from a maximum at the minimum sparking potential to a minimum at the final sparking potential.

After considering a number of explanations of the phenomena, the following was adopted:

(1) The helium rapidly becomes pure, so that only slight traces of foreign gases remain, a fall of v occurs to a minimum, and the properties of the gas then remain almost constant.

(2) The gas layer on the surface of the cathode undergoes slow change, probably by evaporation of the surface gas molecules into the helium and final disappearance in the charcoal. This slow change of the cathode surface diminishes progressively its photoelectric emissivity, and increase of v_c occurs until the modification of the cathode has attained equilibrium under the existing conditions.

It was determined, for various pressures, that throughout this region the graphs showing the relation between the corresponding values of v_c and P were smooth curves, and the relation between log $1/P$ and v_c was either linear or of slightly curved form. The quantitative agreement with the equations given in the above mentioned paper was good. We may conclude, therefore, that the results give strong evidence in favour of the photoelectric theory of sparking potentials.

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Sept. 14.

Sub-Grain Boundaries in Nickel.

REFERRING to the communication of Messrs. C. J. Smithells and H. P. Rooksby in NATURE of Aug. 13, p. 226, concerning their own and Mr. F. S. Tritton's observations on sub-grain boundaries in tungsten

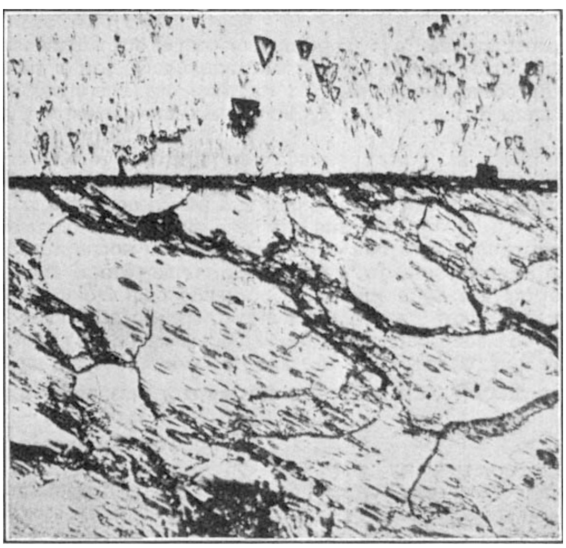

FIG. 1.—Photomicrograph of nickel, deeply etched in concentrated nitric acid. ×200.

and iron, it may be of interest to record that we have observed a similar structure in nickel, as illustrated in the accompanying photomicrograph (Fig. 1). This particular specimen was melted in an atmosphere of hydrogen, cooled rather slowly until below the solidification point and then somewhat more rapidly to room temperature.

The micrograph shows portions of two large grains, with a main grain boundary running parallel to one edge of the photograph. Sub-boundaries may be seen in the upper grain. Deep etching has resulted in a number of etching pits which are seen to be uniformly oriented within the main grains, thus confirming the observations mentioned above. It will also be noted that the sub-grains have a slight elongation (suggestive of cold-working) parallel to the direction of the etching pits.

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Aug. 25.

Poor Common Salt!

"SOME books are lies frae end to end," says Burns. Scientific (save the mark) speculation would seem to be on the way to this state! Thus on p. 405 of NATURE, of Sept. 17, in a letter on Prof. Lewis's light corpuscles, the statement is made by the writer, that a 'speculation,' by Prof. Lewis, about the quantum, "is repugnant to common sense." Again, on p. 414, Prof. W. L. Bragg asserts that "In sodium chloride there appear to be no molecules represented by NaCl. The equality in number of sodium and chlorine atoms is arrived at by a chess-board pattern of these atoms; it is a result of geometry and not of a pairing-off of the atoms."

This statement is more than "repugnant to common sense." It is absurd to the n . . .$^{\text{th}}$ degree, not chemical cricket. Chemistry is neither chess nor geometry, whatever X-ray physics may be. Such unjustified aspersion of the molecular character of our most necessary condiment must not be allowed any longer to pass unchallenged. A little study of the Apostle Paul may be recommended to Prof. Bragg, as a necessary preliminary even to X-ray work, especially as the doctrine has been insistently advocated at the recent Flat Races at Leeds, that science is the pursuit of truth. It were time that chemists took charge of chemistry once more and protected neophytes against the worship of false gods: at least taught them to ask for something more than chess-board evidence.

HENRY E. ARMSTRONG.

Solution of the Equation sin θ/θ = c.

AN approximate solution of the equation $\frac{\sin\theta}{\theta}=c$, where $c \longrightarrow 1$, may be got in the following manner. By putting $\sin\theta=y$, transform the equation to $\frac{\sin^{-1}y}{y}=\frac{1}{c}=K$ say. The approximate solution of this equation is given by $y_a=8\frac{\sqrt{(3K-3)(3K+5)}}{(3K+1)^2}$ which can be evaluated by logarithms. Using $\sin\theta_a=y_a$, we can find θ_a, an approximate solution of $\frac{\sin\theta}{\theta}=c$. If θ_a be in the neighbourhood of 5° we subtract 1″ to get the answer to the nearest second. If θ_a be less than about 3°, the value of θ_a will give us the answer to the nearest second.

In any case, the significant figure of the error (E) may be got by using $E \doteq \frac{3\epsilon}{A}\left(-\frac{1}{2}+\frac{1}{Ay_a^2}\right)$ where

$$\epsilon=\frac{(\sin^{-1}y_a)^5}{4\,\underline{|5}},\ A=\frac{3K+1}{4}.$$

The true value (y) can then be got by using $y_a-y=E$.

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