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Dual Chemical Ionization Inlet for fast switching of reagent ion chemistry in atmospheric pressure chemical ionization mass spectrometry applications

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A novel Dual Chemical Ionization Inlet (DCII, Karsa Ltd.) capable of fast switching between two reagent ion schemes is presented and its performance is demonstrated by measuring a multitude of previously reported oxidation products from much studied cyclohexene and α-pinene ozonolysis systems (e.g., references 1-4), applying bromide (Br-) and nitrate (NO_3-) ionization chemistries. The use of two ion modes enables more comprehensive picture on the oxidized product distribution by combining the best of both methods, for example, by detecting HO_2 radical and less oxidized reaction products with Br- ionization, and the highest oxidized products and strong acids, such as sulfuric acid, in NO_3- mode. While chemical ionization inlets with multiple reagent ion capabilities have been reported previously (e.g., Refs 5, 6), an atmospheric pressure application in which the reagent ion scheme can be switched within second time-scale has not been introduced previously. The new inlet design enables studying the same reacting gas mixture in two consequent ion modes, and one natural ion measurement, in fast repetition without mixing the neutral reagents in to the sample flow.

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