boiling point by 127° ; that is, on the average, by the substitution of one chlorine by one fluorine, the lowering of boiling point is 42° – 43° C. In the present preparation, the difference between the boiling point of monochloroacetone (118° C.) and of monofluoroacetone (72° C., uncorrected) is 46, which is not far off Swarts's results.

Further investigation on these lines on the preparation of fluorinated aldehydes and other analogous compounds is in progress.

It appears that TlF may be used as a fluorinating agent in cases of certain halogen substituted organic compounds.

The details will appear in due course in the *Journal of the Indian Chemical Society*.

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¹ NATURE, 132, 173, July 29, 1933.

² Bull. Classe des Sci., 5, 13, 175.

X-Ray Spectra in the Region 50-250 Å.

Using the concave grating methods previously described¹, we have now been able to follow the *L*-series of the X-ray spectra down to element No. 12 (Mg). For this element, the *M*-shell consists of only the two valency electrons. The *L*-series had formerly been measured by several authors down to element No. 20 (Ca) with the plane grating method; one separate line belonging to this series was found by Prins and Takens² for element No. 16 (S).

The plates for elements Nos. 19 (K) and 17 (Cl) show for each element a nice doublet with very sharp lines measurable in many orders. Also at element No. 16 (S) the corresponding sharp doublet was found when a sulphate was placed on the anticathode. With pure sulphur on a copper anticathode, two rather strong and diffuse lines were obtained, one on the shorter and one on the longer wave-length side of the sharp doublet. Element No. 15 (P) gives a group of five rather broad lines in the region 98–118 Å. Elements 14 (Si), 13 (Al) and 12 (Mg) show very broad lines with a sharp limit on the short wave-length side. This limit, at 126, 170 and 250 Å. respectively, seems to correspond to the absorption edge. This phenomenon may be interpreted as emission due to transition of electrons from the free levels of the crystal grating to an empty inner level. Quite an analogous structure is found in the K-series of the lighter elements, especially of element No. 4 (Be).

In addition to the more prominent lines mentioned above, the plates show several other lines belonging to these elements. A detailed report will be given elsewhere.

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¹ M. Siegbahn, *Proc. Phys. Soc.*, 45, 689; 1933.

² J. A. Prins and A. J. Takens, *Z. Phys.*, 77, 795; 1932.

Structure of Chrysene and 1:2:5:6-Dibenzanthracene in the Crystalline State

THE exact crystal analysis of these two compounds is of importance owing to the fundamental position occupied by the chrysene type of carbon skeleton in sterol and cestrin chemistry on one hand, and to the carcinogenic properties of dibenzanthracene on the other¹.

Following the complete determination of the anthracene and durenene structures², the obvious method consists of basing plane hexagon models on the chemical structure and endeavouring to obtain agreement between the measured and the calculated structure factors.

Chrysene crystallises in the monoclinic system with $a = 8.34$, $b = 6.18$, $c = 25.0$ Å.; $\beta = 115.8^\circ$. The general planes are halved when $h + k + l$ is odd, and all the (*h*01) planes are halved. The space group is therefore C_{2h}^6 or C_2^4 , but the analysis given below indicates the former. Each of the four molecules in the unit cell may thus be assumed to have the centre of symmetry permitted by the chemical formula. The centre of the reflected (or rotated) molecule might lie either half-way along the *a* or half-way along the *c* axis, but the strong reflections from the (035), (037), (0315), (0317), etc., conclusively indicate the latter alternative.

FIG. 1.

Assuming a planar molecule of the anthracene type (carbon to carbon distance, 1.41 Å.), the following orientation has been found, which leads to good agreement between the measured and calculated values of about eighty structure factors. The long axis of the molecule *OA* (Fig. 1) is tilted about 10° away from the normal to the (001) towards the *c* axis, but remains practically in the plane of the (010), and the cross axis *OB* makes an angle of about 16° with the *b* axis of the crystal. The plane of the molecule is thus near to the (202) plane, which is found to give much the strongest reflection observed in the crystal.

1:2:5:6-Dibenzanthracene has a face centred pseudo-orthorhombic lattice, but the intensities of the (*h*01) reflections show that the system is really monoclinic with $a = 6.59$, $b = 7.84$, $c = 14.17$ Å.; $\beta = 103.5^\circ$. The only halving is the (010), so that the space group is C_{2h}^2 or C_2^2 with two molecules per unit cell. The strong tendency for the crystals to develop on the (001) plane in the form of very large thin flakes makes the accurate measurement of intensities a difficult matter, but the enhancement of certain orders such as the (0013), and some of the (*h*06) and (*h*07) reflections, together with the cell dimensions, are sufficient to show that the molecules again stand nearly upright on the (001) plane. Much the strongest reflection from the crystal is given by