

Supplementary material

# Separation of mercury(II) from industrial wastewater through polymer inclusion membranes with calix[4]pyrrole derivative

Iwona Zawierucha <sup>1,\*</sup>, Anna Nowik-Zajac <sup>1</sup>, Jakub Lagiewka <sup>1</sup> and Grzegorz Malina <sup>2</sup>

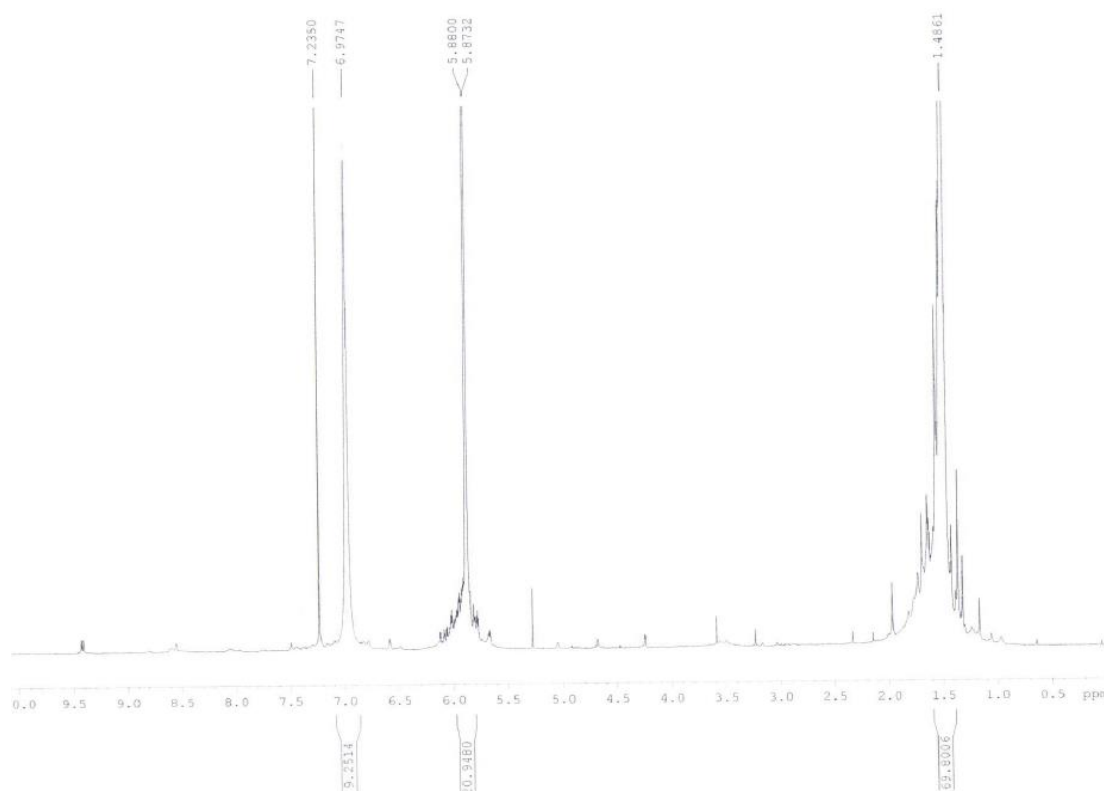
<sup>1</sup> Institute of Chemistry, Jan Dlugosz University in Czestochowa; Czestochowa 42-200, Poland; a.zajac@ujd.edu.pl, jakub.lagiewka@doktorant.ujd.edu.pl

<sup>2</sup> Department of Hydrogeology and Engineering Geology, AGH University of Science and Technology, Mickiewicza 30, Cracow 30-059, Poland; gmalina@agh.edu.pl

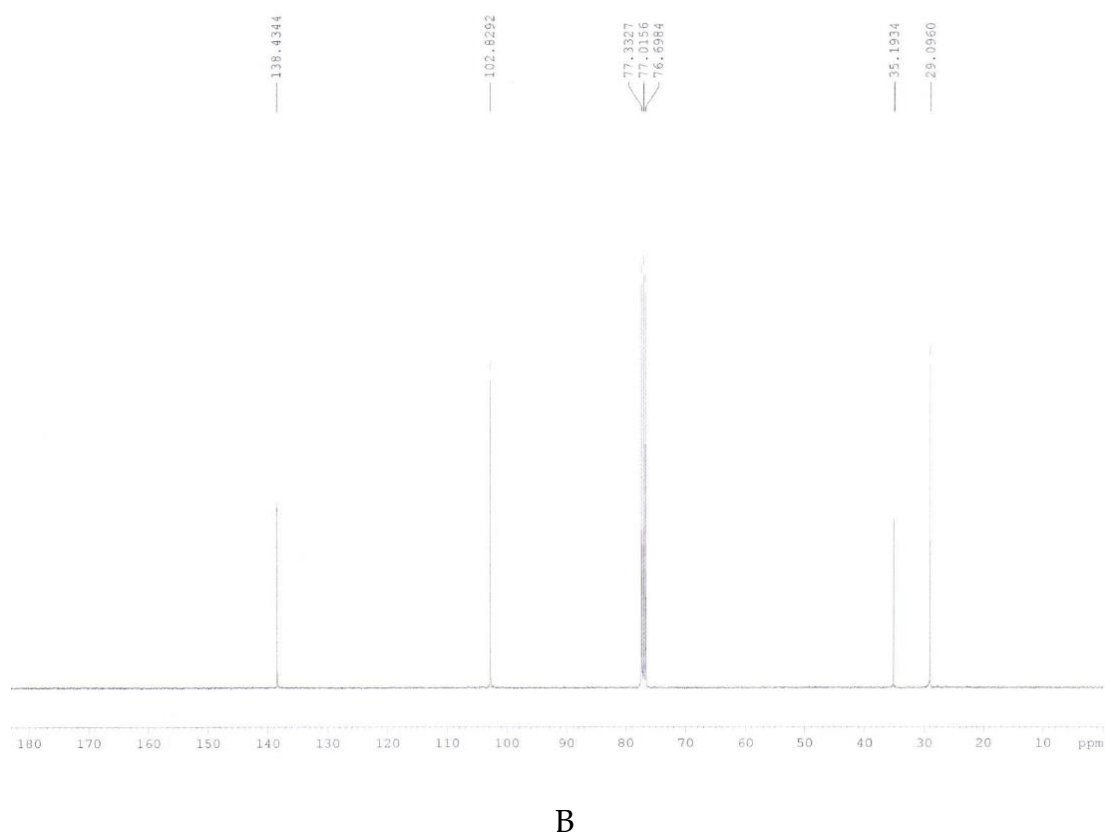
\* Correspondence: i.zawierucha@ujd.edu.pl; Tel.: +48 883 842 222

The “Supplementary materials” section contains the NMR and FT-IR spectra of synthesized *meso*-octamethylcalix[4]pyrrole.

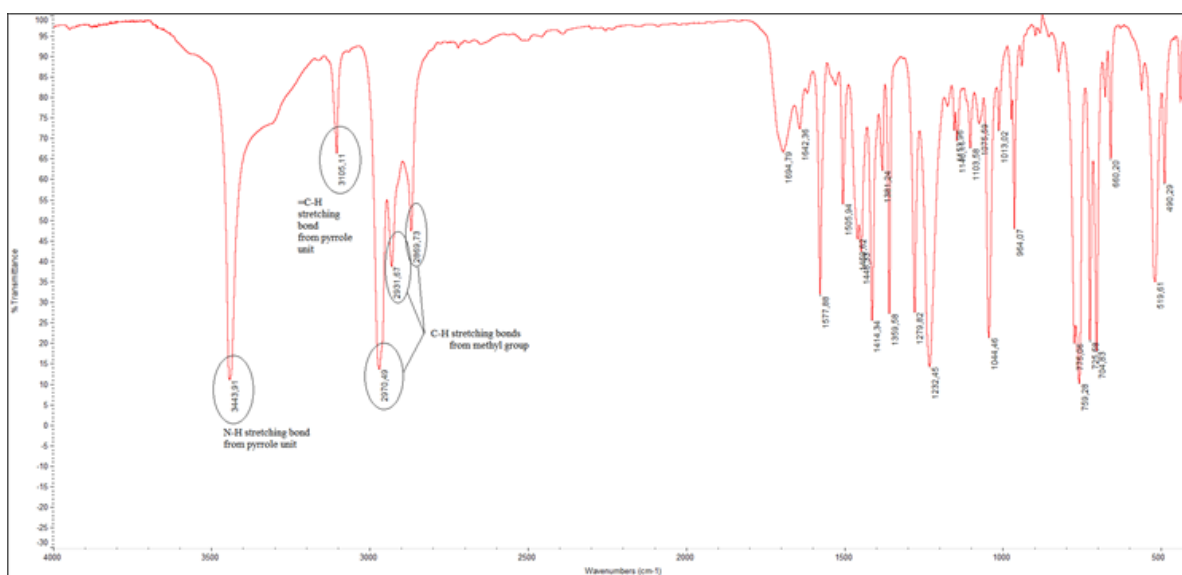
<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>, δ, ppm) (Figure 1A): 6.97 (s, 1H, NH), 5.88 (d, 2H, PyH, J = 2.7 Hz), 1.49 (s, 6H, CH<sub>3</sub>). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>, δ, ppm) (Figure 1B): 29.10 (CH<sub>3</sub>), 35.19 (C(CH<sub>3</sub>)<sub>2</sub>), 102.83 (ArH), 138.43 (Ar).



A



**Figure S1.** (A)  $^1\text{H}$  NMR spectrum of the *meso*-octamethylcalix[4]pyrrole; (B)  $^{13}\text{C}$  NMR spectrum of the *meso*-octamethylcalix[4]pyrrole.



**Figure S2.** FT-IR spectrum of *meso*-octamethylcalix[4]pyrrole.

For pyrrole units, one strong and sharp peak at 3443  $\text{cm}^{-1}$  responds to N-H stretching while a less intensive peak at 3105  $\text{cm}^{-1}$  corresponds with =C-H stretching from an aromatic ring. The successive peaks at: 2970, 2934 and 2870  $\text{cm}^{-1}$  reflect the C-H stretching

bonds from methyl groups. Stretching bonds from pyrrole units and methyl groups indicate presence of *meso*-octamethylcalix[4]pyrrole.