FEATURES OF FULLERENE EXTRACTION WTH TOLUENE

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INTRODUCTION

The most prominent event within last decade is discovery of fullerenes - a stable C_{60} cluster and later on other fullerenes. Up to now scientists' interest in this allotropic modification of carbon does not diminish.

There exist several methods for fullerene synthesis. Electric arc method is more efficient. Its discovery gave opportunity for producing fullerenes in large amounts and fulfil investigators' needs. The next problem requiring scientists' attention is the problem of complete fullerene extraction from synthesis products.

RESULTS AND DISCUSSION

In this work electric arc method has been applied to produce fullerene containing soot (FCS). The unit consists of two communicating vacuum reactors where FCS has been synthesized in helium atmosphere. Operating surface in the reactor was 80x800 mm^2. Electrodes were placed vertically in the unit.

Fullerene extracts have been investigated in toluene. According to literature data fullerene concentration in toluene is about 3 g/l under normal conditions.

Soot samples studied were filled up the bags of filter in amounts of 0.4-0.7 g. The prepared soot did not contaminate the vessel walls. Bags containing soot were poured with toluene in amounts of 100 ml. Samples have been subjected to extraction in the stationary and dynamic modes. In the latter case samples have been placed on the vibroplant.

Extraction has been conducted under continuous vibration, and interrupting it. In the stationary mode solutions have been observed for 40 days under normal conditions. The solutions studied have been compared with standard ones.

It has been found that the solution concentration did not change in the first hour at continuous vibration for 10 hr. Periodicity in measurements was one hour. Without vibrator such fullerene concentration has been achieved for 10-20 hr. Hence, vibration time has been limited by 2 hr as at longer holding the solution concentration has remained unchangeable.

In studying the samples produced in different modes of synthesis the absolute fullerene concentration in the extract has not changed for one hour. It may be explained by difference in the fullerene content (both qualitative and quantitative) in the soot.

FCS samples (0.5 g) have been prepared and poured with toluene to conduct investigations in the stationary mode. The fullerene concentration in the solution has been determined in the interval of 5-10 hr. It has been found that depending on the qualitative fullerene composition, the rate of their dissolving in toluene changes. In the samples containing little amounts of C_{70} fullerene in soot extraction time increased and might reach 10-15 hr.

CONCLUSIONS

Concentration of solutions prepared both in dymanic and stationary modes in fullerene extraction with toluene has been studied.

It has been found that in the dynamic mode time for soot holding in the solvent on the vibroplant may be limited to 2 hr.

It has been shown that with changing extraction time in the stationary mode qualitative and quantitative fullerene compositions in the solution are changing. C_{70} fullerene is extracted slower.

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