2 nuclear magnetons and that the neutrons are slow enough that their wave-lengths are of the order of atomic dimensions. They[2] have also suggested the possibility that the magnetic moment may be 6 units instead of 2 and that the spin would then be $\frac{3}{2}$ instead of $\frac{1}{2}$. It is contended that the substantiation of these values would practically resolve the discrepancy between theory and experiment in the case of the transmission of slow neutrons through magnetized iron. This larger magnetic moment would result in a scattering cross section of "approximately 100×10^{-24} cm^2" in the case of the free manganese ion Mn^{++} for suitably slow neutrons. Van Vleck[3] has pointed out the desirability of using materials in work of this kind which have small coupling between the spins of the various atoms, since coupling of this kind increases the inelastic scattering. Following the suggestions of these authors we have made measurements on differential scattering of slow neutrons at small angles by the salts $MnSO_4$ and MnF_2.

Using an angular ring arrangement which enabled us to count only those neutrons scattered through an angle of 15°±10°, we compared the scattering of the $MnSO_4$ and the MnF_2 samples with that of lead and carbon samples. The MnF_2 was dried in a vacuum oven at a temperature of 200°C for 6 hours. The $MnSO_4$ was first dried at 325°C and was later dried at 550°C for 24 hours when tests indicated that earlier results[4] were not valid because the $MnSO_4$ still contained some water of crystallization. We have, as yet, been unable to prepare a satisfactory sample of MnS.

We conclude from these measurements that any scattering, in addition to the expected nuclear scattering, in the forward angular region studied could not have been greater than equivalent to 5 units (10^{-24} cm^2) of cross section in this region, and we believe it to be considerably smaller. Modifications in technique and apparatus are in progress which will reduce the limit of error.

Some indication of the neutron spectrum used is obtained from the fact that with the same howitzer used here the interference effects in quartz have been observed in addition to other interference results. This seems to indicate that a sufficient number of the neutrons are slow enough that there can be little objection on this ground.

On the basis of these results and the current ideas[1] concerning paramagnetic scattering of slow neutrons it seems impossible to accept the suggestion that the magnetic moment of the neutron may be 6 units. As a matter of fact the 5 units of scattering which has been set as the upper limit is only about 25 percent of that to be expected on the basis of a neutron moment of only 2 nuclear magnetons. We have no explanation of why this magnetic scattering does not show up in these experiments to the extent expected for the lower value of the magnetic moment, since it seems unlikely that the elastic form factor can differ so greatly from unity, in the angular region used, that the entire explanation can be placed here. $MnSO_4$ has been studied thoroughly and its susceptibility as measured under various conditions indicates that the spin coupling cannot be blamed.

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The Abundances of Molecules in the Solar Reversing Layer

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We have recalculated, essentially by the earlier method of Roach,[1] the abundances in the sun's reversing layer of the molecules OH, CN, NH, CH and C_2. Under the assumption of thermodynamic equilibrium at some definite temperature, the observed intensities of many electronic-transition band lines for each kind of molecule were converted by means of the appropriate "curve of growth"[2] and of the appropriate molecular sum rules to Nf values: N is the number of molecules in a cm^2 column through the reversing layer, and f is the f number associated with the complete electronic transition.[3] Then, having found f by any suitable means, N was obtained directly.

The data and results are summarized in Table I. The observational data are the same as were used by Roach,[1] except that Blitzer's recent microphotometric data[4] on CN are used. The values of Nf (given in the table in logarithmic form) are determined for an effective temperature of 5000° in the usual manner. The f values for OH and CN are the experimental ones found by Oldenberg and Rieke[5] and by White,[6] respectively. The f values for NH, CH and C_2 have been calculated by the wave mechanics in the following manner: the ratios of f values for OH, NH and CH, and for CN and C_2, were calculated with the most reasonable standard wave functions—both *AO* and *MO* approximations were considered—and then the f's for NH, CH and C_2 were obtained from these ratios and the experimental f values for OH and CN.

In column 5 are the resulting logarithms (base 10) of the abundances of the several molecules, diminished by 14 so as to make them roughly comparable with the figures in column 6. In column 6 are the logarithms of the relative molecular abundances as calculated by Russell[7] from his (1934) atomic abundances.

TABLE I. *Data on electronic-transition lines.*

MOL.	TRANSITION	LOGNf $T=5000°$	f	LOG$N-14$ $T=5000°$	LOG$N_{\rm rel}$ RUSSELL
OH	$^2\Sigma^+\leftarrow{}^2\Pi$	13.83	3.0×10^{-4}	3.36	5.3
CN	$^2\Sigma^+\leftarrow{}^2\Sigma^+$	14.00	2.6×10^{-2}	1.59	2.3
NH	$^3\Pi\leftarrow{}^3\Sigma^-$	13.57	7.2×10^{-4}	2.71	4.0
CH	$^2\Delta\leftarrow{}^2\Pi$	14.04	4.5×10^{-4}	3.39	3.1
C_2	$^3\Pi_g\leftarrow{}^3\Pi_u$	13.65	2.4×10^{-2}	1.27	0.9

While it is not possible to draw highly precise conclusions from column 5 (because of the low precision of most of the individual observations of band line intensities), nevertheless it appears that the actual abundances of CN and C_2 are quite significantly less than the abundances of the hydrides—this is in general agreement with the results of Russell. This fact did not appear in the earlier calculations[1] simply because at that time the CN and C_2 f values were not known to be much larger than the hydrides' values.

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