which is accessible to the hydrogen ions, and the effect of different methods of treatment of the metal surface on both these factors can be studied.

It is probable that the catalytic activity of a surface depends mainly on the first few atomic layers, and it is the nature and configuration of these surface atoms which are of most interest in contact catalysis. It would seem possible that the electrolytic method can give some information as to the 'area' and properties of these surface atoms. In the interference method, the metal is heated in oxygen until an oxide layer is formed of sufficient thickness to be visible by interference colours. Making assumptions as to the optical properties of the surface and the chemical composition, density, and homogeneity of the oxide layer, its 'area' can be calculated. This method, which has been developed by Constable (*Proc. Roy. Soc., A*, 119, 197; 1928), is a valuable one, capable of giving interesting information of the structure of thin metallic films, but since it necessarily involves the destruction of the metal surface to a depth of some thousand atoms, the information it can give as to the 'area' and configuration of the initial surface atoms is limited. Also, since it disregards the fine structure of the metal surface (inequalities less than 10^{-5} cm. being ignored), it is to be expected that it would give a value for the 'area' which is less than that of the metal surface accessible to hydrogen ions from solution, and experimentally this is found to be the case. The surface which has been measured by the oxidation method is nickel, and the 'area' found for the activated metal varies from 1.3 to 4.5 times its apparent area. By the electrolytic method the 'accessible area' of rolled metal may be from two to five times its apparent area, for sand-papered metal approximately ten times, and in the case of nickel, activation by alternate oxidation and reduction causes an increase to forty-six times its apparent area.

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Vitamin-D and Iso-Ergosterol.

IN connexion with the problem of the constitution of vitamin-D, the following comparison of the absorption spectra of irradiated ergosterol and of unirradiated iso-ergosterol is of interest.

Fig. 1 gives the photometric curves¹ of the spectra of (a) 0.01 per cent alcoholic solution of ergosterol,

FIG. 1.

irradiated in such a manner that the absorption in the region of 270-300 μ has disappeared, and has given place to a rather strong absorption with a maximum at about 247 μ . This phenomenon is shown in the literature to be characteristic for the formation of

¹ It must be noted that in the curves (Fig. 1) only the transmission of the photographic plates in relation to the wave-length is given, and not the absorption coefficients themselves. These will be published in due course, when the whole material has been worked out.

vitamin-D.^{2,3} (b) 0.008 per cent alcoholic solution of iso-ergosterol.

The absorption spectra were taken with a discharge tube emitting the continuous hydrogen spectrum as light-source. When the absorption tray is filled with alcohol, this light-source gives with our spectrograph and plates an absolutely constant blackening of the plate in the region 300-245 μ . For shorter wave-lengths the blackening falls off, first slowly, then more quickly, in proportion as the sensitivity of the plate diminishes. A comparison of the two curves shows immediately that they have the same character. This is clear from the similar shape of their basis-curves. Only curve (a) shows in addition three little peaks at wave-lengths 262, 250, 242 μ . This is a very interesting fact, as two of these bands, at 262 and 250 μ , exist already in the absorption spectrum of unirradiated ergosterol. This is shown by Fig. 2, which gives

FIG. 2.

the absorption coefficient of unirradiated ergosterol as a function of the wave-length. In this figure these two bands are clearly visible. These bands, contrary to the three longer bands of unirradiated ergosterol, do not decrease in strength by irradiation.

These facts suggest the following hypothesis: the ergosterol has two types of absorption bands, connected with different parts of the molecule. By irradiation such that vitamin-D is formed, the first system ($\lambda_1 = 293$, $\lambda_2 = 281$, $\lambda_3 = 270$) makes way for the characteristic absorption band of iso-ergosterol, which would mean that the corresponding part of the molecule undergoes the same change in constitution by irradiation as by the transformation of ergosterol into iso-ergosterol by the chemical method of Reindel.⁴ Another part of the molecule obviously does not change its constitution. This follows from the permanence of the second system of bands ($\lambda_4 = 262$, $\lambda_5 = 250$). The meaning of the peak at $\lambda_6 = 242$ μ is not yet elucidated.

Like vitamin-D, the iso-ergosterol remains unchanged by irradiation with ultra-violet light of wave-length longer than 270 μ , and is destroyed by light of wave-length of about 250 μ , as is shown by the disappearance of the absorption bands.

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² For example, Heilbron, *NATURE*, vol. 120, p. 617; 1927.

³ A study concerning the change in the absorption spectra of ergosterol and other substances by irradiation with different wave-lengths is in progress, and will shortly be published in full.

⁴ Reindel, *Lieb. Ann.*, vol. 452, p. 34; 1927.