

$K_2S_2O_8$, with 2 to 3 per cent. KOH. The persulphate is hydrolysed, according to the equation

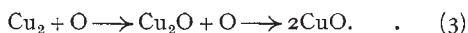


The excess alkali neutralises the acid salt and prevents the solution from becoming acid. Investigations on the velocity of decomposition of persulphate solutions (Green and Masson, J.C.S., 1910, 97, 2086; S. E. Sheppard, *Phot. Jour.*, 1921, 61, p. 454; G. I. Higson, J.C.S., 1921, 119, p. 2048) have shown that the reaction is monomolecular with regard to persulphate, so that equation (1) probably represents the course of the reaction, and atomic oxygen is liberated. The initial production of atomic oxygen is in agreement with the oxidation potential of persulphate solutions.

The simplest representation of the blackening of copper by persulphate would be



but this undoubtedly only represents the initial and final results. That a more complex process occurs appears to be indicated by the structure of the oxide layer. This is formed as a soft velvety pile, which is not removed by gentle rubbing, but consolidates to a smooth and semi-lustrous layer. A further refinement of the oxidation process is to suppose that cuprous oxide is first formed; it has already been pointed out that the lattice structure of cuprous oxide is nearer that of copper metal than is that of cupric oxide. Hence we may write



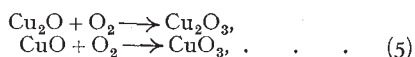
When the metal is slowly lowered into the persulphate solution, it is exposed for a longer time to the air: solution interface. This is the only difference in condition in the two cases. It appeared to me that concentration of molecular oxygen in this layer might be causing the interference. Protection of the surface, as by holding a glass rod against it, while passing the interface, was enough to remove the interference, the protected part blackening normally. Again, if a little antoxidising solution, as hydroquinone-sulphite of soda, were allowed to trickle over the metal just as it entered the persulphate solution, the blackening was of course at first delayed, but soon took place with full vigour. Finally, electrolytic generation of hydrogen at the interface also overcame the interference.

Molecular oxygen is of course accumulating at the interface from the discharge of $O + O \rightarrow O_2$ produced by the hydrolysis of the persulphate. My tentative explanation of the oxygen interference was that cuprous peroxide is formed:

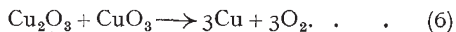


and that this paralyses the reaction, a passive layer being formed.

In line with Mouren's work, it may be possible that both cuprous and cupric peroxides are formed:



and that these decompose each other, with mutual reduction:



Be that as it may, the facts appear to demonstrate another case of the impedance of oxidation by oxygen.

S. E. SHEPPARD.

Research Laboratory,
Eastman Kodak Company,
Rochester, N.Y., September 25.

NO. 2921, VOL. 116]

The Adult Form of the "Harvest Bug."

THE adult form of the larval mite known as the "Harvest Bug" (*Leptus autumnalis* Shaw), which causes so much annoyance in many rural districts at this time of the year, has long been sought for. In the middle of August, Prof. F. V. Theobald and Mr. C. W. Goode, of Wye, sent me three chickens heavily infested with this larval mite. From these larvæ I have succeeded in rearing an adult mite closely allied to *Trombicula*, Berlese, and resembling that genus in having a deep constriction behind the anterior pairs of legs, but more elongated in form and with the setæ on the cephalothorax shorter and differently shaped. I propose the name *Trombicula* (*Neotrombicula*) *autumnale* for this adult mite, *Neotrombicula* being a new subgeneric name. The name *Leptus* was created by Latreille for *Acarus phalangi* (= *Achorolophus ignotus* Oudemans), now referred to the family Erythraidæ, and should not be used for the "harvest bug," which belongs to the family Trombididæ. S. HIRST,

British Museum (Natural History),
London, S.W.7, September 26.

Gibbs' Phenomenon in Fourier's Integrals.

PROF. CARSLAW has raised, in *NATURE* of August 29, p. 312, a point which has been interesting me during the past few months. In addition to the case of Fourier's integral which he cites, I have noticed that Hankel's integral

$$f(x) = \int_0^\infty J_\nu(xu) u du \int_0^\infty J_\nu(tu) t f(t) dt,$$

and Titchmarsh's integral¹

$$f(x) = \int_0^\infty H_\nu(xu) u du \int_0^\infty Y_\nu(tu) t f(t) dt,$$

where $H_\nu(z)$ is Struve's function, possess Gibbs' phenomena at points of discontinuity.

This can be shown by a method similar to that given by Prof. Carslaw, using the asymptotic forms for the functions concerned where necessary.

I may add that in the case of Hankel's integral this throws considerable light on the similar problem in the case of Fourier-Bessel series.

RICHARD G. COOKE.

5 St. Loo Mansions,
Chelsea, S.W.3.

The "Kennelly-Heaviside" Layer.

EVERY radio engineer is familiar with what is called the "Heaviside Layer" and its supposed functions. I find, however, that the hypothesis of an electrically conducting stratum in the upper air was clearly enunciated in an article by Prof. A. E. Kennelly, of Harvard University, published in the *Electrical World and Engineer* of New York on March 15, 1902. The official date of Heaviside's disclosure of his hypothesis is December 19, 1902. About the same date H. Poincaré, A. Blondel, and C. E. Guillaume made similar hypotheses. If names are to be attached to this hypothetical layer it should be called, in equity, the "Kennelly-Heaviside" layer, a name which is beginning to be used in America.

ALEXANDER RUSSELL.

Faraday House,
London, W.C.1.

¹ E. C. Titchmarsh, "Extensions of Fourier's Integral Formula to formulae involving Bessel Functions," *Proc. London Math. Soc.* (2), 23 (1925), xxii. (Records for Jan. 17, 1924.)