Synthesis of Xenon Difluoride by Exposure of Xenon–Fluorine Mixtures to Daylight at Room Temperature

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L. V. STRENG and A. G. STRENG[1] recently described the preparation of xenon difluoride from xenon and oxygen difluoride or fluorine in Pyrex glass vessels at room temperature. We here report similar independent work[2] in which xenon difluoride has been synthesized from xenon–fluorine mixtures.

When mixtures of xenon and fluorine, in Pyrex glass bulbs at room temperature and atmospheric pressure, were subjected to diffuse daylight or bright sunlight colourless crystals formed on the inner surfaces of the vessels. In experiments where more xenon was used than is required for a reaction $Xe + F_2 \rightarrow XeF_2$, the crystals were identified as xenon difluoride. There was no indication of the formation of other xenon-containing species. Volatile impurities formed by the reaction of fluorine with the glass were readily removed.

Mass-spectrometric analyses made on the vapour phase of the reaction products showed fragmentation patterns characteristic of xenon difluoride.[3] Infrared absorption spectra on the vapour phase of purified samples showed peaks characteristic of xenon difluoride.[4] Chemical analysis[5] confirmed the spectrometric evidence.

Similar xenon–fluorine mixtures which were kept in darkness for four months did not produce XeF_2. After exposure to daylight for 24 hours these same mixtures deposited xenon difluoride crystals, showing that the reaction is a photochemical process.

(*Received, September 13th*, 1965; *Com.* 581.)

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