

SEPARATION, PURIFICATION AND CHARACTERIZATION OF FOUR ISOMERS OF FULLERENE C₇₀-O

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The history of fullerenes started in 1985, when H. Kroto, R. Smally and R. Curl [1], accidentally discovered new carbon molecule C₆₀ (Buckminsterfullerene), which was recognized as a third, after graphite and diamond, allotropic form of carbon.

Since Krätschmer and Huffman discovered in 1990 a method to obtain macroscopic quantities of C₆₀ [2], fullerenes have been deeply studied. Special attention was given to their derivatives, such as the simplest ones, fullerenes oxides.

Scientists tried to predict and find the structure of new compounds using all accessible spectroscopic and resonance techniques as well as quantum calculations. Two possible structures of fullerene C₆₀ monoxides were found: oxidoannulene- and epoxide-like structure [3-5]. Since this discovery scientists have been also studied derivatives of higher fullerenes such as C₇₀O and its dimers [6, 7].

The aim of this project was to separate, purify and characterise the four isomers of fullerene C₇₀-O. For the separation and purification of the samples, High Performance Liquid Chromatography (HPLC) was used. Matrix – assisted laser desorption/ionisation time of flight (MALDI-TOF) mass spectrometry was employed to identify the fullerenes present in each HPLC purification step. Each isomer of C₇₀-O was purified in milligram quantities. ¹³C Nuclear Magnetic Resonance (NMR) was used to determine the symmetry of each isomer. The results will be presented at the workshop.

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