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Studies on some Monofluophosphates. Part III*

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The use of magnetic susceptibility measuremont in the study of aquo complexes of monofluophosphates[1] of Mn, Ni, Cr(iii), Fe(iii), and Cd depends on the fact that the electrons used in covalent bond formation are paired, and it is only the unpaired electrons which contribute to the magnetic momont of tho molecules. The number of electrons used in covalent bond formation gives an idea about the nature of the orbitals involved and hence the spatial configuration of the complex. The magnetic properties of the complex depend more on the electronic structure of the central atom than on the nature of the ligand.

EXPERIMENTAL AND RESULTS

The Gouy method was used. A current of only five amp. was used to avoid undue heating. H_{max} was calculated by using AnalR quality of ferrous ammonium sulphate and copper sulphate whose magnetic susceptibilities were known. The mean value for H_{max} was found to be 7.56×10^3 gauss. The expression derived by Klemm[2] was used for the calculation of the susceptibilites. μ_β was calculated by the expression $\mu_\beta = 2.84 \sqrt{\beta X_M T}$. The magnetic moments given below had been found a little greater than the calculated value for the spin contribution only[3].

Substance	μobs.	μ cal.	No. of unpaired electrons	Type of complex
$MnPO_3F\ 4H_2O$	6.02	5.91	5	High spin, sp^3 tetrahedral
$NiPO_3F\ 7H_2O$	3.35	2.83	2	Low spin, sp^3d^2 octahedral
$Cr_2(PO_3F)_3\ 18H_2O$	3.98	3.88	3	Low spin, d^2sp^3, octahedral
$Fe_2(PO_3F)_3\ 12H_2O$	6.04	5.91	5	High spin, sp^3d^2 octahedral
$CdPO_3F\ 8/3\ H_2O$	diamagnetic			

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