

N.N. Rozhkova, G. V. Andrievsky, L.I. Derevyanchenko, V.K. Klochkov, E. Shulyakovskaya. EXTRACTION OF FULLERENES FROM SHUNGITE CARBON BY WATER-CONTAINING SOLVENTS. "1-st World Conference on Carbon "Eurocarbon 2000", July 9-13, 2000, Berlin, Germany, Book of ext. abstr., 1091-1092.

EXTRACTION OF FULLERENES FROM SHUNGITE CARBON BY WATER-CONTAINING SOLVENTS.

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Key words: amorphous carbon, fullerene, mass-spectroscopy

INTRODUCTION

Detection of C₆₀-C₇₀ in the visible film within carbon-rich shungite (ShC) by electron microscopy and mass spectroscopy provoked of a large number of experiments on extraction of native fullerenes from ShC¹. Numerous attempts of extraction by conventional methods were not always successful. The latter supposed to be caused not only by heterogeneity of occurrence of fullerenes in ShC but mostly by way of interaction of fullerenes inside carbon matrix. Thus occurrence of fullerenes in ShC is still questionable². Nevertheless ShC is always remembered in connection with the problem of concentration and preserving of fullerenes and nanostructures in nature³.

Recent achievements of generation of water soluble fullerenes (FWS)⁴ prompt to revision of the approach to extraction of fullerenes from ShC. The difficulties in extraction were supposed to be connected with interaction of fullerenes in ShC by donor-acceptor bonds rather than hydrophobic ones which were was considered before. The present study was undertaken to check this supposition.

EXPERIMENTAL

Method worked out for FWS was tailored for extraction of fullerenes from ShC. The stable water colloidal solutions of fullerenes (in the form of hydrated clusters 3-36 nm in size)⁵ were used as a standard in this study. Powdered ShC (from Shunga deposit⁶) was subjected to ultrasonic treatment in water with addition of toluene-alcohol (4:1 v/v) until complete evaporation of toluene phase. Then mixture was filtered and centrifugated at 4x10³ g. Stable gray-brownish and opalescent in reflected light solution was obtained.

Mass spectrometric measurements were carried out using time-of-flight MSBC mass spectrometer ("Selmi", Sumy, Ukraine) by the ²⁵²Cf PID method. UV-VIS spectra of colloidal solutions and IR- spectra of powdered dry films dispersed homogeneously in KBr pellets, were performed respectively by spectrometers "Specord M-40", "Specord M-80", Germany.

RESULTS AND DISCUSSION

Mass-spectrum of positive ions of the water colloidal solution of ShC re-dissolved in hexane showed prominent peaks with m/z 720,66 a.e.m, correspondent to signal of C₆₀ molecular ion (Fig.1). UV spectra of water solution demonstrated wide band at λ_{max} 265-267 nm. Adsorption