

TEMPERATURE VARIATION OF THE PHOTOELASTIC CONSTANTS OF AMMONIUM CHLORIDE

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In a recent paper (Rao and Murty, 1966) from this laboratory, the temperature dependence of the photoelastic behaviour of a number of cubic crystals of NaCl type has been described. As ammonium chloride belongs to CsCl type and is found to show a behaviour different from NaCl type crystals with regard to variation of elastic constants with temperature (Bhagavantam, 1955), it is thought worthwhile to study the temperature dependence of its photoelastic constants also.

Using the same procedure as described earlier (Rao and Murty, 1966), the photoelastic constants of ammonium chloride have been determined at various temperatures in the range 35°C to 100°C. It was not possible to make observations above 100°C, as the crystal became translucent beyond 100°C, probably due to the onset of sublimation. The data on the thermal expansion and the thermoelastic behaviour, needed for evaluating the photoelastic constants at various temperatures, have been taken from literature (Sharma, 1950 and Subrahmanyam, 1954). As the data on the thermoelastic behaviour is not available, the value of dn/dt is calculated using Ramachandran's theory (1947) on the thermo-optic behaviour of solids.

Table I shows the values of the photoelastic constants obtained at different temperatures. The stress and the strain optical constants are found to increase numerically with temperature. In the temperature range studied, the variation in $(q_{11} - q_{12})$ is only 14.6%, whereas the variation in q_{44} is much larger, being 24.7%. Thus the behaviour of ammonium chloride, with respect to photoelastic-

TABLE I

Temperature °C	$-(q_{11} - q_{12}) \times 10^{13}$ C.G.S.	P_{11}	P_{12}	$q_{44} \times 10^{13}$ C.G.S.	P_{44}
35	2.95	0.161	0.251	4.28	0.032
60	3.11	0.169	0.263	4.70	0.034
80	3.25	0.176	0.274	5.03	0.035
100	3.38	0.182	0.284	5.35	0.036

city also, is different from NaCl type crystals, in which the variation in $(q_{11}-q_{12})$ is larger than in q_{44} . It will be interesting to study whether other CsCl type crystals also behave in the same manner.

R E F E R E N C E

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