NMR analysis of chemical compounds in the gas phase
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Nuclear magnetic resonance (NMR) is extensively used for the analysis of chemical compounds. NMR gives quick and precise answer whenever the spectra of unknown material are compared with those of pure chemical compounds. However, the comparison must be always performed maintaining the same experimental conditions otherwise the results of analysis may be not satisfactory, mostly due to different intermolecular interactions. The above problem can be solved if the effects of intermolecular interactions are completely removed from NMR spectra. It is possible when the observation of spectral parameters is performed in the gas phase and the results of measurements are extrapolated to the zero-density limit. At present such experiments can be easily completed also for medium-sized molecules when any inner gas is used as the solvent. In our laboratory we have already performed hundreds of such analyses and we have obtained the NMR parameters of isolated molecules which are doubtlessly the best standards for future applications. We have also proposed the direct shielding measurement with the use of a standard NMR spectrometer. According this method the shielding parameters can completely replace the chemical shifts of numerous nuclei. The new method has also many additional advantages; as it allows for example the direct comparison of experimental and theoretical shielding constants and makes possible the determination of the first order isotope effect in shielding, which was not available in NMR spectroscopy before.

Biography
Karol Jackowski received his PhD in 1974. Since that time he is permanently employed at the University of Warsaw. He was a Visiting Assistant Professor at the University of Illinois at Chicago Circle, USA, for 2 years in 1983-1985 and a Visiting Professor at the University of Western Sydney, Australia in 2011. Presently, he is a Full Professor of Physical Chemistry and NMR Laboratory Head. He has published more than 100 papers in reputed journals and has been serving as an editorial board member of the International Journal of Spectroscopy and the American Journal of Physical Chemistry.