division of radioactivity. For example, Osterberg *et al.* (*8*) report that average activity of Zr^{95}-Nb^{95} in marine organisms (euphausiids) from nine consecutive tows was 13.6 pc/g with a standard deviation of only 1.2 pc/g. This indicates that individual fallout particles generally do not contribute appreciably to the total fallout radioactivity present in the diet of these animals. The small fraction of fallout particles large enough to drop out of suspension in the river and the large fraction of very small "suspendable" particles in the ocean would lead one to expect a more even distribution of fission products in plankton than in sediments. Clearly the "hot particle" was in a class of its own; it contained 7300 pc of Zr^{95}-Nb^{95}, 3600 pc of Ru^{103}, and 1400 pc of Ce^{141} on the date collected.

Origin of the particle is not obvious. Its large size makes it unlikely, but not impossible, that air currents carried it about 800 km from the test site in Nevada [25 μ is considered to be the division between local and world-wide fallout (*9*), with most of the latter smaller than 4.5 μ (*10*)]. It is also unlikely that a particle this large could be carried from the Sahara Desert eastward to the northwestern United States. On the other hand, a particle of this size released into the river at Hanford might be expected to settle out in the quiet waters of Lake Wallula, which lies between Hanford and the collection site.

We conclude that the particle is unusual because of its high radioactivity, large size, and lack of fractionation, and also because its location in the river makes its origin an enigma (*11*).

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Xenon Hexafluoride Complexes

Abstract. *Xenon hexafluoride reacts with BF$_3$ and AsF$_5$ to form 1:1 adducts which are white solids with vapor pressures of less than 1 millimeter at room temperature. The XeF$_6$ · BF$_3$ adduct melts at 90°C to a pale yellow viscous liquid.*

Xenon tetrafluoride reacts with SbF$_5$ or TaF$_5$ to form complexes with the composition XeF$_2$ · 2SbF$_5$ or XeF$_2$ · 2TaF$_5$ (*1*). However, BF$_3$ does not appear to form complexes even when heated to 200°C (*1, 2*). Complexes with XeF$_6$ have not yet been described.

It has now been found that XeF$_6$ will form 1 : 1 addition compounds with BF$_3$ and AsF$_5$.

At room temperature BF$_3$ and XeF$_6$ combine to form an adduct of composition XeF$_6$ · BF$_3$. At room temperature the adduct is a white solid which melts at 90°C to a pale-yellow viscous liquid. Its vapor pressure is less than 1 mm at 20°C. However, it can be sublimed under vacuum (its own vapor pressure) at this temperature. The infrared spectrum of the solid at −195°C is complex, but shows a broad absorption centered at a wave number of about 1025 cm^{-1}, which is characteristic of BF$_4^-$ (*3*). The infrared spectrum of the vapor was obtained in a reflection cell of 60-cm path length (*4*). This shows absorptions characteristic of BF$_3$ and XeF$_6$, indicating that the adduct is at least partially dissociated in the vapor phase.

The adduct, XeF$_6$ · BF$_3$, reacts with NaF at 100°C to form NaBF$_4$ and an ill-defined addition product of XeF$_6$ and NaF. The XeF$_6$ can be recovered from this addition product by pumping under vacuum at 100°C (*5*).

Xenon hexafluoride also reacts with AsF$_5$ at room temperature to form a 1 : 1 addition compound. This is a white solid which cannot be sublimed under vacuum at room temperature. Raman spectra of solid XeF$_6$ · BF$_3$ and XeF$_6$ · AsF$_5$ prepared *in situ* in a sapphire cell show scattering peaks at 612 cm^{-1} and 620 cm^{-1}, respectively, which cannot be ascribed to any of the components (*3, 6, 7*). It is interesting that solutions of XeF$_6$ in anhydrous HF show a scattering peak at 620 cm^{-1} (*8*), and possibly the species in HF may be similar to that in the adducts.

The adducts of XeF$_6$ compare in chemical reactivity with that of XeF$_6$ itself (see *9*). They are extremely hygroscopic. Although they can be stored in nickel containers, they appear to react with pyrex. The reactivity of these compounds and their low volatility present formidable obstacles to the determination of their structures.

Peacock (*1*) has suggested that the complex (XeF$_2$ · 2SbF$_5$) may be covalent, with the possibility of fluorine bridges linking the heavy atoms. The XeF$_6$ adducts may have similar structures, but ionic complexes of the type (XeF$_5$)$^+$(AsF$_6$)$^-$ cannot be ruled out. The (AsF$_6$)$^-$ configuration is known to be particularly stable (*7*), while the stability of a possible (XeF$_5$)$^+$ may be enhanced by the favorable octahedral geometry predicted for one lone and five bonded electron pairs (*10*).

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