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Two year record (2007-2009) of hydrogen concentration measurements in the air by GC/PDHID method

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In the Department of Physicochemistry of Ecosystems located in the Institute of Nuclear Physics, Polish Academy of Sciences in Kraków, the gas chromatographic (GC) method was developed for the continuous measurements of hydrogen concentration in the air. An air sample is analyzed in two chromatographic columns filled with a molecular sieve 5A working in the "back-flush" mode. For the hydrogen detection, a Pulsed Discharge Helium Ionization Detector (PDHID) was used. The sensitivity of the detector is about 0,61 mVs/pgH2 at the detection limit 15 ppb of hydrogen and the detector is linear in the range of mass 16 pg – 332 pg H2.
The continuous measurements of hydrogen concentration in the air were conducted alternately with a secondary standard in a one-hour cycle, in a sequential injection of standard sample to air sample. Based on the data obtained during two years in the air of Kraków (50N, 20E), we can observe episodes, which considerably intensify by achieving 2000 ppb even more of H2 in the air during the autumn-winter season. The Gaussian filtration method allowed the separation of these episodes from the background hydrogen concentration in the air, which was correlated with meteorological data. It clearly showed that the mass of the most hydrogen polluted air is from south-western directions, especially during autumn-winter season. A little less polluted air mass is from southern, western and north-western direction. The least polluted one is the air mass from north, east and south-east.