These facts have suggested (*a*) preliminary abrasion, followed by (*b*) the etching away of the 'shattered' metal which is difficult to render passive, and finally (*c*) treatment in a solution containing chlorides and chromates in amounts adjusted to eat away specially susceptible spots whilst leaving the remainder passive. (On pure iron, where there are no chemically different spots, chloride-free chromate gives almost equally good results.)

After such treatment, specimens of iron or mild steel, 1·8 cm. square, have been preserved in various natural waters, and have only produced a rusty colour in the water after periods of the order of 100 times those required with untreated metal. Thus soft moorland water, which becomes rusty after about an hour's contact with untreated metal, remains clear for several days if the metal has first been treated; harder waters from chalk sources, which acquire a rusty tint within a day from untreated metal, have remained unchanged for some months in contact with treated metal. But the 'expectation' of escaping corrosion decreases with the specimen-size, and, although encouraging, the observations are not thought to possess immediate technical importance, especially as the treatment does not prevent rusting by a polluted atmosphere.

The behaviour of the passive iron to scratching is very interesting. Iron covered with a *visible* oxide scale by heating and scratched locally before immersion often suffers intensified corrosion, since the oxide-scale acts as cathode of a cell which concentrates anodic attack on the small area of exposed metal; but a specimen of iron, rendered passive and then engraved with a scratch in the Mears-Ward machine[4] (66 tons/sq. in.), has remained in Cambridge water for three months without appreciable change (similar iron not rendered passive produces rust within a day). A possible explanation—suggested by studying films transferred to celluloid, as described elsewhere[5]—is that, whilst the engraving of a scratch line causes a *thick* film to crack off, exposing the iron, it tends to press a *very thin* film down into the groove, so that the metal remains largely covered. Some interruption of the film is certainly unavoidable, but this will not necessarily cause corrosion if the interruptions are very small, since the anodic current density may then reach the value needed to restore passivity; the largest gap which can be tolerated will depend on the composition of the water.

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Negative Thixotropy

AQUEOUS solutions of ammonium oleate are strongly elastic. If given a rotary motion and then allowed to come to rest, the rotation is in part retraced before they do so. In 1926, Hatschek and Jane[1] examined these solutions in a Couette-type viscometer. They found, *inter alia*, that when the outer cylinder was rotated at a constant angular velocity, the torque on the inner one, after a short period of normal magnitude, increased to an irregularly fluctuating value many times greater. After a period of rest, the behaviour was repeated. It appeared that a gelatinous structure was actually built up by the process of shear, and dissipated again at rest. The subsequent discovery[2] that the anomalous increase of torque was associated with the onset of turbulence distracted attention[3] from this first conclusion. It seems probable, however, that the turbulence itself, also anomalous and of abnormal appearance[2], was another result of the structure built up rather than the direct cause of the increased torque.

Solutions of many of the newer paraffin chain salts also show the phenomenon of elastic recoil, and in more pronounced degree, and similar behaviour in the Couette viscometer. The observations now referred to were made mostly on a 0·02 per cent solution of the copper salt of cetyl-phenyl-ether sulphonic acid at 80–90° C.

A very simple experiment demonstrates what may be called the 'negatively thixotropic' behaviour. A slow stream of air bubbles of suitable size is introduced at the bottom of a large beaker full of solution. They rise in normal manner and in normal time (for water) if the solution is undisturbed. If the solution is now gently stirred round, their upward course takes many times as long and is extremely irregular. The bubbles frequently collect in small clusters and, whether single or in clusters, they are seen to halt at, or be diverted round, invisible barriers. About a minute after the stirring is stopped, the normal behaviour is almost completely restored.

Further evidence is found in experiments on flow through plugs of fibrous material, for example, glass wool, cotton wool or (at 60°) wool felt. If a pressure difference is applied suddenly, after a period of complete rest, the flow is at first about as rapid as with water, but quickly falls to a steady value only a small fraction of that obtaining initially. Pressure differences in excess of a somewhat critical value cause permanent rapid flow. The smaller the applied pressure difference the smaller is the volume passed before the limiting slow flow is reached, and, after attainment of this limiting flow in one direction, immediate reversal of the pressure difference (keeping its magnitude the same) simply reverses the flow at the limiting value, the initial rapid stage being eliminated.

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Crystal Structure of Succinic Acid

THE cell dimensions of the low-temperature form of succinic acid have been found to be $a = 5{\cdot}10$, $b = 8{\cdot}88$, $c = 7{\cdot}61$ A., $\beta = 133°\ 37'$, in agreement with those found by Yardley[1]—with other choice of *c*-axis—and Dupré la Tour[2]. The space group is $C_{2h}^5 - P2_1/a$. The cell contains two molecules; as the general atomic position of the space group $P2_1/a$ is 4, this leads to the conclusion that the molecule has a centre of symmetry.

The crystal shows pronounced fibre cleavage along the *c*-axis, this being also the direction of the largest refraction index. These facts indicate that the