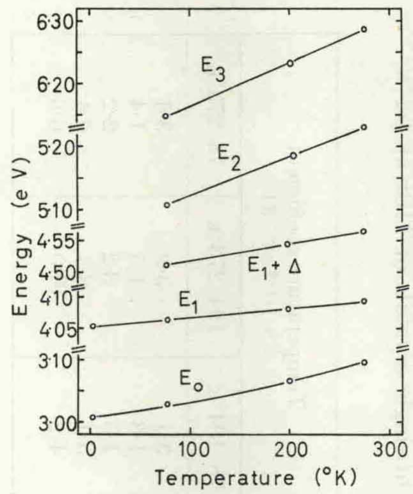
Table 1. Position and temperature coefficient of exciton absorption peaks in single crystals of TlBr at 4·2°K, 78°K, 194°K and 273°K

Exciton	Position (ev, and brackets give Å)				Temperature coefficient ($\times 10^{-4}$ ev/°K)		
	4·2°K	78°K	194°K	273°K	78–194°K	194–273°K	78–273°K
E_0	3·011 (4117)	3·029 (4093)	3·065 (4045)	3·096 (4003)	3·1	3·9	3·4
E_1	4·054 (3058)	4·064 (3050)	4·079 (3040)	4·091 (3030)	1·3	1·5	1·4
$E_1+\Delta$		4·516 (2745)	4·533 (2735)	4·558 (2720)	1·5	3·2	2·2
E_2		5·107 (2428)	5·166 (2400)	5·232 (2370)	5·1	8·4	6·4
E_3		6·148 (2017)	6·197 (2001)	6·277 (1975)	4·2	10·0	6·6

Fig. 2



The variation with temperature of the energy of exciton absorption peaks in single crystals of TlBr.

summarized in table 1 and illustrated in fig. 2. The last three columns of table 1 give the average temperature coefficients for 78°K–194°K, 194°K–273°K and 78°K–273°K respectively. It appears that the observed transitions can be divided roughly into two groups according to the rate of movement with temperature. E_1 and $E_1 + \Delta$ have on the whole appreciably smaller temperature coefficients than E_0, E_2 and E_3. It is reasonable to infer that these two groups of transitions involve interband states of totally different symmetry and this will be supported by evidence from pressure measurements. It is also apparent that unlike all the higher energy excitons, the temperature coefficient for E_0 increases markedly at higher temperatures, suggesting the possibility of a different mechanism for exciton–lattice interactions at the minimum gap.

3.2. *The Effect of Pressure on the Minimum Gap E_0 of Thallous Halides*

The pressure coefficient for the E_0 absorption peak has been measured for TlCl (films) and TlBr (films and single crystals) at 80°K and 274°K, as well as for TlI (films) at 80°K. A further measurement has been made for TlBr films at 198°K in order to follow the variation of the pressure coefficient with temperature.

It was found that the E_0 peak moved linearly and reversibly to lower energy at constant temperature with increasing pressure to 6 kbars for all three materials. Figure 3 shows the movement of this exciton peak under pressure in a TlBr single crystal at 80°K. The pressure coefficient which is simply the linear slope of this variation, is given in table 2. It can be seen that this coefficient is similar for the first peak in all the halides at