LETTERS TO THE EDITOR

Prompt publication of brief reports of important discoveries in physics may be secured by addressing them to this department. Closing dates for this department are, for the first issue of the month, the twentieth of the preceding month; for the second issue, the fifth of the month. The Board of Editors does not hold itself responsible for the opinions expressed by the correspondents.

Band Spectrum of Arsenic Oxide (AsO)

At the St. Louis meeting of the American Physical Society (November 30, 1934) we reported on the results of an investigation of the band spectrum of arsenic oxide (AsO) in emission and absorption.[1] Two systems of double double-headed bands were observed. In a paper to be presented by Jenkins and Strait at the Los Angeles meeting of the American Physical Society (December 21–22, 1934), a confirmation of these observations is recorded (Bulletin of the American Physical Society 9, No. 6, p. 7). There is, however, a discrepancy in the vibrational analysis of the *A*-system. On the basis of measurements of wavelengths on a Hilger E_1 quartz spectrograph, we found these bands to be represented within the error of observation by means of a formula requiring a doubling of the initial state. Jenkins and Strait have, however, represented these bands by a formula which does not require the doubling of the initial state. Either formula represents equally well our observations on the E_1 quartz spectrograph so that without more accurate observations a choice is not possible.

We have repeated our observations in the second order of a 21-foot concave grating having 30,000 lines to the inch and also on a Hilger E185 quartz spectrograph. In the latter case, the band system was excited by passing 5 amperes at 1000 volts d.c. through a discharge tube containing the vapor of As_2O_3. We have thus been able to extend the band systems previously observed and to increase the accuracy of our measurements. We now find that the *A*-system can be best represented without a doubling of the initial state. There is no change in the analysis of the *B*-system.

The results of a similar investigation by Connelly[2] have been received after our results had been prepared for publication. Except for minor differences in the numerical values of the vibrational constants, his results agree with those which we obtain. We have, however, been able to extend the *B*-system to $v'=6$ whereas Connelly's recorded observations stop with $v'=4$ and Jenkins and Strait observed only the $v'=0$ progression and attributed the absence of further progressions to predissociation. It also may be of interest to note that in the form of excitation used in our experiments both sub-bands were of approximately equal intensity.

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December 18, 1934.

[1] E. N. Shawhan and Frank Morgan, Phys. Rev. **47**, 199 (1935).
[2] Connelly, Proc. Phys. Soc. **46**, 790 (1934).

Rate of Fall of Meteoric Material on the Earth

In the *Physical Review* for November 15, 1934 Dr. G. N. Lewis of the University of California publishes an interesting paper on *Genesis of the Elements.* In this paper he suggests the genesis of stony meteors from metallic meteors. Although he himself, in this paper, publishes no estimate of the rate of fall of meteoric material on the earth, the press notices of the article did contain such an estimate. The figure appearing in the *Literary Digest,* and elsewhere, was nineteen feet in sixty million years.

It may be that your readers will be interested in the result of a calculation based on the relative amount of material reaching the earth in the form of telescopic meteors, naked-eye meteors and meteorites of various sizes. We have previously published papers on the daily and annual numbers of telescopic meteors, naked-eye meteors and meteorites. We have also published calculations on the masses of meteors of various magnitudes. Recently it occurred to us that a plot showing for each magnitude the total amount of material reaching the earth could be made. This indicated that the meteoric material in the space through which the earth is passing is distributed, as far as useful data are available, approximately according to the probability curve.

It should be said that, because of recent work, we are using for the telescopic meteors somewhat higher numbers than the usual estimates in the past. We are also using distinctly higher numbers for the meteorites. For the masses of individual meteors our figure is of the same order of magnitude, but slightly higher, than most which have been published. Yet when we integrate the probability curve and obtain the total amount of meteoric material reaching the earth each year, we obtain a smaller figure than the previous estimates. These previous estimates have, of course, been based to a much smaller extent on observation and calculation. Our result is that the annual amount of meteoric material per square mile is ten grams. At this rate the radius of the earth would be increased one inch in about 2×10^{10} years. The estimate for the age of the earth given in Russell-Dugan-Stewart's *Astronomy* is 5×10^{9} years. So in the lifetime of the earth, according to this estimate, the radius of the earth would be increased only a fraction of an inch by meteoric material falling at the present rate.

The more complete paper is to appear in Contributions of the University of Iowa Observatory.

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December 28, 1934.