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THERMOCHEMISTRY OF FLUOROANTIMONATES AND RELATED COMPOUNDS

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From alkaline hydrolysis measurements the enthalpy of formation of $SbF_5(\ell)$ is estimated to be -1324 ± 12 kJ mol^{-1}, in agreement with the most recent fluorine bomb calorimetry value of -1328 kJ mol^{-1} [1].

The enthalpy of the process $\frac{1}{4}(SbF_5)_4(g) \rightarrow SbF_5(g)$ has been estimated from vapour density measurements to be 18.4 kJ mol^{-1}; by combining this value with the known enthalpy of vapourisation of $SbF_5(\ell)$, 43.4 kJ mol^{-1}, and the degree of association at the b.p. (n = 3.0) [2,3], the enthalpy of the process $SbF_5(\ell) \rightarrow SbF_5$ (g, monomer), is estimated to be -1301 ± 15 kJ mol^{-1}.

From alkaline hydrolysis and aqueous solution measurements the enthalpies of formation of $LiSbF_6(s)$, $NaSbF_6(s)$, $KSbF_6(s)$, $CsSbF_6(s)$, and SbF_6^-aq. are estimated to be -2062 ± 5, -2060 ± 6, -2080 ± 3, -2082 ± 15, -1633 ± 3, and -1789 ± 4 kJ mol^{-1} respectively. These results, combined with lattice energy calculations on the salts $LiSbF_6$ and $KSbF_6$, indicate that the Sb atom in the $SbF_6^-(g)$ ion has a charge of +1.7 (assuming Li and K = +1.0). The fluoride ion affinity of $SbF_5(\ell)$ is estimated to be -418 kJ mol^{-1}, and that of $SbF_5(g)$ to be -445 kJ mol^{-1} [4].

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