and those obtained from origins are not greater, however, than may be expected.

A more detailed paper on the ultra-violet bands will appear in *Arkiv för Fysik*.

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Spectrum of the Compton Radiation from Solids

THE spectrum of the Compton radiation from *free* atoms has been calculated[1] and was found to consist of a band with a sharp limit towards short wave-lengths. At the same time some 'electronic Raman lines' are supposed to exist between the limit and the line of the primary radiation. In the case of *solids*, this picture should be modified because the discrete energy-levels are replaced by energy-bands. The form of the spectrum will depend on the density distribution of states in the highest occupied energy-zone and in the free zone above it. The sharp limit and the electronic Raman lines will be replaced by broad bands, possibly with a structure. If the highest occupied zone is filled and there is a forbidden zone above it—as in the case of insulators—the broad Compton band should show a limit towards short wave-lengths. The energy shift between this limit and the primary line will be equal to the breadth of the forbidden zone. Although most experiments on Compton scattering have been carried out on solids, such a structure has not yet been observed because of the short wave-lengths used. In the following an account is given of experiments showing the above effect.

Unfiltered copper radiation is scattered on beryllium and carbon at angles between 17° and 45°. The scattered radiation is collected in a bent crystal spectrometer and is then investigated spectroscopically with a Geiger–Müller counter moved along the Rowland circle. The form of a typical spectrum obtained is shown in the accompanying graph. The surface under the curve can be divided into the following areas : (*a*) background, (*b*) line α_1, (*c*) line α_2, and (*d*) the Compton band.

(*a*) *Beryllium*. Experiments were carried out at angles of 20·5°, 25·5°, 30°, 35° and 40°. In all cases the Compton band starts near the primary line, showing that no limit towards short wave-lengths exists. Also in no position of the spectrum does it show an appreciable maximum.

(*b*) *Graphite*. The Compton band at 17° was found to have the same properties as that of beryllium.

(*c*) *Diamond*. At angles of 17° and 30° the Compton band has no appreciable intensity near the primary line. It could only be measured at longer wave-lengths than the α_2-line. At an angle of 35° its intensity is sufficient to show that it starts between the lines α_1 and α_2 at a position corresponding to a shift of 7·5 eV. from the primary line. A similar hump can be observed at a position of the spectrum that corresponds to a shift of 7·5 eV. from the α_2-line.

The spectra obtained agree fully with the current theory of solids. The electrical conductivity of beryllium leaves no possibility for the existence of a forbidden zone. Also, the fact that the absorption
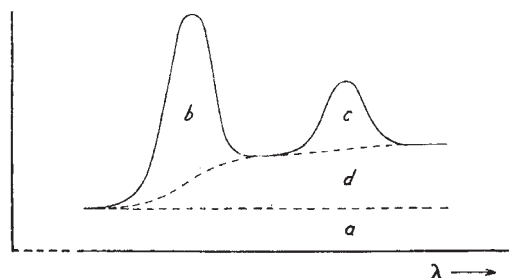
edge coincides with the high-energy limit of the emission line proves that this view is correct.

A graphite single crystal irradiated in such a way that the incident and the scattered radiation are contained in the basal plane should at $T = 0$ give a Compton band with a zero intensity at zero shift and with increasing intensity as the shift increases[2]. The present experiment does not show this behaviour because $T \neq 0$ and because the graphite was polycrystalline.

Diamond has a fully occupied zone that is separated from the next free zone[3] by a forbidden zone of about 7 eV. This has been found from absorption experiments in the ultra-violet. The present experiments also indicate the existence of such a forbidden zone.

A detailed report on the above experiments will appear in the *Arkiv för Fysik*.

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Fate of Sodium 2,4-Dichlorophenoxy-ethyl-sulphate in the Soil

SODIUM 2,4-dichlorophenoxy-ethyl-sulphate, a chemical of low intrinsic phytotoxicity, can be sprayed in relatively concentrated aqueous solutions on to plants normally sensitive to the hormone herbicides, without serious damage to them ; but when it comes into contact with the soil, a high phytotoxicity is generated, sufficient to give satisfactory control of weed-seed germination in the surface layers of the soil[1]. The toxic compound arising from it has been assumed to be 2,4-dichlorophenoxy-acetic acid (2,4-D).

To check this assumption, the behaviour of sodium 2,4-dichlorophenoxy-ethyl-sulphate in soil has been followed using the perfusion technique described for previous investigations on the herbicides 2,4-D and MCPA (2-methyl-4-chloro-phenoxyacetic acid)[2]. Solutions of 100 p.p.m. of the substance have been perfused continuously through garden loam and the changes in phytotoxicity of the perfusate followed by the cress root-growth assay technique[2]. The results of a typical experiment are shown in the graph, where toxicity is expressed in 2,4-dichlorophenoxyacetic acid equivalents (p.p.m.). Toxicity is generated slowly at first ; but the rate increases up to about the eighth day, suggesting the proliferation of an organism adapted to bring about the interconversion. Later, the toxicity curve flattens out, probably due