BUDAPESTI MŰSZAKI ÉS GAZDASÁGTUDOMÁNYI EGYETEM
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Intézményi azonosító: FI 23344, Témaszám: BME 30037

Measurement report

1. Aim of the analysis

The aim of this work is to determine the hexane uptake capacity of different adsorbent mixtures.

2. Materials

Adsorbent mixtures

Hexane (Merck, Darmstadt, Germany)

Glyceryl-triacetate (Fluka Analytical, Steinheim, Germany)

3. Sample preparation

First ATD tubes were filled with the adsorption mixture then the weight of the tubes was measured with an analytical balance. The tubes were attached to the evaporating unit (the measurement setup can be seen in Figure 1 and 2). After an adequate amount of the solvent was placed into the evaporating bottle, the evaporating unit was placed into a water bath (50 °C) and was constantly rinsed with a nitrogen flow for 60 minutes. Afterwards the content of the adsorbent tube was put into a headspace vial and the adsorbent was suspended in 1 mL of glyceryl-triacetate to extract the analyte from the surface. The amount of hexane was quantified by HS-GC analysis.

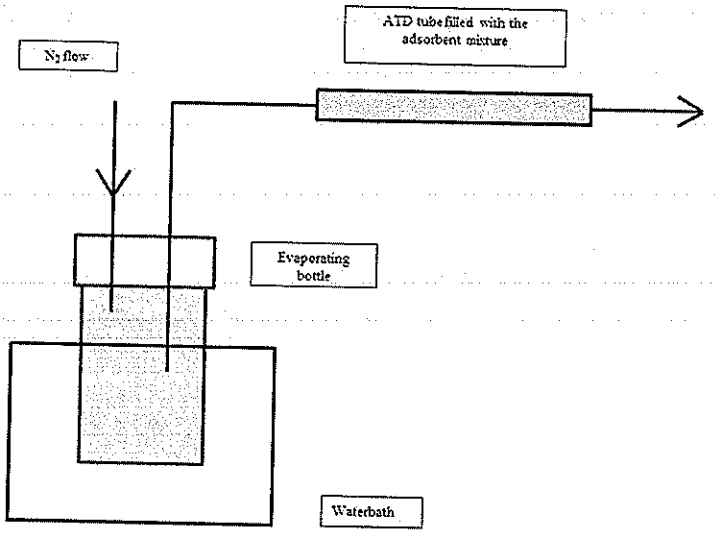

Figure 1 – Scheme of the adsorbent tube attached to an evaporating unit

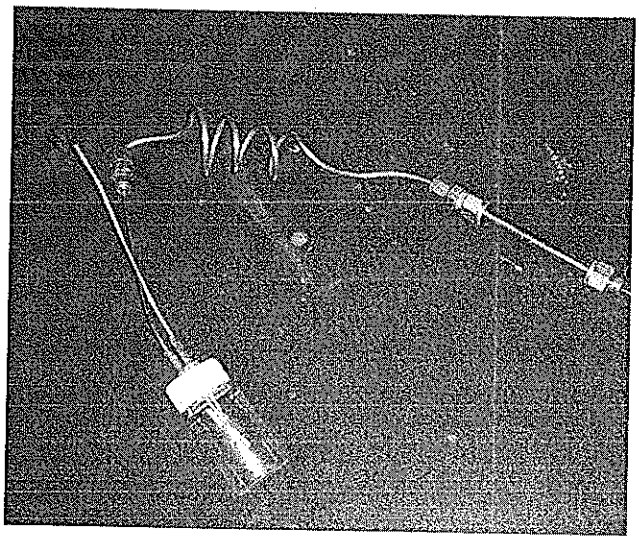

Figure 2 – Adsorbent tube attached to the evaporating unit

4. HS-GC method

Sample introduction: Perkin Elmer Headspace HS-40

Oven temperature: 90 °C

Needle temperature: 100 °C

Transfer line temperature 110 °C

Thermostating time: 10 min

Pressurization time: 1 min

Inject time: 0.02 min

Withdrawal time: 0.5 min

Gas chromatograph: Perkin Elmer Autosystem XL Gas chromatograph

Column: Phenomenex Zebron ZB-624, 60 m x 0,53 mm x 3 µm

Oven program initial temperature: 60 °C

Hold time: 8 min

Carrier gas: Nitrogen

Column pressure: 15 psi

Detector: FID, 200 °C

5. Results

In the following tables and figures the adsorbed amount of hexane is given as a function of the evaporated hexane in case of different adsorbent mixtures.

2:5:0 adsorbent mixture				
Weight of the adsorbent (g)	Volume of hexane (µl)	Weight of hexane (mg)	Weight of the adsorbed hexane (mg/g adsorbent)	Area (µVs)
0,7169	50	34	47,4	444151
0,7450	100	68	91,3	607885
0,7209	150	102	141,5	886332
0,7376	200	136	184,4	1034874
0,7229	250	170	235,2	1100901
0,7109	400	272	382,6	1137049

Table 1 - Adsorption properties of the 2:5:0 adsorbent mixture

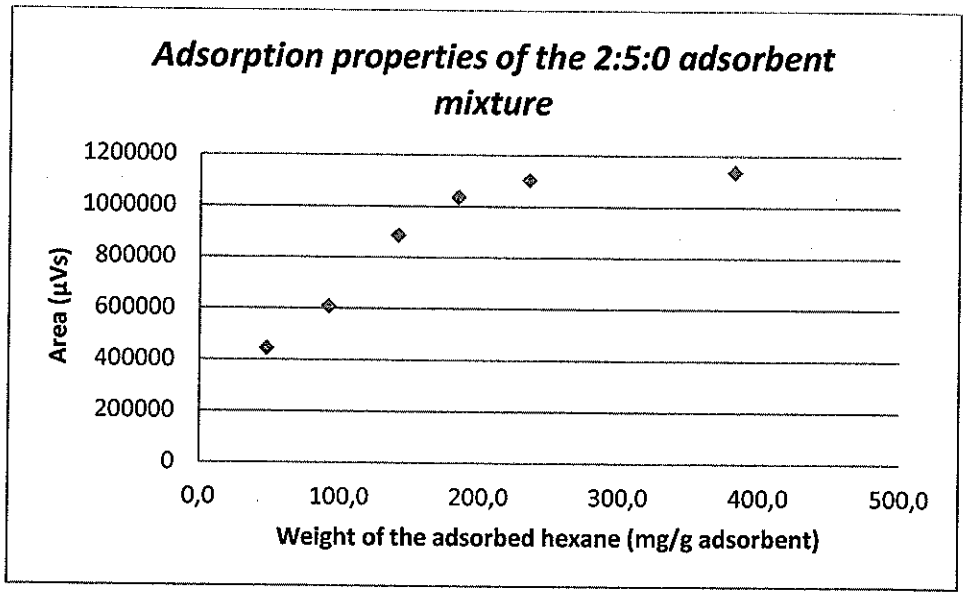

Figure 1 - Adsorption properties of the 2:5:0 adsorbent mixture

3:2:2 adsorbent mixture				
Weight of the adsorbent (g)	Volume of hexane (µl)	Weight of hexane (mg)	Weight of the adsorbed hexane (mg/g adsorbent)	Area (µVs)
0,7365	50	34	46,2	986195
0,7400	100	68	91,9	1414922
0,7324	150	102	139,3	1791186
0,7087	200	136	191,9	2126945
0,7105	250	170	239,3	2257371
0,7330	250	170	231,9	2229198
0,7119	400	170	382,1	2325820

Table 2 - Adsorption properties of the 3:2:2 adsorbent mixture

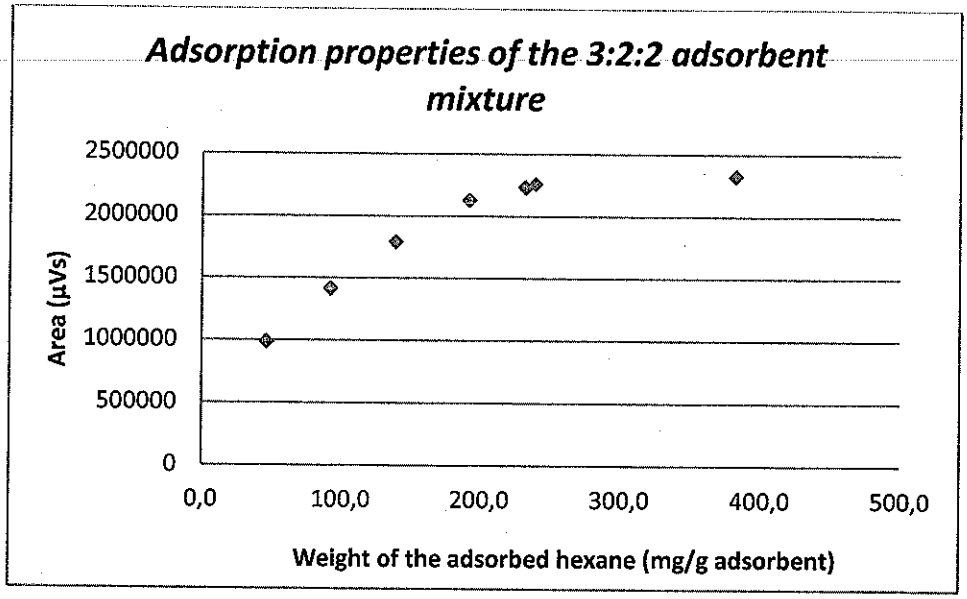

Figure 2 - Adsorption properties of the 3:2:2 adsorbent mixture

4:2:4 adsorbent mixture				
Weight of the adsorbent (g)	Volume of hexane (µl)	Weight of hexane (mg)	Weight of the adsorbed hexane (mg/g adsorbent)	Area (µVs)
0,8206	50	34	41,4	105757
0,7137	100	68	95,3	297878
0,8383	150	102	121,7	338605
0,7183	200	136	189,3	385000
0,7308	200	136	186,1	371745
0,7407	250	170	229,5	472612
0,7528	400	272	361,3	450325
0,7608	400	272	357,5	393069

Table 3 - Adsorption properties of the 4:2:4 adsorbent mixture

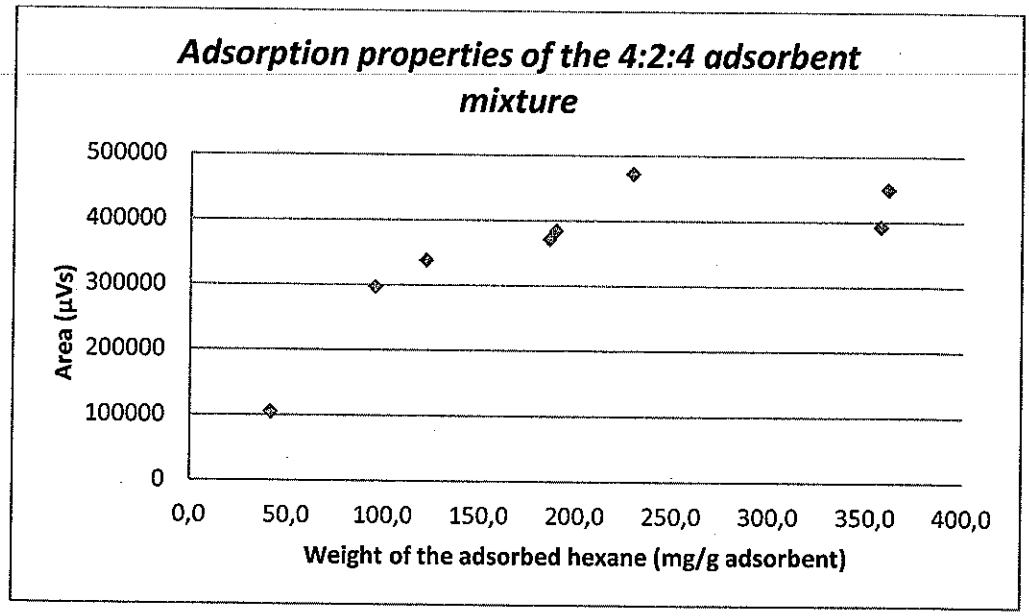

Figure 3 - Adsorption properties of the 4:2:4 adsorbent mixture

5:1:0 adsorbent mixture				
Weight of the adsorbent (g)	Volume of hexane (µl)	Weight of hexane (mg)	Weight of the adsorbed hexane (mg/g adsorbent)	Area (µVs)
0,6506	50	34	52,3	309376
0,6517	100	68	104,3	925962
0,6681	150	102	152,7	1093303
0,7766	200	136	175,1	1200032
0,7391	250	170	230,0	1219922

Table 4 - Adsorption properties of the 5:1:0 adsorbent mixture

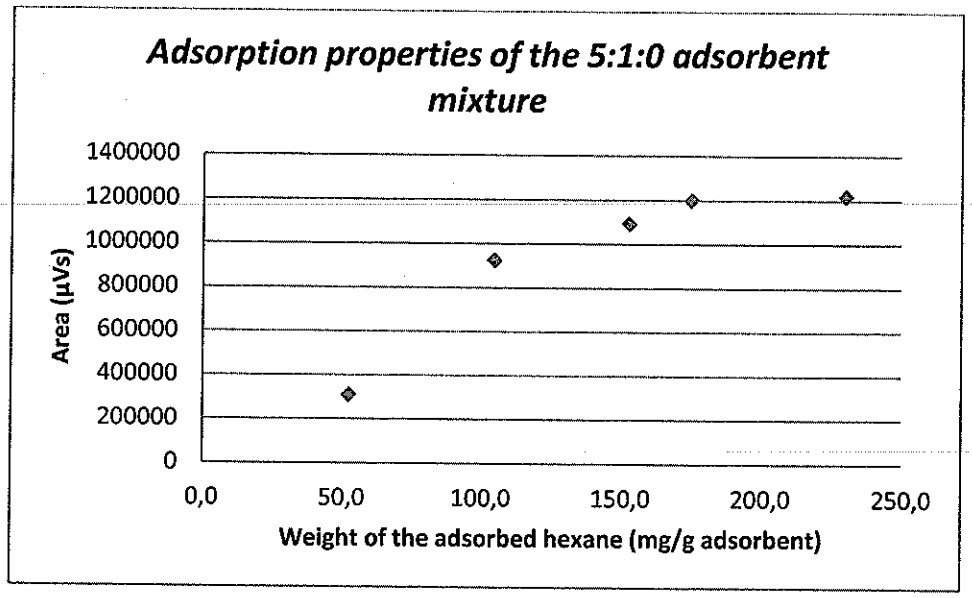

Figure 4 - Adsorption properties of the 5:1:0 adsorbent mixture

4:0:5 adsorbent mixture				
Weight of the adsorbent (g)	Volume of the hexane(µl)	Weight of the hexane (mg)	Weight of the hexane (mg/g adsorbent)	Area (µVs)
0,8393	50	34	40,5	58257
0,8333	150	102	122,4	473547
0,7538	250	170	225,5	853074
0,8223	250	170	206,7	845245
0,8926	250	170	190,5	805758
0,6881	500	340	494,1	831494

Table 5 - Adsorption properties of the 4:0:5 adsorbent mixture

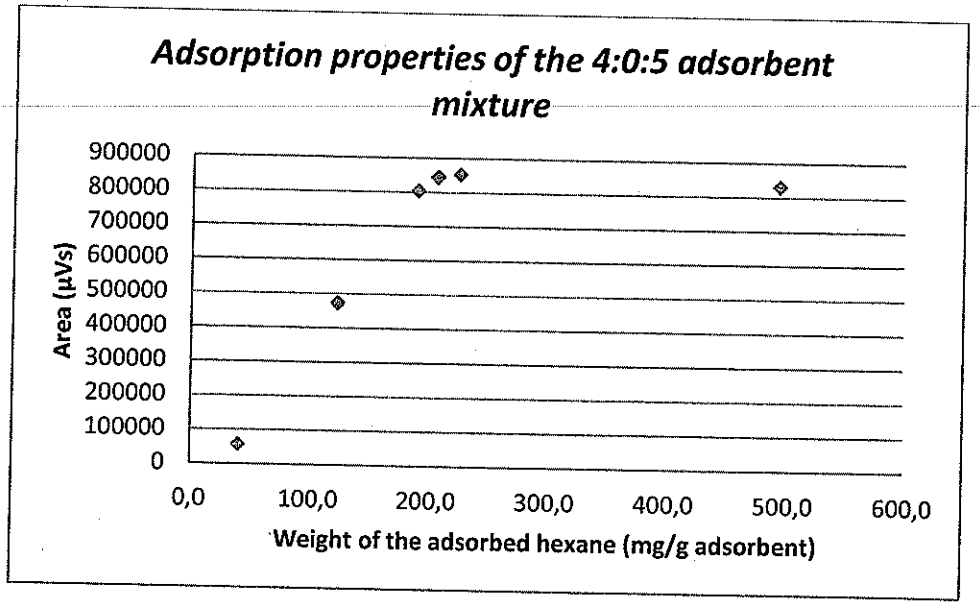

Figure 5 - Adsorption properties of the 4:0:5 adsorbent mixture

Budapest, 7 October 2016

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Appendix

Figure 1: Chromatogram of hexane

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