

Very similar behaviour is to be expected for neutron scattering.

If we use the model of Fig. 1 to build up the lighter nuclei (up to A^{26}) from protons and neutrons, we obtain exactly the scheme proposed by Bartlett. We notice, however, that for many processes this scheme has to be replaced by others which are more adequate. If we deal, for example, with α -particles, it is more convenient to speak about α -particle levels in the nucleus.

Considering the anomalous scattering of α -particles, a similar picture to that of Fig. 1 must hold (but we have naturally to account for the Bose-statistics of these particles). We give here the analysis of the anomalous α -scattering by light nuclei:

$\alpha \rightarrow \alpha$: $1s_{\alpha}$ -scattering ³
$\alpha \rightarrow \text{Be}^9$: $1p_{\alpha}$ -scattering ⁴
$\alpha \rightarrow \text{B}^{10,11}$: $1p_{\alpha}$ -scattering ⁴
$\alpha \rightarrow \text{C}^{12}$: $1p_{\alpha}$ -scattering ⁴
$\alpha \rightarrow \text{F}^{19}$: $1d_{\alpha}$ -resonance disintegration (?) ⁵
$\alpha \rightarrow \text{Al}^{27}$: $1d_{\alpha}$ -resonance disintegration (?) ⁶ $2s_{\alpha}$ -scattering ⁷

It is easily seen that this analysis of the anomalous scattering is consistent with all our knowledge about nuclear energy levels.

A more complete report on this problem is to be published in the *Physical Review*.

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¹ *Z. Phys.*, **90**, 754; 1934.

² Pose and Diebner, *Z. Phys.*, **90**, 773; 1934.

³ Rutherford and Chadwick, *Phil. Mag.*, **4**, 605; 1927. Taylor (*Proc. Roy. Soc., A*, **134**, 103; 1931) accounts for this scattering by a $2s_{\alpha}$ -scattering. The $1s_{\alpha}$ -scattering accounts equally well for the experiments, and avoids all the difficulties discussed by Taylor.

⁴ Rietzler, *Proc. Roy. Soc., A*, **134**, 154; 1931.

⁵ Pose, *Z. Phys.*, **72**, 528; 1931.

⁶ Pose, *Z. Phys.*, **64**, 1; 1930.

⁷ Rietzler, loc. cit.

The Phenomenon of 'Wings' and the Vibrational Raman Effect in Benzene and Naphthalene Crystals

As has been pointed out in our previous note¹, the continuous spectrum (wings) observed around the primary line at the scattering of light by liquids consists of two parts. The central part just near the primary line (*c.* 20 cm^{-1} in diphenyl ether) gains in intensity when the liquid is heated, whereas the outer part remains unaltered. By comparison of the Raman effect in liquid and crystalline diphenyl ether, we have shown that the later part is not due to the rotation of molecules in the liquids as usually accepted, but is produced by the vibrational Raman lines caused by slow vibrations (probably characteristic for the crystal lattice of diphenyl ether). It seemed to us of interest to include in our experiments also the crystal of benzene because the phenomenon of wings of this substance in the liquid state has been carefully studied by many observers².

We investigated the Raman effect of single crystals of benzene and naphthalene. The experiments have fully confirmed our previous results obtained with diphenyl ether. In place of the wings observed in liquid benzene and naphthalene, we have obtained very distinct vibrational Raman lines: $\nu_1 = 63 \text{ cm}^{-1}$ and $\nu_2 = 108 \text{ cm}^{-1}$ in the benzene crystal and $\nu_1 = 20 \text{ cm}^{-1}$, $\nu_2 = 38 \text{ cm}^{-1}$ and $\nu_3 = 94 \text{ cm}^{-1}$ in the naph-

thalene crystal. The new Raman lines are indicated by arrows in Fig. 1. The spectrogram showing the wings of liquid naphthalene is not reproduced, because it is similar to that of liquid benzene.

The central part of the continuous spectrum just near the primary line is of great intensity in the case of liquid naphthalene, and is probably connected with existence of a very large coefficient of depolarisation of the scattered light in this substance. We wish especially to emphasise that this part of the wings, the intensity of which increases on heating, is absent in the spectra of crystals (and, as it seems, in amorphous solids) and is apparently characteristic of the liquid state.

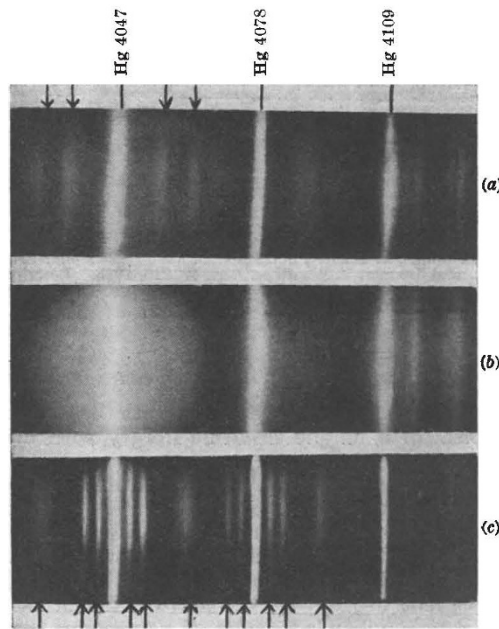


FIG. 1. Raman spectra of (a) benzene crystals, (b) liquid benzene, (c) naphthalene crystals.

It was found that there is a difference in the ordinary Raman spectrum of liquid and crystalline naphthalene. For example, the Raman lines $\nu = 211 \text{ cm}^{-1}$ and $\nu = 278 \text{ cm}^{-1}$ observed with the crystal are absent or at least very weak in the liquid. A detailed account of these variations will be published elsewhere.

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¹ NATURE, **135**, 100, Jan. 19, 1935.

² C. V. Raman and K. S. Krishnan, NATURE, **122**, 278, 882; 1928. *Proc. Roy. Soc., A*, **122**, 23; 1929. I. Cabannes and P. Daure, *C.R.*, **186**, 1533; 1928. W. Gerlach, *Ann. Phys.*, **1**, 301; 1929. I. Weiler, *Z. Phys.*, **68**, 782; 1931. A. Rousset, *J. Phys. et le Rad.*, **3**, 555; 1932. S. P. Ranganadham, *Ind. J. Phys.*, **7**, 353; 1932. S. Bhagavantam, *Ind. J. Phys.*, **8**, 197; 1933. S. Bhagavantam and A. V. Rao, *Ind. J. Phys.*, **8**, 437; 1934.

A High-Pressure Wilson Cloud Chamber

FOR various investigations, such as for large range radiation or when ionisation occurs infrequently, it is an advantage to use high pressure in a Wilson cloud chamber¹. We have developed a Wilson chamber of 2 cm. diameter in which pressure can be increased to 100 atmospheres. The desired compression and sudden expansion was obtained by a piston which followed the pressure of gas in a cylinder