CARBONATE MODEL OF DIAMOND FORMATION: EXPERIMENTAL DATA

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According to a complex of petrological data, natural diamond forms at P=5-6 GPa T=900-1400C. It was shown experimentally, that only the melts of metals can provide diamond crystallization at similar parameters. The present work is devoted to investigation of diamond nucleation and growth in carbonate-carbon systems.Experiments with “dry” carbonates were carried out at P=7GPa T=1700C. It was established that diamond nucleation is limited to a great extent by kinetic parameters. Diamond formation in fluid-rich carbonates was studied using carbonates of Na and K and oxalic acid dehydrate, generating, C-O-H fluid, at P=5.7 GPa T=1150-1420C. All the experiments are characterized by a period of induction, preceding the diamond nucleation and growth, increasing with decrease of temperature. In the experiments of 120 hrs duration, diamond nucleation and growth were distinctly established up to 1150C at P=5.7 GPa. As a whole, carbonate melts, containing C-O-H fluid are more active than “dry” melts of alkaline carbonates. Considering the abundance of carbonates in diamond-bearing rocks as well as aqueous-carbonaceous composition of mantle fluid it can be suggested, that alkaline carbonate-containing fluids represent the most probable medium of natural diamond formation. They are capable to provide dissolution and transport of carbon, as well as diamond nucleation and growth at P-T parameters of natural formation of diamond.