THE DIXENON(1+) CATION: THE RESOLUTION OF SOME OUTSTANDING PROBLEMS

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The gas phase is well known to be host to homonuclear diatomic cations of the noble gases [1], but condensed phases do not readily support species which are at once so acidic and weakly bound. However, the reaction between elemental xenon and the salt $XeF^+Sb_2F_{11}^-$ in an antimony pentafluoride medium gives a *green* product which is long-lived under a pressure of xenon at ambient temperatures [2]. The product has been characterised by a combination of ESR, ultraviolet-visible, and Raman spectroscopies. The effects of ^{129}Xe-enrichment and computer simulation establish beyond doubt that the Xe_2^+ cation is the carrier of the ESR signal, and all the other distinctive spectroscopic features, including resonance Raman effects, can now be satisfactorily attributed to this same species. Moreover, the results can at last be reconciled with the formation of Xe_2^+ in accordance with the equilibrium

$$3Xe + XeF^+ + 2SbF_5 \rightleftharpoons 2Xe_2^+ + Sb_2F_{11}^-$$

although a secondary equilibrium finds the Xe_2^+ bound in a complex with an excess of the oxidant [3]:

$$Xe_2^+Sb_2F_{11}^- + XeF^+Sb_2F_{11}^- \rightleftharpoons Xe_2^+Sb_2F_{11}^- \cdot XeF^+Sb_2F_{11}^-$$

1 See, for example, P. M. Dehmer and J. L. Dehmer, *J. Chem. Phys.*, 68, 3462 (1978).

2 L. Stein, J. R. Norris, A. J. Downs, and A. R. Minihan, *J. Chem. Soc., Chem. Commun.*, 502 (1978); A. R. Minihan, D.Phil. thesis, University of of Oxford (1981).

3 L. Stein and W. W. Henderson, *J. Am. Chem. Soc.*, 102, 2856 (1980).