Since there is no component of the force parallel to the edge of the pole piece, we have as in the optical case,

$$\sin(\theta-\delta)v_B=\sin\theta v_A,$$

$$\frac{\sin\theta\cos\delta-\cos\theta\sin\delta}{\sin\theta}=\frac{v_A}{v_B}=\frac{\sqrt{\frac{2E}{m}}}{\sqrt{\frac{2}{m}(E+\mu H)}},$$

where μ is the Bohr magneton.

Since δ is small

$$\delta=\left(1-\frac{1}{\sqrt{1+\frac{\mu H}{E}}}\right)\tan\theta.$$

If the ratio $\mu H/E$ is small

$$\delta=\frac{\mu H}{2E}.\tan\theta.$$

For a distance l, the total deviation will be

$$\Delta=\delta l=\frac{\mu H}{2E}.l\tan\theta.$$

What is of experimental importance in the final equations is that the deviation depends on the value of the homogeneous field only, which enables one to dodge the serious technical difficulties involved in determining the inhomogeneity of a magnetic field in a small region.

As a numerical example: if l be 10 cm., $H=10^4$ gauss, $\mu=1$ Bohr magneton, $0{\cdot}92\times10^{-20}$ gauss cm., E the average energy for 0° C., and $\theta=80°$ (app.), then Δ is approximately 0·5 mm., a conveniently measurable deflection.

The above considerations also apply to the case of an electric field; here a parallel plate condenser takes the place of the flat pole pieces. One can also generalise the above procedure and construct analogues of prisms, etc.

A complete discussion, including an experimental investigation, will be published in the *Zeitschrift für Physik.*

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Photochemical Union of Hydrogen and Chlorine.

SHORTLY before the close of 1927 we finished some experiments, which had extended over about two and a half years, on the photochemical union of hydrogen and chlorine. Circumstances have prevented publication until now, and may impose a still further delay. We therefore would wish to make known certain of our results, particularly as we think they will prove of interest to other workers in the same field.

Our attention was directed towards two main points—the effect of intensity and that of wave-length, using monochromatic light in both cases. With regard to the former, we need only say that our results are in agreement with those obtained earlier by Mrs. M. C. Chapman and with those published after the commencement of our experiments by Kornfeld and Steiner and by Marshall. The effect of wave-length on quantum efficiency was, however, surprising. We worked with moist electrolytic gas, employing the Bunsen-Roscoe technique and used the quartz-mercury lamp lines at (*circa*) 546, 436, 405, 365, 313, and 260 $\mu\mu$, separating these so far as possible by means of filters. Four of the latter let through less than one per cent of foreign light, and the only serious uncertainty arose with the filter for 260 $\mu\mu$. The incident intensities, as also the amount and nature of foreign light in the beams used, were determined by thermopile measurements, and the absorbed intensities calculated from the data of von Halban and Siedentopf. The result was that we found the quantum efficiency to rise from 546 $\mu\mu$ to 405 $\mu\mu$, and then, as the frequency was increased, to fall off to 260 $\mu\mu$. The actual (relative) figures are as follows:

Wave-length	260 $\mu\mu$	313 $\mu\mu$	365 $\mu\mu$	405 $\mu\mu$	436 $\mu\mu$	546 $\mu\mu$
Quantum efficiency	0·10	0·49	0·53	1·00	0·67	0·22

The figure for the first group of lines could only be determined very roughly, but certainly did not exceed fifty per cent of that obtained for the same gaseous mixture, with practically monochromatic 436 $\mu\mu$ radiation. The sensitivity of the gas used in the various experiments corresponded to a yield of the order of 200,000 molecules of HCl per quantum of blue light absorbed. It showed no induction period, but gave a marked Draper effect during the first instants of insolation.

Experiments carried out at 19·7° and at 25° showed the relative temperature coefficients of the quantum efficiency to increase slowly, but unmistakably, with wave-length between 313 $\mu\mu$ and 436 $\mu\mu$. Other experiments in which two 'monochromatic' beams were allowed to act simultaneously gave a velocity equal to the sum of their separate effects, in disagreement with work of Padoa, but in agreement with the conclusion to be drawn from the experiments on the effect of intensity.

It is difficult to explain our main results without recourse to *ad hoc* hypotheses, of which we have considered many. To two points, however, we would direct attention. The relative efficiencies found for the 436 $\mu\mu$ and 260 $\mu\mu$ rays are in agreement with the experiments of Heymer (1927), whilst the definite effect of the mercury green line (most workers seem to assume, on insufficient experimental evidence, that it would be inactive) is in accord with recent work of W. Taylor.

Further experiments, using spectrally dispersed light, are now being started in this laboratory.

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Diffraction of Electrons at Ruled Gratings.

IN June of last year (*Proc. Phys. Soc.*, vol. 40, p. 284) I made a preliminary announcement of an experiment on the diffraction of electrons from a ruled grating in much the same way as has been done with X-rays. In a recent publication summarised in NATURE of Jan. 5, p. 29, E. Rupp has published results of an investigation on this subject, using a method very similar to my own, in which he obtains diffraction images on one side of a reflected line, which yield a value of the equivalent wave-length in good agreement with the de Broglie value. In view of the immediate interest in experiments of this type, I give below the results of a preliminary experiment which I obtained in December last.

Electrons from a coated filament were 'collimated' and sent at a glancing angle of the order of 1° on to a ruled grating (speculum). A series of experiments verified that electrons, but no light, were falling on the grating, and a photographic record was obtained which clearly showed a diffracted line on *both sides* of the direct reflected line. Any doubt as to this