# A NEW APPROACH FOR SAMPLING AND MONITORING OF DISSOLVED HEAVY METALS IN URBAN RUNOFF BY MEANS OF PASSIVE SAMPLER SORBICELL

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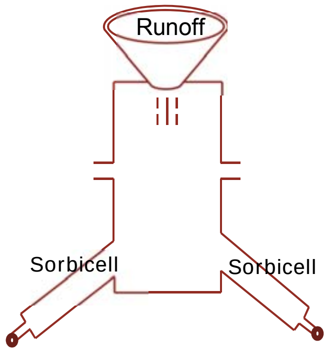
**Introduction:** In the environmental sciences, monitoring of contaminant transport in water has numerous applications, hence; sampling is one of the crucial parts for stormwater study. For the determination of freely dissolved compound in storm water, passive sampler Sorbicell is mostly simpler to use and more cost effective (Birch, Sharma, Vezzaro, Lützhøft, & Mikkelsen, 2013). The SorbiCell (SC) passive sampler, a cartridge-type adsorbent that sequesters the solute, proportional to the velocity of influent water. In this study, the challenges of installation and performances were evaluated in laboratory condition..

**Material and Methods:** Duplicated Sorbicells (Sorbisense A/S, Denmark) were installed in a specially constructed device (Fig 1.) from 31-03-2015 to 09-04-2015 and 13-04-2015 to 21.04.2015 in the laboratory of the IGSNRR, Chinese Academy of Sciences, Beijing, China. The adsorbent resins were extracted in Polytetrafluoroethylene (PTFE-Teflon) vessels and digested with analytical grade $HNO_3$ at 120 $^0$C for 4 hours. A microwave-assisted method 3051 A was also used to digest the adsorption resins to be analyzed for metals (USEPA, 1990). Dissolved concentrations of heavy metals of for composites samples were also measured by filtering through a 0.45 μ m filter membrane (Clesceri, Greenberg, Eaton, & Eds., 1992). To quantify the volume of water that passes through the sensor during a deployment period equation 1 (de Jonge & Rothenberg, 2005) was used. $V = \frac{(M_{t,0} - M_t)}{C_{t,max}}$ (1) Where, *V* is the total water volume passing through the passive sampler, $M_{t,0}$ is the initial mass of tracer salt, $M_t$ the final tracer mass after installation, and $C_{t,max}$ the concentration of the tracer ion in solution. The samples were analyzed by inductively coupled plasma Optical Emission spectrometry (ICP-OES) (ELAN DRC-e, Perkin Elmer SCIEX) (Wang & Liang, 2014).

**Results: Determination of total volume of samples**

Velocity dependent passive sampling devices Sorbicells were used to obtain the time-averaged concentration of analyte in urban runoff water. The total amount of sample passed through the different Sorbicells 1, 2, 3, 4 are 0.529 L, 0.431 L, 0.478 L and 0.582 L, respectively. The recovey percentages was in accepted ranges from the producers guidelines, however, to obtain the true concentration, recovery percentages were also considered.



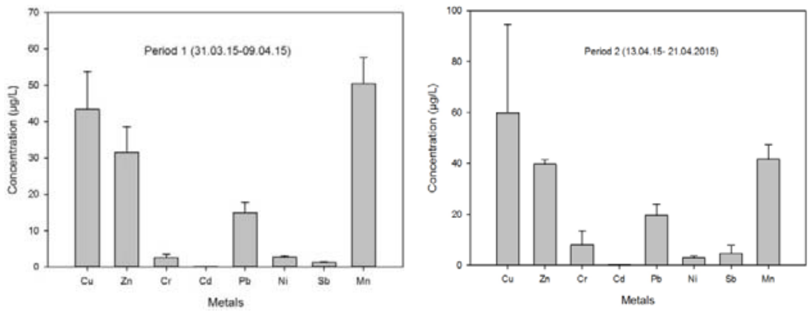




*Figure 1: A passive Sampler installation device. Figure 2: Heavy metals in velocity dependent passive samplers*

Figure 3 shows the variation of different heavy metals in urban runoff. Higher concentration of Zn, Cu, Pb and Mn are seen in both of the period. Cu and Pb are higher in concentration and Zn are comparatively lower in concentration than the study of Birch et al. (Birch et al., 2013). Result from this current study also could be compared with dissolved concentration of composite samples contain Cu (9.07-57.25 µg/L), Zn (19.33-42.82 µg/L), Pb (15.64-27.22 µg/L) which are less amount than passive samplers concentration in some extent.Sb content in the SC are much higher than other studies (Huber, Welker, & Helmreich, 2016). **Conclusion**: In this preliminary study, the results shows the possibility of measuring the average concentration of metals in urban runoff. These preliminary results show how velocity dependent passive sampling may be used for monitoring over longer time periods instead of focusing on single events.

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