the outer diffuse line of photograph (2) has almost disappeared in (3) and cannot be distinguished in any of the remainin gphotographs.* Further, measurements show that as the crystal size decreases, the basal plane (002) spacing increases, while the (100) spacing decreases at a lesser rate. This general trend can be seen in the photographs. Such changes of spacing had already been noticed,[5] but we think the present series of photographs gives rather a convincing demonstration of the gradations between a truly crystalline substance and one which would formerly have been called amorphous. It must also be remembered that the shape of the ultimate crystallites of the polished surface will have a bearing on the relative intensities of the bands.

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* The line referred to is positioned beneath the arrow at the top of the figure.

Mechanism of Racemisation

IN some work shortly to be published, we have shown that the racemisation of Rochelle salt by caustic soda is accompanied, and probably conditioned, by complex formation. It was previously observed by Thomsen,[1] and confirmed by Winther [2] and by ourselves, that the rotation of sodium tartrate is reduced by the addition of alkali. We have, therefore, in continuation of our work on racemisation, investigated the behaviour of the specific rotation of Rochelle salt with increasing concentrations of alkali, and we find that the specific rotation of Rochelle salt eventually becomes strongly negative. In other words, the complex is itself lævo-rotatory, and the progressive reduction in the rotation is due to increasing formation of complex with addition of alkali. The rotation changes sign at an alkali concentration of 10 *N* caustic soda (approx.). It should be stressed that these changes of rotation are prior to any racemisation, in the ordinary sense of the term, the rotations being quite stable in the strongest alkali, provided the solutions are kept at room temperature.

If, as we suppose, the complex is produced by the entrance of sodium atoms in place of the hydrogens of the radicle OH-groups, it appears that interchange of groups takes place, immediately on dissolving in alkali, if we accept the usual hypothesis of the mechanism of racemisation. On this view, the subsequent process of heating to produce racemisation is merely one of stabilisation to prevent the converse interchange of groups on acidification. This view meets with the following difficulties: (1) it is difficult to see in what this process of stabilisation consists; (2) under certain conditions, the heating should lead to an inversion, and not a racemisation. In our opinion, the stereochemical conception of optical activity as a static phenomenon is not entirely satisfactory.

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Measuring the Surface Area of Living Animals

A NEW method of estimating the surface area of living animals used in metabolism work seems likely to be of interest to many biological workers outside the agricultural sphere. Such a method has recently been developed by me in this laboratory.

Although the animals immediately concerned are pigs, the method is applicable generally to all animals not encumbered with a thick shaggy coat, and consists, essentially, in the estimation of the approximate value of the integral $\int P dx$ over the surface of the animal, where P is the perimeter in a plane perpendicular to the axis of x. In the case of pigs, it appeared satisfactory to take $P = k\pi(a + b)$, assuming the cross section elliptical for the head and body. Here k is a constant which indicates the departure from perfect ellipticity and varies somewhat in value at different parts of the body, while a and b have their usual connotations in the approximate formula for the perimeter of an ellipse. The approximate integration is then made by Simpson's rule, the values of the ordinates a and b for different values of x being read off directly from scale photographs, one taken from the side and the other from directly above the animal. The ears, legs, and tail are estimated separately.

A consideration of the various corrections required and of the errors involved leads to the conclusion that the total error in the method, when all precautions are taken, amounts to not more than 2·0-2·5 per cent, varying a little with the individual animal, in the case of pigs.

For other animals, the constant k and the errors would have to be determined, but there seems reason to suppose that—except perhaps in the case of human beings, for whose superficial area a mass of data is available—a very considerable increase in accuracy may be expected by the employment of the method outlined, in preference to the use of empirical formulæ depending on weight, height, length, or any or all of these. Experience shows that such formulæ are all liable to errors of the order of 10 per cent when applied to animals of the same species other than the ones actually used by the experimenter in determining the formula.

A full account of the method will appear in the April issue of the *Journal of Agricultural Science*.

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Crystal Structure of β-Zirconium

FROM the temperature variation of the resistivity, the thermal dilatation and the thermionic emission, C. Zwikker [1] has deduced that zirconium is transformed into another modification between 1150° K. and 1430° K. Quite recently, the transition point was accurately measured by R. Vogel and W. Tonn [2] from a study oι the cooling curve. They found it to be $862° \pm 5°$. The crystal structure of the high temperature modification (β-zirconium) has been determined by us to be cubic body-centred, with two atoms of the metal in an elementary cube, the side-length of which at a temperature in the neighbourhood of the transition point is 3·61 A. The experimental details and the high temperature vacuum camera used will be described elsewhere (*Z. anorg. allgem. Chem.*).

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[2] *Z. anorg. allgem. Chem.*, **202**, 292; 1931.