dilution, and it was clear that a change in the magnetic moment of the carrier was taking place.

By using the pure solid compounds with two molecules of pyridine, we have found a large difference in moment between the two isomerides. The stable violet form gives at room temperature $\mu_{\text{eff.}} = 5 \cdot 34$. The blue form, prepared by heating to 120° for a few hours and cooling rapidly with solid carbon dioxide gave in successive experiments $\mu_{\text{eff.}} = 4 \cdot 62$, $4 \cdot 58$ when measured at 20°. The true value may be slightly lower since conversion to the violet form soon caused a marked increase in moment, which rose to 5·3 in a few days.

The magnetic moment of most of the elements of the first transition series is close to that predicted for electron spin only[5,6]. Bivalent cobalt compounds are an exception to this rule and usually possess moments greater than that predicted for an electron spin of 3/2, namely, $\mu_{\text{eff.}} = 3 \cdot 87$. Some orbital component seems to be conserved and the degree of conservation may depend upon the symmetry of the environment of the magnetic atom[7]. If the violet form has the structure $[Co4Py]^{‡}(CoCl)_4^{=}$ then the cobalt atoms have a more symmetrical environment than in the unionized structure $[Co2PyCl_2]$, which may represent the blue form. This interpretation leads, however, to difficulties in connexion with the magnetism of other cobalt complexes which will be described elsewhere.

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Dissociation of N_2^+

WITH reference to communications on valency and electronic structure published in this journal from time to time[1], we wish to direct attention to the spectrum of N_2^+ and particularly to the term $(C)\ ^2\Sigma$ (3·52 e.v. above $(B)\ ^2\Sigma$) found by Watson and Koontz[2] some time ago. This term, being the second excited level of $^2\Sigma$ type, is produced by the excitation of the unpaired $3s\sigma(2p)$ electron of the ground state $(X)\ ^2\Sigma$, to the group $3d\sigma(3s)$.

The extrapolation of the vibrational levels shows that in this state N_2^+ dissociates into atoms one of which is excited by 11·28 e.v. (or 10·20 e.v. if the cubic term of the equation is employed). This value agrees perfectly well with the energy of excitation of nitrogen from its ground state $2s^2\ 2p^3\ ^4S$ to the level $2s^2\ 2p^2\ 3s\ ^4P$ (= 10·29 e.v.) which is indeed the lowest term in which N possesses a $3s$ electron. The energy of dissociation or formation of the molecule in this state is about 50 per cent bigger than that for the ground level. This shows that a more stable chemical linkage is produced in N_2^+ if the unpaired electron is removed to the next shell by excitation, the conditions being very similar to those in NO, discussed earlier[1]. There is, however, one significant difference. In NO the unpaired electron is in a premoted, or antibonding group. In N_2^+ the odd electron is a non-premoted or bonding electron.

This constitutes the first example which unambiguously shows that a single unpaired electron does not act as bonding but weakens the linkage, even if it is in a bonding orbital. Further, the large increase in dissociation energy as the molecule is excited from $(X)\ ^2\Sigma$ to $(C)\ ^2\Sigma$ state, directly contradicts the general identification of non-premoted with bonding and premoted with antibonding electrons. This evidence and other experimental results, which are mentioned earlier, are to our mind incompatible with the latter hypothesis.

A more detailed discussion will be given in connexion with considerations on the applicability of the Birge–Sponer method of vibrational extrapolation in a forthcoming paper, in the *Proceedings of the Indian Academy of Science* (Bangalore).

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Recent Auroræ and Magnetic Disturbances

WITH reference to the displays of aurora on January 7 and February 3, reported in NATURE of February 13 and 20, pp. 277 and 318, the following further details may be of interest. The aurora of January 7 was noted by an observer in the vicinity of Preston, who reported seeing it between 19h. and 19½h. U.T. On this occasion, the magnetic records of Stonyhurst Observatory show a moderate disturbance between 18h. and midnight, the most notable movements being a fall of 27′ in westerly declination between 19h. 15m. and 19h. 32m., followed by a sharp rise of 28′ between 19h. 32m. and 19h. 42m., whilst horizontal force rose by 140γ between 19h. 22m. and 19h. 34m. and then fell by 180γ between 19h. 36m. and 19h. 43m. It may be noted that on this occasion the minimum value of D almost coincided with the maximum value of H. On February 3, however, these conditions were reversed, the minima in D and H being almost, but not quite, coincident in time. On this occasion, declination fell by 70′ between 18h. 58m. and 19h. 12m., whilst horizontal force fell by 225γ between 18h. 56m. and 19h. 09m., each element rising by corresponding amounts in the next ten minutes.

From fifty accounts received from observers of the aurora on the latter occasion, there can be little doubt that the most brilliant part of the display occurred during the easterly swing of the declination magnet. Of the fifty observers, eight first noted it between 18h. 40m. and 18h. 45m., and seven gave the end as 19h. 25m. or 19h. 30m., whilst no fewer than twenty-five reported first seeing it between 18h. 55m. and 19h., and twenty-nine gave the end as 19h. 10m. or 19h. 15m., the rest giving intermediate times for the first and last observations. It seems clear that whilst some observers noted the fainter glows near the beginning and end, the majority saw only the more vivid portions of the display. Two observers first noted it at 18h. 57m., two others note an increase in brilliance at 18h. 58m., one gives the end as 19h. 12m., and one other the duration as from 18h. 57m. to 19h. 12m.

This circumstance, of the display being chiefly during an easterly swing of the declination magnet, seems to apply also to the single local observation of