DETERMINATION OF THE WORKING PARAMETERS OF TYPICAL PASSIVE SAMPLERS

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The purpose of the work has been the determination of the working pararameters of typical passive samplers.

About 200 passive samplers SKC 530-II have been used for the testing; this kind of sampler has been employed both for its interchangeable capsules and because the adsorbent medium is activated granular carbon, which makes possible to prepare comparison vials used in the contemporary active sampling.

The tested contaminants have been examined in the ranges included between 0,1 and 2,4 µl of adsorbed contaminant per 100 mg of active carbon. Three badges have been exposed for each experimental point, using a system for the generation of dynamic standards; simultaneously three active samplings have been made at the same flow wich the maker had declared for the passive ones.

During the test the average value of the contaminant concentration in the exposure chamber was kept at about 1000 mg/m^3 and its coefficient of variation was less than 0,01.

Figures 1 and 2 show the trends of the apparent desorption efficiencies. Using the data referring to the contemporaneous active samplers it is possible to determine the actual equivalent flow (Table 1).

On the basis of the results of the experimental tests the following remarks can be made about the employing of passive samplers.

For low amounts of adsorbed contaminant the actual equivalent flow is quite different from the on declared: but if the adsorbed amount increases the actual flow converges with the one declared. This means that short-term samplings are not very reliable, while samplings of a length from 4 to 8 hours can be reasonably accepted.

Becouse of the lack of homogeneity of diffusion septa some sampling differences have been observed, which in some cases reach 10%.

The diffusion septa deteriorate progressively so that, after being used 20-25 times, they show a considerable shrinkage in the equivalent flow.

Table 1: Actual flow of the passive samplers.

Adsorbed amount (ul/100 mg.)	Toluene Declared flow (15,9 ml/min.)	Benzene Declared flow (17,5 ml/min.)
0,3	24,8	20,2
0,5	19,8	21,0
0,7	20,1	—
0,9	18,9	—
1,1	19,3	19,3
1,5	—	18,0
1,6	17,7	—
1,8	16,3	18,2
2,3	16,1	—
2,4	—	17,5
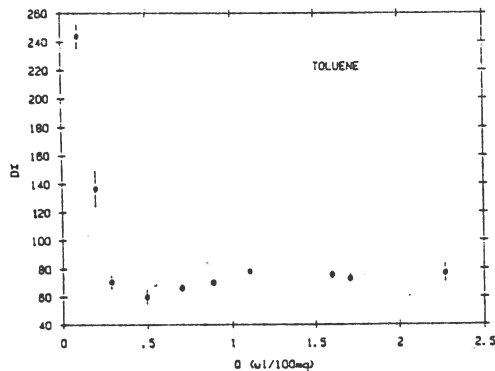
Fig.1 - Trend of the apparent desorption efficiency.
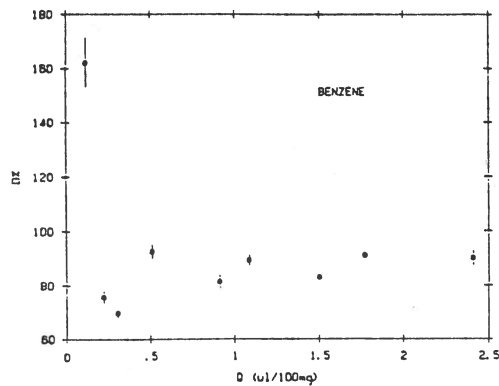
Fig.2 - Trend of the apparent desorption efficiency.

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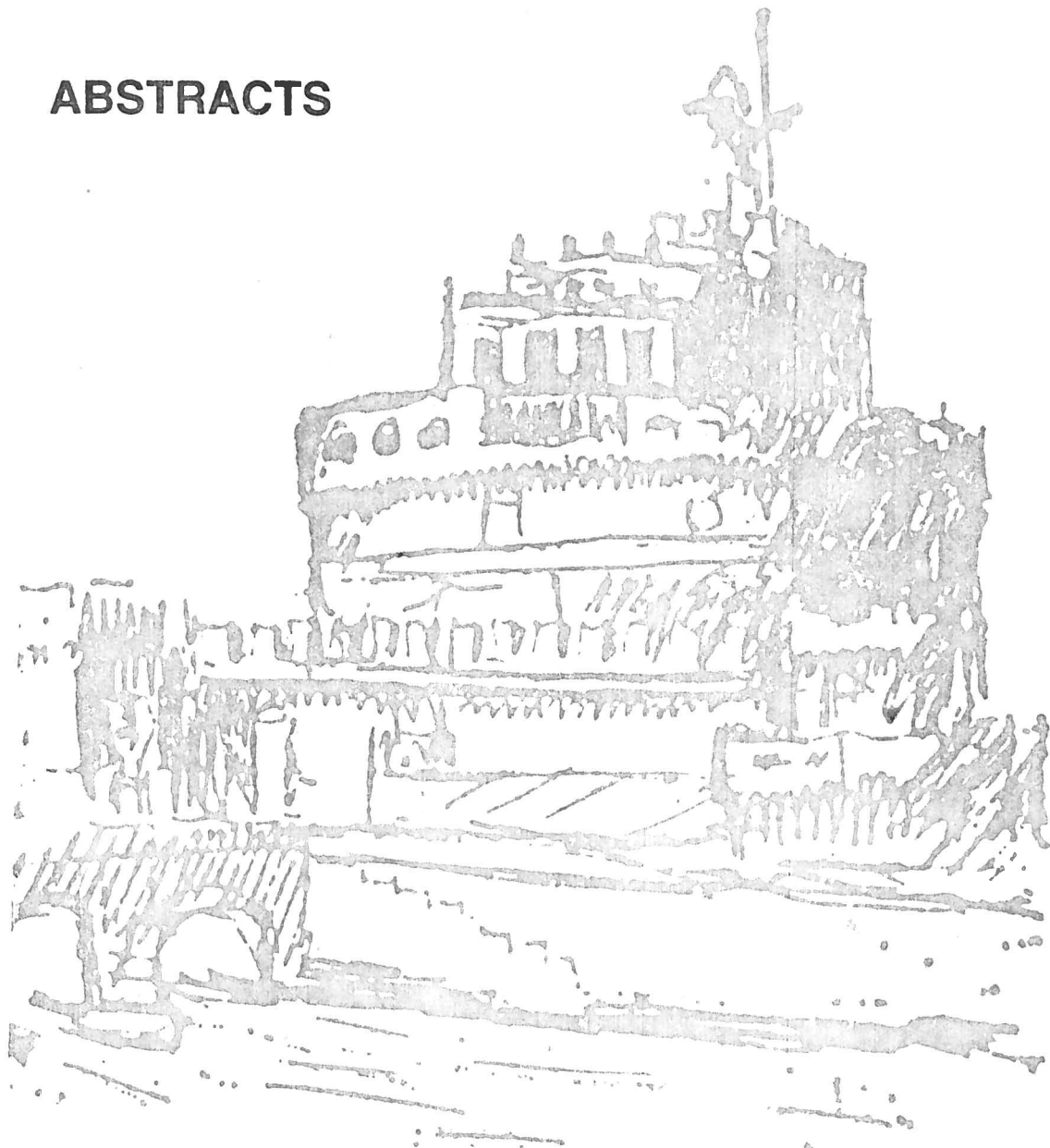
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