

Chapter 8

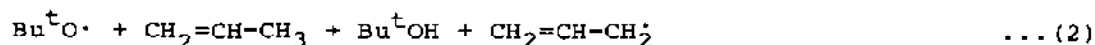
NOBLE GASES

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8.1 THE ELEMENTS

The adsorption of Xe on Pt supported on NaY-zeolite at 25°C has been investigated by ^{129}Xe n.m.r. spectroscopy.¹ The solubility of the noble gases in 1,4-dioxan at 101kPa over the temperature range 285-303K has been reported.² Liquid Xe is a useful solvent for e.s.r. studies of reactive free radicals, e.g. reactions (1) and (2): the g-factors of many types of radical are not the same in Xe as in normal solvents.³ Cook and Roberts did



not detect any Xe-based radicals. The UV photolysis of $\text{Cr}(\text{CO})_6$ in liquid Xe/ N_2 mixtures at 183K has been shown by i.r. spectroscopy to generate the mixed carbonyl dinitrogen species, $\text{Cr}(\text{CO})_{6-x}(\text{N}_2)_x$, $x = 1$ to 5.⁴ The compound with $x = 1$ was found to be unstable thermally in liquid Xe at -35°C, whereas the $x = 5$ compound is unstable even at -90°C. The presence of xenon in the first coordination sphere of $\text{Cr}(\text{CO})_5$ has been reported for the first time by Turner and coworkers.⁵ It was produced by the photolysis of $\text{Cr}(\text{CO})_6$ in liquified Xe or Kr doped with Xe and detected by i.r. spectroscopy. The half-life of $[\text{Cr}(\text{CO})_5\text{Xe}]$ in such solutions is ca. 2s at -98°C.

8.2 KRYPTON(II) AND XENON(II)

Fluorination of methionine or methionylglycine derivatives with XeF_2 in MeCN occurs exclusively at the methylthio position, in 70-90% yield under carefully controlled conditions.⁶ The synthesis of ^{15}N -enriched $\text{Xe}[\text{N}(\text{SO}_2\text{F})_2]_2$ has enabled Schumacher and Schrobilgen⁷ to characterise this compound by both ^{15}N and ^{129}Xe n.m.r. spectroscopy. Three possible isotopic isomers were identified and the presence of two equivalent Xe-N bonds inferred. The dissociation of $\text{F}[\text{XeN}(\text{SO}_2\text{F})_2]_2^+\text{AsF}_6^-$ in solution was also investigated and the formation of $\text{Xe}[\text{N}(\text{SO}_2\text{F})_2]_2$ in SO_2ClF established. Thermal analysis studies of XeF_2 have shown that above 350°C disproportionation occurs to Xe and XeF_4 .⁸ The reaction of XeF_2 with $\text{Cs}_3\text{M}^{\text{III}}\text{F}_6$, M = Ce, Pr, Tb, Nd, Dy or Er, has been studied thermogravimetrically.⁹ The formation of $\text{Cs}_3\text{M}^{\text{IV}}\text{F}_7$ occurred in the temperature range 115°C (for Ce) to 382°C (for Nd).

The X-ray photoelectron spectra of core levels of KrF_2 , XeF_4 and XeF_6 have been obtained. Satellites on the low kinetic energy side of the core levels have been assigned to monopole-allowed shake-up transitions by using X α -SW hole state and atomic model calculations.¹⁰ An X α -SW calculation on the KrF_2 ground state gives good agreement with the experimental valence-bond energies.

8.3 XENON(IV) AND (VI)

Photolysis of XeF_6 is said to cause complete dissociation to XeF_4 and F_2 .¹¹

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