NOTE ON COEFFICIENTS OF EXPANSION AT LOW TEMPERATURE.

BY J. S. SHEARER.

IN the determination of the expansion coefficients of silver and aluminium at low temperatures by Mr. Ayres it appears that the correction for change of index of the air is large in the lower temperature intervals and is of course greater the greater the length of the specimen used. Mr. Ayres did not have time to fully satisfy himself that the results in vacuum were the same as those found using Pulfrich's formula for the correction. Professor F. M. Simpson, at the writer's suggestion, took up the work during the summer of 1904, with the apparatus used by Ayres, slightly modified for greater convenience.

If $(\mu - 1)/d$ is constant it is evidently immaterial whether we remove the air or simply close the vessel filled with *dry* air at any convenient pressure, so long as we do not liquefy the enclosed gas. It was found convenient to work with air in the enclosure at about 5 mm. pressure and the results demonstrated very clearly that the correction formula was applicable.

The opposite table gives a comparison of the values obtained by these observers for silver and aluminium. The agreement is striking except for the lowest temperature interval in the case of aluminium, where there is quite a discrepancy. Further study in this line is now being prosecuted by Mr. H. G. Dorsey, with apparatus modified in a few details where experience has indicated liability to interruption of work by frosting of surfaces or failure to remain air-tight at extremely low temperatures.

Since the completion of the work described above, the writer has noted a paper by Scheele (*Zeitschrift für Instrumentenkunde*) describing a similar method for work in low temperature ranges, in which is given a reference to the inaugural dissertation of Reimerdes, who proposed the ring method in 1896. No reference to this work had previously come to my attention and hence it was not mentioned in Mr. Ayres' paper.

Silver.

Ayres.		Simpson.	
Temp.	E. (Mean).	Temp.	E. (Mean).
0 to - 50	193×10^{-7}	0 to - 40	193×10^{-7}
- 50 " -100	183×10^{-7}	- 40 " - 80	187×10^{-7}
-100 " -150	166×10^{-7}	- 80 " -120	178×10^{-7}
-150 " -184	151×10^{-7}	-120 " -160	165×10^{-7}
		-160 " -180	154×10^{-7}

Aluminium.

Ayres.		Simpson (only one series).	
0 to - 40	216.6×10^{-7}	0 to - 40	216×10^{-7}
- 40 " - 80	198×10^{-7}	- 40 " - 80	199.5×10^{-7}
- 80 " -120	182×10^{-7}	- 80 " -120	190.5×10^{-7}
-120 " -160	158×10^{-7}	-120 " -160	160.5×10^{-7}
-160 " -185	136×10^{-7}	-160 " -180	153×10^{-7}

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