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ASSESSMENT OF AIR QUALITY BY DIFFUSIVE SAMPLING AT TWO CZECH ARCHIVES

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The measurement of gaseous and particulate pollutants in museum, galleries and archives is important to ensure acceptable conditions for the protection of artifacts displayed or stored indoors. Diffusive samplers were developed for the assessment of various gaseous pollutants [1] as a simple and less expensive alternative to traditional sampling methods and they were previously employed for surveys in such environments [2].
The present study was aimed at collecting air pollutants data at two Czech archives, Zlatá Koruna and Třeboň located respectively in a monastery in the countryside and in a small city. The measurements were performed by means of diffusive sampling from December 2011 to November 2012 on a monthly basis.
Nitrogen dioxide, sulphur dioxide, ozone, ammonia, nitric acid and organic acids (acetic and formic) were monitored both outdoors and indoors at the two sites. The results obtained from the campaigns carried out at the two archives have been analyzed and processed. The average concentration values calculated for the different pollutants and the ratio between indoor and outdoor values are reported in table 1.

Table 1. Pollutants concentration yearly averages and I/O ratio at Zlatá Koruna and Třeboň archives.

Location	Period	Pollutant	IN ($\mu g/m^3$)	OUT ($\mu g/m^3$)	IN/OUT
Třeboň	Dec 11/Nov 12	NO_2	2.8	13.7	0.2
		SO_2	1.5	2.9	0.5
		O_3	1.5	32.9	0.05
		NH_3	6.7	1.6	4.2
		HNO_3	n.d.	n.d.	n.d.
		HCOOH	1.1	1.1	1.0
		CH_3COOH	1.2	1.0	1.2
Zlatá Koruna	Dec 11/Nov 12	NO_2	1.3	5.9	0.2
		SO_2	1.7	3.7	0.5
		O_3	4.0	42.6	0.09
		NH_3	10.7	1.8	5.9
		HNO_3	n.d.	n.d.	n.d.
		HCOOH	5.4	1.1	4.9
		CH_3COOH	4.4	1.0	4.4

Comparing the outdoor concentration values, the difference between the two sites is confirmed since Třeboň archive is most influenced by the small city sources of pollution showing higher values of nitrogen dioxide concentration, whereas at Zlatá Koruna higher ozone concentration values were recorded. The indoor values are quite similar at the two archives for most of the pollutants with the exception of ammonia and organic acids which show the highest concentration values at Zlatá Koruna. On the basis of the results collected and of the I/O ratios calculated it can be concluded that Zlatá Koruna is slightly less influenced from outdoor environment. The measurement of nitric acid didn't show, in most of the campaigns, detectable concentration values. The detection limit of nitric acid of 1.3 $\mu g/m^3$ was only exceeded at Třeboň during three months out of the twelve under investigation.

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