Concentration and separation of high fullerenes

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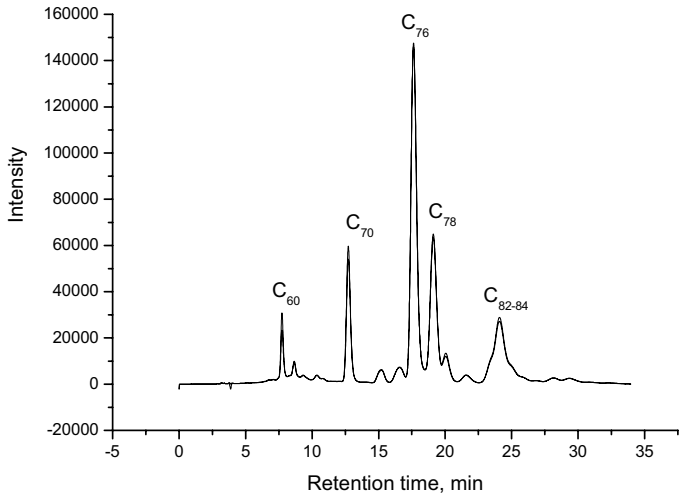
Recent activity at PNPI in the field of advanced technologies and production of high fullerenes is presented in this review of experimental results demonstrating substantial adventures in the enrichment of the mixtures of fullerenes in solutions. The mixtures of fullerenes C_{60}, C_{70} containing also ~ 4 wt.% of high mass fullerenes (C_{76}, C_{78}, C_{82}, C_{84} etc.) were obtained by the method of graphite evaporation in electric arc in helium atmosphere. First there was proposed a simple and effective method allows concentrate the fractions being enriched with high fullerenes. The method is based on different solubility of fullerenes in various organic solvents. The process employs the chromatographic column filled with graphite material and organic solvent as a mobile phase that enables to realize the two-stage separation. In the first stage, toluene serves as a mobile phase, and in the second one, 1,2,4-trimethylbenzen is used. As a result, in the second stage the eluate is strongly enriched with high fullerenes (70-80 wt.%). A typical HPCL chromatogram showing a big content of high fullerenes is presented in figure below.



Chromatogram: peaks corresponding various high fullerenes are shown.