

The Crystal Structure of a Complex Between Silver Iodide and Piperazine ($\text{AgI}, \frac{1}{2}\text{C}_4\text{N}_2\text{H}_{10}$)

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Summary An X-ray crystallographic structure determination of the complex between silver iodide and piperazine is reported.

THE addition of aqueous piperazine to silver iodide dissolved in potassium iodide solution yields, amongst other crystalline products, tabular crystals of $\text{AgI}, \frac{1}{2}\text{C}_4\text{N}_2\text{H}_{10}$. The formula was assigned by analytical and X-ray data. Such compounds are of interest in aiding investigations of possible mechanisms whereby silver iodide nucleates supercooled clouds and fogs.^{1,2}

The crystals are monoclinic: $a = 7.796$, $b = 15.18$, $c = 8.983$ Å, $\beta = 91.2^\circ$, space group $A2/a$ or Aa , $Z = 8$.

X-Ray data were collected on a diffractometer using Mo- K_α radiation and a scintillation counter. The structure was solved by Patterson and Fourier methods. The full-matrix least-squares structure factor refinement (anisotropic for Ag and I and isotropic for C and N) using 457 observed reflections gives an R value of 0.074 (based on space group $A2/a$).

The structure may be described as layers of iodide ions encrusted with silver ions. These layers are sandwiched between layers of piperazine molecules (Figure 1). As was noted in the two related complexes with piperidine¹ and morpholine,² the silver receives a lone pair of electrons from the donating nitrogen and is almost equidistant from three iodide ions. The packing patterns of silver iodide differ in all three complexes. Short Ag-Ag distances, slightly longer than the Ag-Ag distance of 2.88 Å in metallic silver³ are noted.

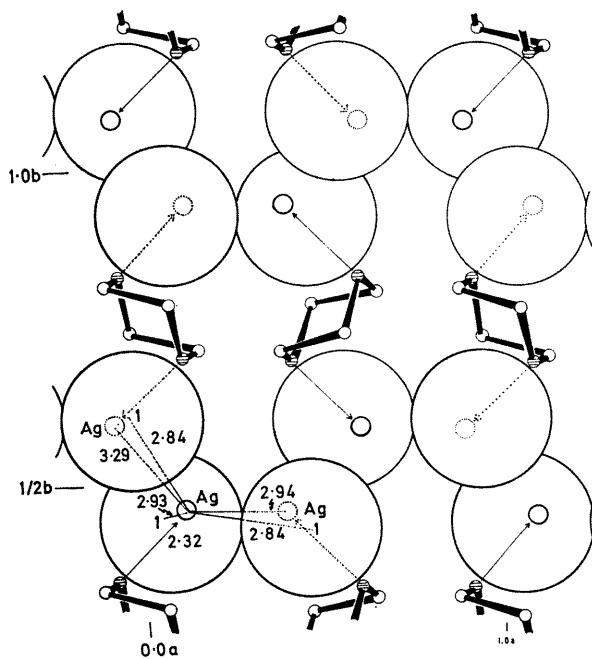


FIGURE. The complex viewed down the c -axis.

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* G. B. Ansell, L. A. Burkardt, and W. G. Finnegan, *Chem. Comm.*, 1969, 459.

² G. B. Ansell and W. G. Finnegan, *Chem. Comm.*, 1969, 960.

³ International Tables of X-Ray Crystallography, vol. 3, Kynoch Press, Birmingham.