Coordination Chemistry Reviews, 66 (1985) 504—505
Elsevier Science Publishers B.V., Amsterdam — Printed in The Netherlands

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 $Cr(CO)_6$ in liquid Xe/N_2 mixtures at 183K has been shown by i.r. spectroscopy to generate the mixed carbonyl dinitrogen species, $Cr(CO)_{6-x}(N_2)_x$, 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 $Cr(CO)_5$ has been reported for the first time by Turner and coworkers.[5] It was produced by the photolysis of $Cr(CO)_6$ in liquified Xe or Kr doped with Xe and detected by i.r. spectroscopy. The half-life of $[Cr(CO)_5Xe]$ in such solutions is ca. 2s at -98°C.

$$Bu^tOOBu^t \xrightarrow{h\nu} 2Bu^tO\cdot \qquad ...(1)$$

$$Bu^tO\cdot + CH_2{=}CH{-}CH_3 \rightarrow Bu^tOH + CH_2{=}CH{-}CH_2^{\cdot} \qquad ...(2)$$

0010-8545/85/$03.30

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 $Xe[N(SO_2F)_2]_2$ has enabled Schumacher and Schrobilgen[7] 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 $F[XeN(SO_2F)_2]_2^+AsF_6^-$ in solution was also investigated and the formation of $Xe[N(SO_2F)_2]_2$ 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 $Cs_3M^{III}F_6$, M = Ce, Pr. Tb, Nd, Dy or Er, has been studied thermogravimetrically.[9] The formation of $Cs_3M^{IV}F_7$ 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 Xα-SW hole state and atomic model calculations.[10] An Xα-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]

REFERENCES

1 T.Ito, L.-C. de Menorval, J. Chem. Phys., 30(1983)573.
2 M.A.Gallardo, J.S.Urieta and C.G.Losa, J. Chim. Phys., 30(1983)621.
3 M.D.Cook and B.P.Roberts, J. Chem. Soc., Chem. Commun., (1983)264.
4 J.J.Turner, M.B.Simpson, M.Poliakoff, W.B.Maier and M.A. Graham, Inorg. Chem., 22(1983)911.
5 M.B.Simpson, M.Poliakoff, J.J.Turner, W.B.Maier and J.G.McLaughlin, J. Chem. Soc., Chem. Commun., (1983)1355.
6 A.F.Janzen, P.M.C.Wang and A.E.Lemire, J. Fluorine Chem., 22(1983)557.
7 G.A.Schumacher and G.J.Schrobilgen, Inorg. Chem., 22(1983)2178.
8 Yu.M.Kiselev and S.A.Goryachenko, Russ. J. Inorg. Chem., 28(1983)9.
9 M.Kiselev, S.A.Goryachenkov and L.I.Martynenko, Russ. J. Inorg. Chem., 28(1983)651.
10 G.M.Bancroft, D.J.Bristow, J.S.Tse, and G.J.Schrobilgen, Inorg. Chem., 22(1983)2673.
11 K.Lutar and J.Slivnik, J. Fluorine Chem., 23(1983)430.