Inhibition of Ps Formation in Benzene and Cyclohexane by CH3Cl and CH3Br - DTU Orbit (17/08/2019)

Inhibition of Ps Formation in Benzene and Cyclohexane by CH3Cl and CH3Br: Correlation to Radiation Chemistry Results

Positron-annihilation lifetime spectra have been measured for mixtures of CH3Cl and CH3Br in cyclohexane and of CH3Cl in benzene. The ortho-positronium (Ps) yield decreased monotonically from 38% and 43% in cyclohexane and benzene respectively to 11% in pure CH3Cl and 6% in pure CH3Br. The strength of the inhibition of Ps formation by CH3Br was ten times that of CH3Cl in cyclohexane, because the CH3Br− anion debrominates rapidly, while CH3Cl− is long-lived (= 30 ns) compared to the maximum time of Ps formation of 400–500 ps. as shown in radiation chemistry. The positron can pick off the electron from the CH3X− anions to form Ps, while it forms a bound state with the halides X−. CH3Cl was a roughly three times weaker Ps inhibitor in benzene than in cyclohexane, which shows that CH3Cl− does not dechlorinate in times comparable to or shorter than 400–500 ps in benzene. An improved model for the explanation of Ps formation in mixtures, where the Ps yield versus electron scavenger concentration has a minimum, is proposed and discussed.

General information
Publication status: Published
Organisations: Nano-Microstructures in Materials, Materials Research Division, Risø National Laboratory for Sustainable Energy
Contributors: Wikander, G., Mogensen, O. E., Pedersen, N. J.
Pages: 159-168
Publication date: 1983
Peer-reviewed: Yes

Publication information
Journal: Chemical Physics
Volume: 77
Issue number: 2
ISSN (Print): 0301-0104
Original language: English
Source: orbit
Source-ID: 282709
Research output: Contribution to journal › Journal article – Annual report year: 1983 › Research › peer-review