound and, more importantly, the use of a dispersed liquid sodium--potassium alloy, which is an extremely explosive and inflammable chemical.

We discovered that precursor **1** can be synthesized by reacting bromoform with active metals, such as Ca and Mg [2] (Reaction II). This method is free of the drawbacks inherent in reaction (I) and, therefore, allows the synthesis of 1 to be readily scaled up.

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[1] Bianconi P.A., Joray S.J., Aldrich B.L., Sumranjit J., Duffy D.D., Long D.P., Lazorcik J.L., Raboin L., Keams J.K., Smulligan S.L., Babyak J.M. // J. Am. Chem. Soc. 2004. V.126. P.3191.

[2] Rieke R.D. // Pat. 5,436,315 USA, IC C 08 G 61/02. Publ. 25.07.1995