

# SHORT COMMUNICATIONS

## FIVE-COORDINATED IRON(II)\*

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Using X-ray powder diffraction, it has been shown that dichloro-2,2',2''-terpyridineiron(II) is isomorphous and probably isostructural with dichloro-2,2',2''-terpyridinezinc(II). Corbridge and Cox,<sup>1</sup> in their single-crystal structure determination, reported that the zinc atom in the complex is linked in a distorted trigonal bipyramid to five atoms, three nitrogens of one terpyridine ligand (2.19, 2.11, 2.34 Å) and two chlorines (2.28, 2.30 Å).

TABLE 1  
X-RAY DIFFRACTION DATA

<i>hkl</i>	Dichloro-2,2',2''-terpyridinezinc(II) <sup>1</sup>			Dichloro-2,2',2''-terpyridineiron(II)		
	2θ	<i>d</i> (Å)	<i>F</i> <sub>obs</sub> <sup>*</sup>	2θ†	<i>d</i> (Å)	<i>I</i> ‡
001	8.074°	10.965	8	8.16°	10.83	w
200	10.936	8.090	22	10.89	8.115	m
$\bar{2}$ 01	12.070	7.330	37	12.05	7.345	s
011	13.438	6.590	19	13.28	6.665	m
201	14.002	6.325	27	14.11	6.273	w
$\bar{1}$ 11	14.327	6.180	15			—
111	14.701	6.025	14	14.83	5.972	w
210	15.339	5.774	13			—
002	16.189	5.474	24	16.42	5.398	w
$\bar{2}$ 11	17.040	5.201	16	17.17	5.164	w
012	19.458	4.561	15			—
310	19.665	4.514	18			—
$\bar{1}$ 12	19.951	4.450	14			—
202	20.131	4.411	17			—
112	20.495	4.333	35	20.66	4.300	s
$\bar{3}$ 11	20.897	4.251	12			—
$\bar{2}$ 12	21.875	4.062	30	21.91	4.056	s
212	22.861	3.890	23	23.05	3.858	m
121	23.812	3.730	20			—
220	24.218	3.675	24	24.12	3.671	w

\* Structure amplitude. †  $2\theta_{\text{obs}}$  measured to an accuracy of 0.03°. ‡ Estimated intensity.

This new evidence supports the claim that the iron(II) atom in dichloro-2,2',2''-terpyridineiron(II) is five-covalent and coordinated in a distorted trigonal bipyramid.

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<sup>1</sup> Corbridge, D. E. C., and Cox, E. G., *J. Chem. Soc.*, 1956, 594.

This suggestion was first made by Broomhead and Dwyer<sup>2</sup> in their investigation of the magnetic moments of some metal halide complexes. They found that the purple-red complex had a magnetic moment of 4.60 B.M., which corresponded to the high-spin type.

#### *X-Ray Diffraction Results*

Powdered, chemically pure dichloro-2,2',2''-terpyridineiron(II) was packed tightly into a 0.3-mm Lindemann glass capillary, and mounted in a standard Philips powder camera. One and ten hour exposures were taken, using nickel-filtered Cu K $\alpha$  radiation ( $\lambda = 1.54178 \text{ \AA}$ ), from a Philips PW1010 generator. The camera was calibrated with a 30-min exposure of a standard (sodium chloride,  $a = 5.63874 \text{ \AA}$ ), and had an effective radius of  $57.067 \pm 0.001 \text{ mm}$ . The lines were indexed in terms of dichloro-2,2',2''-terpyridinezinc(II) ( $a = 16.21$ ,  $b = 8.25$ ,  $c = 10.97 \text{ \AA}$ ,  $\beta = 93.5^\circ$ ) and are listed in Table 1.

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<sup>2</sup> Broomhead, J. A., and Dwyer, F. P., *Aust. J. Chem.*, 1961, **14**, 250.