Thermo-destruction of the fullerenes

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Studies of the thermal behavior of fullerenes and their condensed form - fullerites began with the receipt of a macroscopic. The research results of thermal stability available in the literature [1,2 etc.] are quite contradictory and ambiguous both for pure $C_{60}$, $C_{70}$ and their mixture.

The thermal behaviour of the fullerenes and the fullerites ($C_{60}$, $C_{70}$ and their mixture $C_{60/70}$) in CO conditions has been investigated by the X-ray structural analysis and the ultraviolet spectroscopy. It has been shown that the thermal decomposition occurs in the narrow temperature range. It has been established that the thermal stability of the fullerene $C_{70}$ (>98%) is higher than that of $C_{60}$ (99,5%). The critical stability temperatures of them have been determined as 950 $^\circ$C and 850 $^\circ$C respectively. The initial decomposition temperature of the mixture $C_{60/70}$, obtained extraction from toluene solution is 775 $^\circ$C. This temperature is lower than that of $C_{60}$ and $C_{70}$.

It has been established that the critical decomposition temperature of the fullerenes and the fullerites is determined by the presence of impurities (oxygen and solvent). It has been shown that the crystallization of the fullerenes from gaseous phase is the most advantageous method of cleaning. At the same time the difference in the stability temperatures of $C_{60}$ and $C_{70}$ is, at least, $\Delta T = 125$ $^\circ$C.

The decomposition kinetics of the fullerites mixture $C_{60/70}$ at $T = 800$ $^\circ$C has been investigated.

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