

levels are 68582.9, 68580.9 and 68579.8 cm.^{-1}) and of 2712, 2684 and 2670 (upper level = 69746.3 cm.^{-1}) points to interaction between these groups of levels. 4630 of Zn (upper level 68337.9 cm.^{-1}) has become weaker. Its excitation energy seems to have been taken up by 2734, 2775 and 2868 (upper level = 66681.5 cm.^{-1}), which have become strengthened. This latter level may also have been enriched at the expense of 3072, 3035 and 3018 (upper level = 65432.4 cm.^{-1}), which are slightly weakened. The slight weakening of Zn 6362 (upper level = 62458.6 cm.^{-1}) may be correlated with the slight brightening of 3252, 3133 and 3081 (upper level = 62563.2). The brightening of Cd 2288 (upper level = 43692.2 cm.^{-1}) must be brought about by 4^1P_1 of zinc of energy 46745.1 cm.^{-1} and the weakening of 2139 of Zn confirms this. 2139, however, does not affect our film sufficiently to show up clearly and hence it cannot be seen in the reproduction. The strengthening of Cd 2660 (upper level = 69404.3 cm.^{-1}) is possibly connected with the weakening of the zinc lines 2609, 2583 and 2570 (upper level = 71213.5 cm.^{-1}), 2516, 2492 and 2480 (upper level = 72628.1 cm.^{-1}) and 2464 (upper level = 73471.3 cm.^{-1}) of Zn, all of which are weakened, have excitation energies very near the ionization energy of cadmium which is 72538.8 cm.^{-1} . The slight increase in brightness of the spark line 2265 of Cd may be due to the ionization thus produced. The simultaneous weakening of Zn 4810, 4722, 4680 (upper level = 53672.4 cm.^{-1}) and of Cd 5086, 4800, 4678 (upper level = 51484.1 cm.^{-1}) is difficult to explain except by assuming that the energy of the first group is given to ionised Cd and that of the second to ionised Zn. Since the spark lines of Zn and Cd are very weak, support for this view is difficult to obtain from their behaviour. The weakening of 4663 (upper level = 65133.9) of Cd will have to be explained in a similar way by assuming that its energy is used to strengthen some spark line, probably 2265 of Cd, but this explanation is only tentative.

In conclusion we have great pleasure in ex-

pressing our thanks to Prof. A. Venkat Rao Telang for the many facilities given to us.

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¹ *Curr. Sci.*, 1939, 8, 508; 1940, 9, 14.

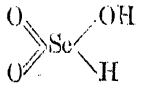
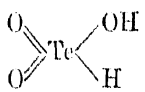
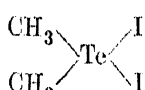
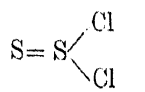
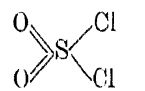
Molecular Structure of Some of the Selenium and Tellurium Compounds

PAULING,¹ Van Vleck,² Slater³ and Angus⁴ have shown that the diamagnetic susceptibility of an ion is given by $\chi_A = -\frac{e^2z}{6mc^2} \sum r^{-2}$, where $\sum r^{-2}$ depends upon the valency state of the ion. The validity of this expression has been verified by Farquharson,⁵ Gray and Cruickshank,⁶ Clow⁷ and Bhatnagar and co-workers.⁸

Varadachari and Subramaniam⁹ and Nevgi¹⁰ have determined the susceptibilities of a number of sulphur compounds and using Kido's values for the ionic susceptibility of sulphur in different valency states, have assigned suitable valencies to sulphur in these compounds. We have measured the magnetic susceptibilities of about a dozen compounds of selenium and tellurium by the modified form of Gouy's Balance and have calculated the theoretical values of selenium and tellurium in different valency states using Slater's and Angus's methods for the calculation of $\sum r^{-2}$. The calculated and observed values for some of these compounds are shown in Table I.

Incidentally we have calculated the values of $\sum r^{-2}$ according to Slater's and Angus's methods and hence the ionic susceptibilities, for sulphur in different valency states and have used them to calculate the susceptibilities of the sulphur compounds studied by Varadachari and Subramaniam and Nevgi. Table I shows that the values thus calculated for S_2Cl_2 and SO_2Cl_2 agree closely with those experimentally found by Varadachari and Subramaniam and Nevgi, respectively.

TABLE I

Compound	Correct constitution	$-\chi_a \times 10^6$ & $-\chi_m \times 10^6$ observed by the authors	$-\chi_a \times 10^6$ & $-\chi_m \times 10^6$ calculated by Slater's method	$-\chi_a \times 10^6$ & $-\chi_m \times 10^6$ calculated by Angus's method
Se ₂ Br ₂	Br-Sc-Se-Br	(χ_a) 0.3544 (χ_m) 112.6	0.3479 110.72	0.3400 108.18
H ₂ SeO ₃		(χ_a) 0.3515 (χ_m) 45.41	0.3470 44.84	0.3465 44.77
H ₂ TeO ₃		(χ_a) 0.1966 (χ_m) 34.89	0.1978 35.12	0.1972 35.00
(CH ₃) ₂ TeI ₂		(χ_a) 0.3535 (χ_m) 145.40	0.3547 145.85	0.3542 145.71
S ₂ Cl ₂		(χ_a) 0.461 } ⁹ (χ_m) 62.2 }	0.4613 62.272	0.4523 61.05
		(χ_a) 0.405 } ¹⁰ (χ_m) 54.7 }		
SO ₂ Cl ₂		(χ_a) 0.365 } ⁹ (χ_m) 49.3 }	0.3891 52.517	0.3884 52.422
		(χ_a) 0.397 } ¹⁰ (χ_m) 53.6 }		
		(χ_a) 0.402 } (χ_m) 54.6 }		
		(Kido)		

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