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Analysis of C60 samples

Technical report

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Contents

Executive Summary

Five samples were received for analysis of C60/C70 content. The samples were:

a. Commercial sample of C60 (Sigma Aldrich)
b. Commercial sample of C60 (Solaris Chem)
c. C60 suspended in ethanol (Red Lion Biomedical)
d. C60 soot suspended in ethanol (Red Lion Biomedical)
e. Commercial sample of C70 (Solaris Chem)

HPLC-MS analysis revealed that C60 is present in the commercially sourced C60, from Sigma and Solaris Chem, as well as the sample from Red Lion Biomedical. Traces of C60 we also found in the sample of C70 and the separated soot sample.

Introduction

Five samples were received for analysis of C60/C70 content.

The objective of this project was to determine the presence of C60/C70 in the supplied samples.

Methods and Instrumentation

HPLC-MS analysis was conducted on an Agilent 1290 UHPLC instrument coupled to a 6125B MSD detector, an Agilent SB-C18 50 mm x 2.1 mm ID, 1.8µm particle size column. Elution conditions were 50% methanol/50% toluene, in 3 minutes at 0.25 mL min^{-1}. MS detection was done in positive mode at Selective Ion Mode (SIM) at m/z 720 (C60) and m/z 840 (C70). All samples were dissolved/diluted in toluene prior to analysis.

Results and discussion

a. Dissolution and HPLC-MS analysis

Following dissolution/dilution with toluene, the samples were visually examined and the corresponding photograph is shown in Fig. 1.

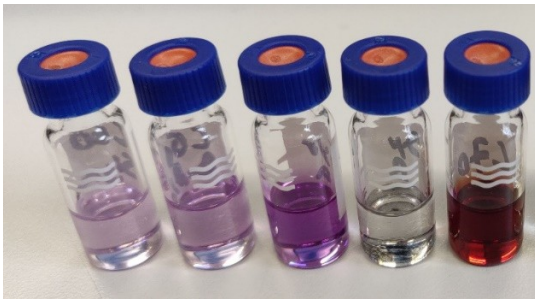

Fig. 1 From left to right: commercial sample of C60 (Sigma Aldrich), commercial sample of C60 (Solaris Chem), C60 suspended in ethanol (Red Lion Biomedical), C60 soot suspended in ethanol (Red Lion Biomedical) and commercial sample of C70 (Solaris Chem).

Observation reveals that the three samples from the left show an intense ruby colour indicative of the presence of C60 while the fourth sample is in fact mostly insoluble in toluene and a fine black precipitate is clearly seen. The sample of C70 was an intense red colour.

The obtained HPLC-MS chromatograms collected are shown in Fig. 2-6.

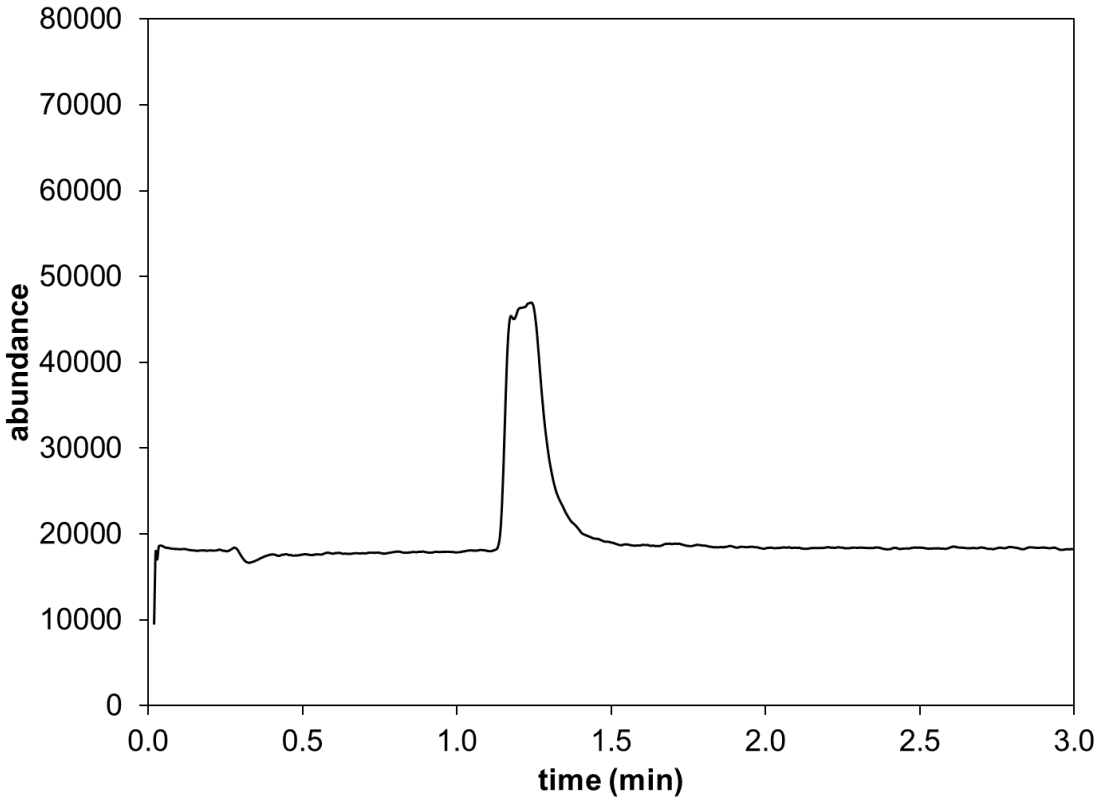

Fig. 2 HPLC-MS chromatogram of commercial C60 sample (Sigma Aldrich).

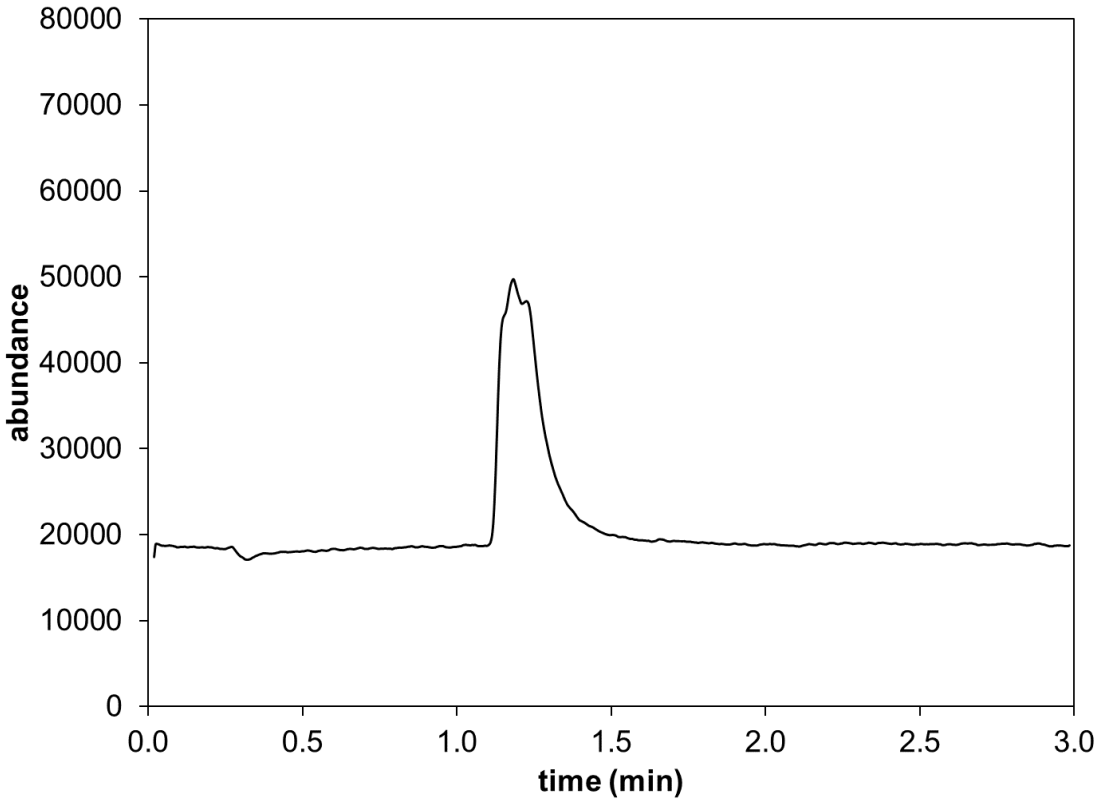

Fig. 3 HPLC-MS chromatogram of commercial C60 sample (Solaris Chem).

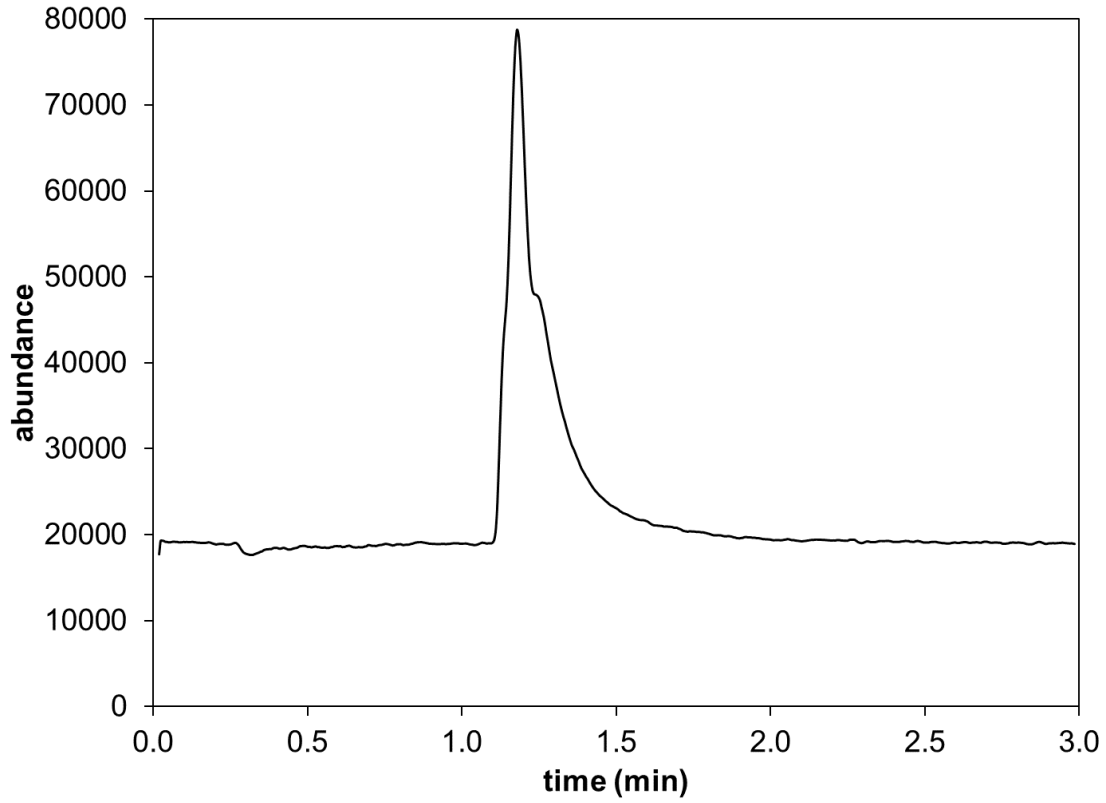

Fig. 4 HPLC-MS chromatogram of C60 sample suspended in ethanol (Red Lion Biomedical).

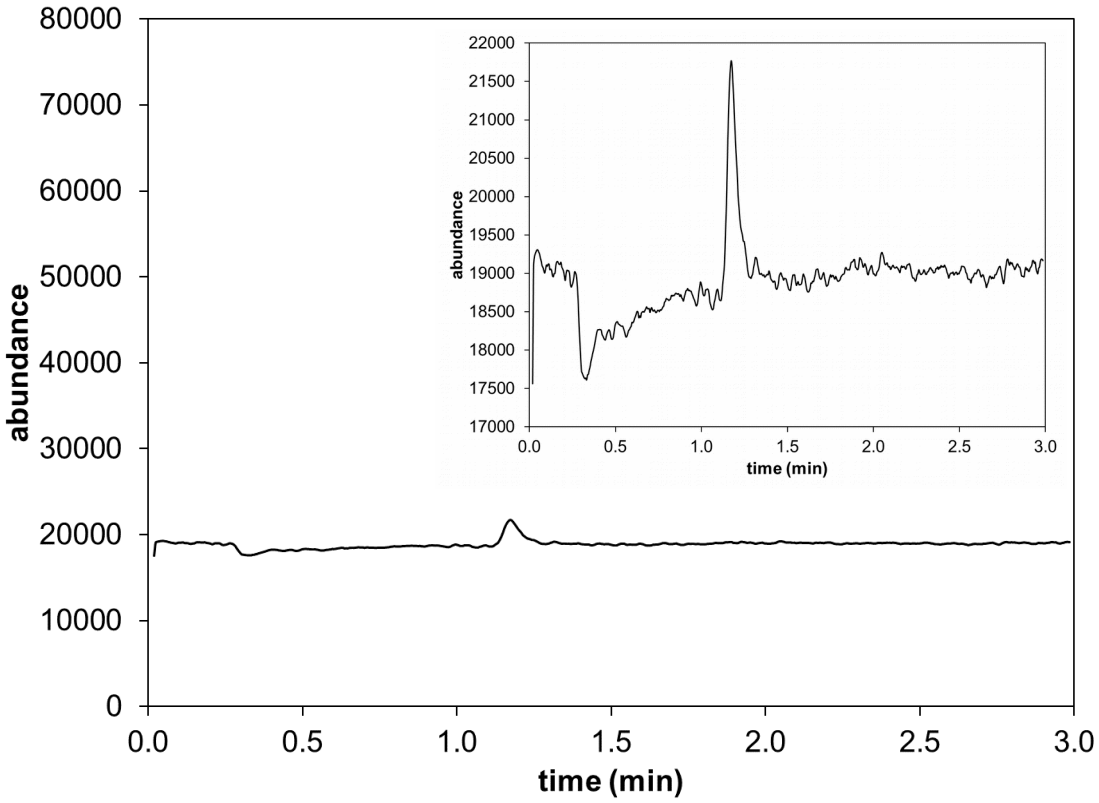

Fig. 5 HPLC-MS chromatogram of C60 sample suspended in ethanol (Redi Lion Biomedical).

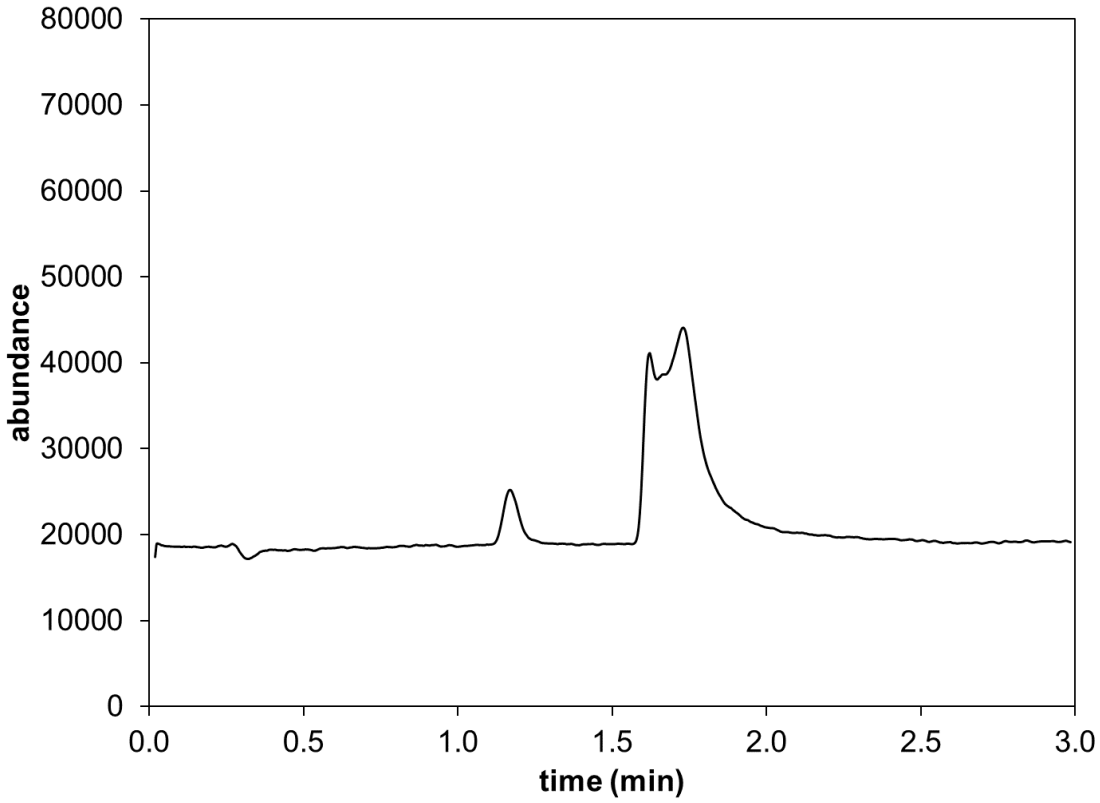

Fig. 6 HPLC-MS chromatogram of commercial C70 sample (Solaris Chem).

As seen above, a single peak is seen in Fig. 2-4 at 1.2 min, corresponding to C60. The peak for C70 appears at 1.6-1.7 min (Fig. 6) while a small amount of C60 is also present in the sample.

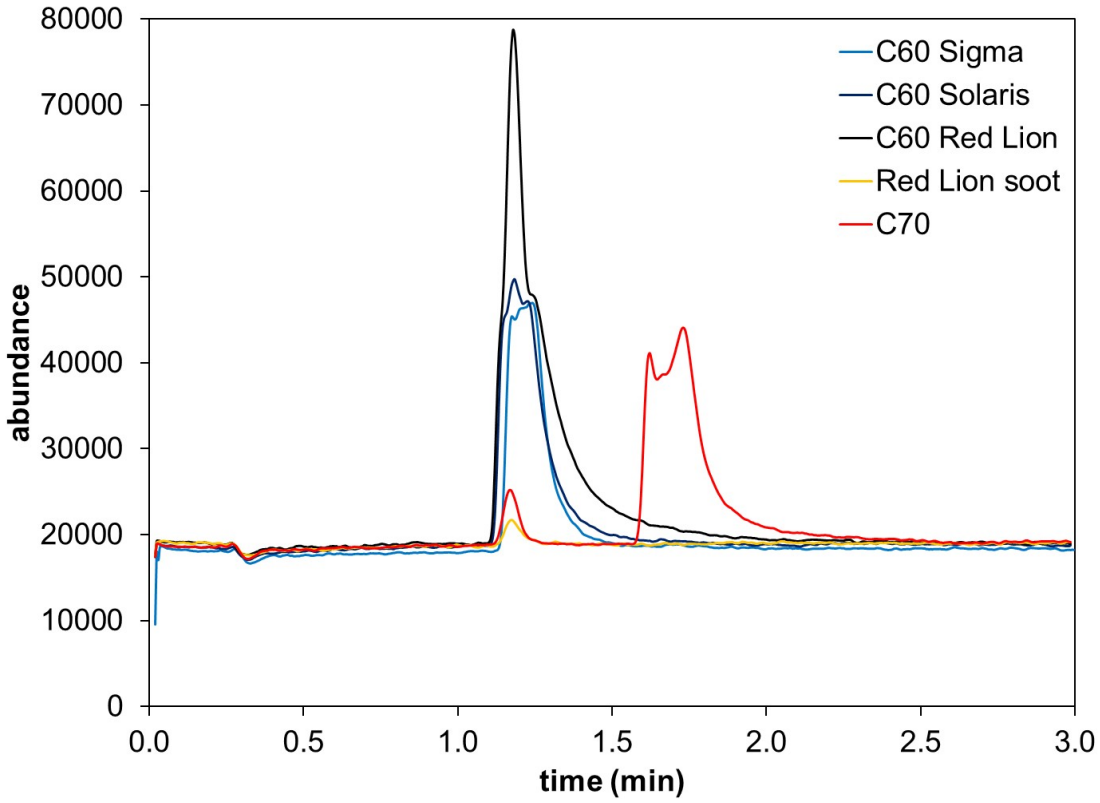

Fig. 7 Overlay of HPLC-MS chromatograms of all analysed samples.

Conclusion

In conclusion, HPLC-MS analysis of the submitted samples revealed that the sample from Red Lion Biomedical contains C60, as verified by the similarity to the two commercial C60 samples. Furthermore, traces of C60 were found in the sample of C70 as well as the separated soot sample.

Analytical data and technical report compiled by:

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