Further Observations on the Diamagnetism of the Trivalent Bismuth Ion.

IN our note on the subject,[1] the value (43·80) for the diamagnetism of the trivalent bismuth ion was obtained by modifying the original Slater formula by assigning for electrons in the lower groups instead of shells and the *d* and *f* groups a value 0·85 instead of the usual 1. We have now calculated the value for Bi^{+3} by the orthodox Slater formula and its modification proposed by Angus and obtain the following results :—

		Experimental	Slater	Angus
$-x \times 10^6$	Bi^{+3}	41·24	42·23	42·09

The agreement is as good as can be expected particularly on the Angus formula. More so when one realises that the Slater method is strictly valid for ions of the closed configuration type. Kido has brought out an interesting empirical relationship which seems to hold for a number of ions according to which the difference in the susceptibilities of ions due to two electrons is of the following order :—

	$-\Delta x \times 10^6$
$P^{+3} - P^{+5}$	= 9·4
$As^{+3} - As^{+5}$	= 8·2
$S^{+4} - S^{+6}$	=10·4
$Se^{+4} - Se^{+6}$	= 9·5
$Cl^{+5} - Cl^{+7}$	=11·1
$I^{+5} - I^{+7}$	=12·5

The value for Bi^{+5} for which the Slater and Angus formulæ should strictly apply, has been calculated to be 29·22. The difference between Bi^{+5} and Bi^{+3} calculated on the Angus formula is 42·09−29·22= 12·87, which is of the same order as suggested by Kido and is of particular significance.

It may be recalled here that out of the many compounds of bismuth mentioned in our last note, the susceptibility values of four are described in the *International Critical Tables* (Bi_2O_3, $BiCl_3$, $BiBr_3$, BiI_3). Three of these are in excellent accord with our values and only one has been shown to have a lower value.

Full results are being communicated to the *Journal of the Indian Chemical Society*.

S. S. BHATNAGAR.
BHIM SAIN BAHL.
University Chemical Laboratories,
Lahore.
October 5, 1935.

[1] *Curr. Sci.*, 1935, **4**, 153.