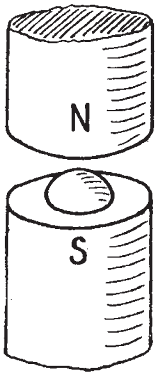
Use of a Magnetic Field in Detecting Corrosion Currents

WHEN a drop of dilute potassium chloride solution is placed on a horizontal sheet of freshly abraded iron, corrosion occurs at the centre of the drop, but the periphery remains unattacked[1]. This phenomenon is commonly ascribed to electric currents flowing between the (well-aerated) peripheral zone as cathode and the (less well-aerated) central zone as anode. In several analogous cases, such as partly immersed plates of metal, the electric currents have been measured and found to be sufficiently strong to account for the whole of the corrosion observed[2]. The study of the currents flowing in drops has been somewhat less direct, and the following experiment may possess general interest.



A powerful electromagnet is provided with two iron pole-pieces, the air gap being a few millimetres across (see diagram). A drop of potassium chloride, or similar salt solution, placed on the lower surface, is found to rotate when the magnetic field is turned on; the direction of rotation changes from clockwise to counter-clockwise when the polarity of the field is reversed. The rotation is best observed by the use of dark-background illumination; the light (suitably filtered to eliminate heat rays) arrives from the left, and the observations are made from the front by means of a lens or microscope. The observation of the movement depends upon the presence of the small dust particles commonly present in water which has not been specially prepared.

From the velocity of rotation, a rough estimate of the strength of the current flowing can be obtained in the following way. A drop is placed in the gap of the magnet, in such a way that its centre rests on a small circular electrode and the periphery on a ring electrode of platinum wire. An E.M.F. is applied between the two electrodes and the current flowing is measured directly. The relation between current and rotation velocity can thus be obtained, and the results used for obtaining the strength of the current flowing in the main experiments.

In other experiments, arrangements were made for the replacement of air by nitrogen. This replacement caused the rotation of the drop to become very much slower—confirming the explanation given above.

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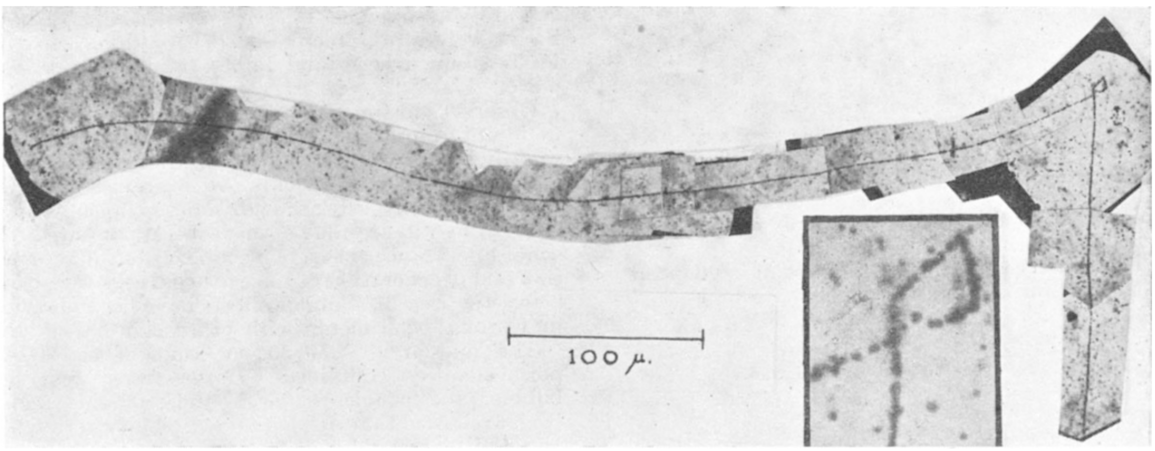
[1] Evans, U. R., *J. Soc. Chem. Indust. Trans.*, **43**, 315 (1924).

[2] Evans, U. R., and Hoar, T. P., *Proc. Roy. Soc.*, A, **137**, 343 (1932). Evans, U. R., and Agar, J. N., *J. Iron and Steel Inst.*, **141**, 221 P (1940).

An Unusual π—μ Decay Track

THE accompanying photograph shows an event observed in an *N.T.4* plate exposed for several hours at an altitude of some 90,000 ft. in balloon flights made recently at Bangalore. The heavier track enters the emulsion from the air, and gives rise to the lighter track after a path of 535 μ. The lighter track has a range of 571 μ and ends in the emulsion. The event can be identified with confidence as an example of π—μ decay. The grain densities are also consistent with this explanation.



A remarkable feature of the event, however, is the sequence of three large-angle scatterings near the end of the π-track. The μ-track originates at a distance of 2 μ from the third scattering, and passes slightly underneath the π-track, thus forming a closed loop. The inset photograph shows the loop on a larger scale. We have not previously observed the formation of a closed loop by scattering, and the event seems sufficiently curious to be worth recording.

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