cients very little correlation was found between the magnitude and sign of the ratio.

The conclusion reached from this research are as follows:

1. The explosive nature of bismuth is not due to the absorption of gases when liquid, but is due to the sudden increase in volume on freezing.

2. The rate of cooling, size, and orientation of the crystals determined to a large extent the magnitude of the various coefficients.

3. There is very little correlation between the ratios of

$$\frac{\text{Hall coefficient}}{\text{Ettingshausen coefficient}} \quad \text{and} \quad \frac{\text{Nernst coefficient}}{\text{Righi-Leduc coefficient.}}$$

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CHARACTER OF THE ^{3}S TERMS IN THE MERCURY SPECTRUM

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On the basis of perturbation calculations in quantum mechanics and assuming the existence of more than one optical electron Langer[1] deduced an equation for the energy of the terms of spectra of complex atoms in the form of

$$\nu_n = \frac{R}{\left[n + \sum_{o}^{\alpha} \frac{p_{in}}{\nu_i \nu_n}\right]^2} = \frac{R}{(n^*)^2}$$

where p_{in} is a function of the probability of transition between the terms ν_i and ν_n, and the ν_i is an observable spectroscopic term. This cannot be any term, but must arise from an electron configuration with nearly equivalent energy as that of one of the terms ν_n of the series. When no perturbing term ν_i is near enough to ν_n the formula reduces to the usual Ritz form and the plot of the quantum defect n*-n against ν_n is then a straight line. Where, however, the ν_i has a value falling amongst the terms of a series to which it does not belong then the plot of n*-n for that series should be similar to a dispersion curve around an absorption line.

Langer pointed out that such cases arise in the arc spectrum of mercury as well as other metals. A plot of the terms of the ^{3}S series determined from the 2^3P_2-m^3S lines was made by Shenstone and Russell[2] from the wave-lengths published, and the value of n*-n was found to rise rapidly for the higher series members. This may sometimes be due to a wrong value assigned to the ground term and may be corrected by adding a small value to that term. In this case, however, no manipulation of the 2^3P_2 term could achieve a straight line plot for the ^{3}S terms.

At the suggestion of Dr. Shenstone a redetermination of the wave-lengths of this series was undertaken. The source consisted of a mercury arc in a quartz tube produced between a mercury cathode and an iron anode. The anode had a slot cut in it and through this slot mercury vapor passed from the arc into a low pressure chamber above, forming a beam of luminous vapor. The light from this beam, rich in the higher members of the mercury series, was analyzed by a Hilger E-1 quartz spectrograph. The lines from an iron arc superimposed on the Hg spectrum served for the comparison of wave-lengths. The accompanying table gives the wave-lengths and wave numbers of the 2^3P_2-m^3S series. The first eight lines are taken from Kayser's Handbuch, the next ten members being newly measured. In column 4 the term value is obtained by subtracting from $2^3P_2 = 40138.3$. These terms again have a large rise of n*-n for the higher series members, but when the 2^3P_2 is taken 2.5 units greater, viz., 40140.5, a straight line is obtained for the plot of n*-n against ν_n showing a Ritz relation, indicating an unperturbed series.

1 $2^3P_2-m^3S$ m	*2* Wave Length	*3* Wave Number	*4* Term Value	*5* Corrected Term Value	*6* Residuals
2	5460.74	18307.5	21830.8	21833.3	+56.8
3	3341.48	29918.3	10220.0	10222.5	0
4	2925.41	34173.4	5964.9	5967.4	— 0.7
5	2759.70	36225.3	3913.0	3915.5	— 0.5
6	2674.99	37372.5	2765.8	2768.3	+ 0.7
7	2625.24	38080.7	2057.6	2060.1	— 0.2
8	2593.41	38548.0	1590.3	1592.8	— 0.1
9	2571.81	38871.6	1266.7	1269.2	— 0.4
10	2556.34	39106.7	1031.6	1034.1	0
11	2544.93	39282.0	856.3	858.8	— 0.3
12	....	....	....	....	....
13	2529.47	39522.1	616.2	618.7	— 1.4
14	2524.12	39605.9	532.4	534.9	— 1.5
15	2519.81	39673.6	464.7	467.2	— 1.4
16	2516.26	39729.6	408.7	411.2	— 1.6
17	2513.32	39776.0	362.3	364.8	— 1.7
18	2510.86	39815.0	323.3	325.8	— 1.7
19	2508.70	39849.3	289.0	291.5	— 3.0

The equation then is

$$n^* - n = .30433 - 2.732 + 10^{-6}\nu$$

and the residuals for the observed term values minus the calculated term values are given in the last column. The large residual for the first term is quite a usual occurrence in spectral series.