

$(\text{NH}_4)_4\text{UF}_{10}$ – ITS THERMAL DECOMPOSITION AND THE STUDY OF ITS POWDER DIFFRACTION DATA

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$(\text{NH}_4)_4\text{UF}_{10}$, which was prepared by a low temperature (55°C) oxidation of $(\text{NH}_4)_4\text{UF}_8$ by XeF_2 contains, according to the vibrational spectra, distorted UF_{10}^{4-} ions, with one of the fluorine atoms having significant ionic character (B. Družina, S. Miličev and J. Slivnik, J. Chem. Soc., Chem. Commun., 1984, 363). Powder diffraction data have been indexed in terms of a monoclinic unit cell ($a = 12.686 \text{ \AA}$, $b = 8.468 \text{ \AA}$, $c = 13.984 \text{ \AA}$, $\beta = 120^\circ 37'$) similar to $(\text{NH}_4)_4\text{UF}_8$ ($a = 13.126 \text{ \AA}$, $b = 6.692 \text{ \AA}$, $c = 13.717 \text{ \AA}$, $\beta = 121^\circ 19'$) (A. Rosenzweig and D.T. Cromer, Acta Cryst., B26 (1970) 38). Only the b axis is significantly enlarged (for more than 25%) and exactly in this direction UF_8^{4-} ions of $(\text{NH}_4)_4\text{UF}_8$ have most space between their fluorines. Thermal decomposition proceeds in one indistinct (at 120°C) and three definite steps (at 210° , $(\text{NH}_4)_3\text{UF}_8$, at 290° , NH_4UF_6 and at 380° , $\text{NH}_4\text{U}_3\text{F}_{13}$). We could not yet define the product at 120°C , but Raman spectrum shows disappearance of $(\text{NH}_4)_4\text{UF}_{10}$ (the band at 560 cm^{-1} loses intensity) and appearance of a species with lower coordination number (strong band at 589 cm^{-1}). Both powder data and thermal data are in accordance with the presence of UF_{10}^{4-} ions in $(\text{NH}_4)_4\text{UF}_{10}$.