Raman Effect in Rock-Salt

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The recorded Raman spectrum exhibits two distinct lines at 623 and 194 cm\(^{-1}\), which are recorded also in infrared absorption roughly at the corresponding positions. These lines are characteristic features of the Raman spectrum. They are, however, completely absent from the spectrum deduced from the Born lattice dynamical model.

Fermi and Baselti remark in their paper that the Raman spectrum of rock-salt terminates abruptly at 660 cm\(^{-1}\). The observations made at Bangalore also definitely confirm this result, and show that the microphotometer record beyond this point arises from a continuum associated with the mercury lines at 556 2 and 365 9 nm. The extension of the spectrum up to 600 cm\(^{-1}\) indicated by the Born lattice model does not find experimental support.

The Born theoretical spectrum exhibits a couple of strong peaks in the region of low-frequency shifts. Investigations carried out at this Institute definitely show that there are no corresponding bands in the Raman spectrum. The band in this region appearing in the photograph taken by Fermi and Baselti would appear to be a spurious one of instrumental origin.

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Born and Bradburn\(^1\) have deduced the nature of the Raman spectrum of rock-salt to be expected on the basis of the Born lattice dynamical model. They claim that the observed lines are only small peaks on a strong background, a feature which is characteristic of the spectrum deduced from the Born dynamical model. This description, which is mainly based on the microphotometer record reproduced by Fermi and Baselti, is not justified. It is a familiar experience in microphotometry that even in the case of ordinary atomic spectra consisting of closely spaced sharp lines, microphotometer records of heavily exposed spectrums exhibit the lines only as small peaks on a strong background. In order to gauge correctly the nature of the spectrum in such cases, it is necessary to take weakly or moderately exposed spectrums and count them by microphotometer. The photograph taken by Fermi and Baselti and reproduced by Born and Bradburn itself bears testimony to this statement. The intense Raman line with a frequency shift of 660 cm\(^{-1}\) appears only as a small peak on the Stokes side, whereas it is more prominently visible on the anti-Stokes side of the microphotometer record. It is also seen clearly as a line on the anti-Stokes side of the spectrums and is so sharp that it may easily be mistaken for a mercury line.

