Further details of the method and some biological applications will be published elsewhere.

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PHASE BOUNDARY POTENTIALS OF NICKEL IN FOREIGN ION SOLUTIONS[1]

Sir:

An investigation was started early in 1947 concerning the phase boundary potentials of inert metals in contact with solutions initially free from the common metal ions. The study of such systems, which remain relatively free from common ions, might contribute to a better understanding of the initial processes which induce corrosion of the metal. Our approach aims at very careful control of all experimental factors, since most metals show a greater or lesser tendency to interact with electrolyte solutions.

In a recent publication by El Wakkad and Salem,[2] the behavior of the potentials of mercury in buffer solutions initially free from mercury ions is discussed. An earlier article by Tourky and El Wakkad[3] dealt with an analogous investigation of the potentials of copper in foreign ion solutions.

Since in these laboratories work already has been done on several inert metals,[4] we believe that a preliminary account of our measurements on nickel may be of interest. Stable potentials could be obtained within 5 to 15 hours in a series of potassium hydroxide solutions, and in a series of phosphate buffer solutions covering the entire *p*H range. The stationary potentials, calculated against the standard hydrogen electrode, are plotted as a function of the *p*H of the solutions (Fig. 1).

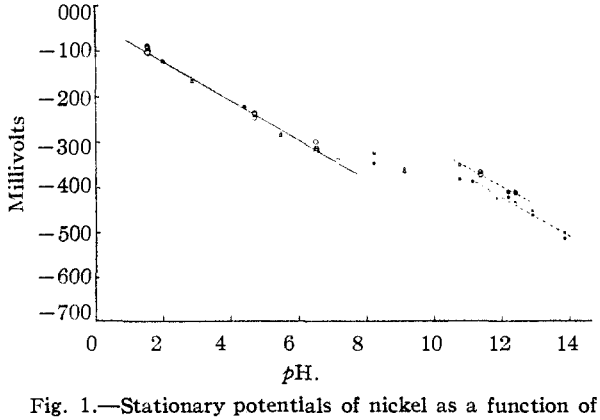

Fig. 1.—Stationary potentials of nickel as a function of *p*H in potassium hydroxide (× runs 4 and 5) and in 0.100 *M* phosphate solutions (O run XI, □ run XII, △ run XIV).

(1) This paper was presented before the General Meeting of the Division of Physical and Inorganic Chemistry of the American Chemical Society, Chicago, Ill., September, 1950.

(2) S. E. S. El Wakkad and T. M. Salem, *J. Phys. and Coll. Chem.*, **54**, 1371 (1950).

(3) A. R. Tourky and S. E. S. El Wakkad, *J. Chem. Soc.*, 740, 749 (1948).

(4) J. J. Singer, Jr., Ph.D. Dissertation, Clark University, 1949; J. H. Rosenbaum, Ph.D. Dissertation, Clark University, 1950.

Since aeration greatly accelerates the corrosion of nickel in acid media, oxygen was excluded from the half cells. Lengths of nickel wire of high purity were thoroughly cleaned and pretreated. The samples were freed from oxides and gases by induction heating first in hydrogen and then in a high vacuum. The solutions were freed from oxygen before making contact with the nickel samples. More details of the apparatus and the procedure will be given in a more extensive article. After each run the solutions were tested for nickel which might have gone into solution. The results were always negative, even in the acid phosphate solutions, unless oxygen had been admitted. The potentials were measured with a Leeds and Northrup K-2 potentiometer, using a Coleman electrometer as null point indicator.

Our graph of the nickel potentials in the phosphate buffers shows analogy with the curves obtained for copper[3] and mercury[2] in contact with a set of buffer solutions. In a more complete article we hope to discuss the interesting aspects both of an experimental and a theoretical nature.

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AN INTERMEDIATE IN THE CONVERSION OF FIBRINOGEN TO FIBRIN[1]

Sir:

When bovine fibrinogen and thrombin react in the presence of 0.4 *M* hexamethylene glycol (at *p*H 6.3, ionic strength 0.45), no clot is formed. However, the fibrinogen, whose sedimentation constant is about 9 *S*, appears to be gradually replaced by a new molecular species with a sedimentation constant of 25 *S*, which is evidently an intermediate polymerization product.[2] (All sedimentation constants given here are extrapolated to zero protein concentration.) We have now found very similar behavior with urea instead of glycol as the inhibitor. At *p*H 6.3 in 1.0 *M* urea, or at *p*H 7.5 in 2.35 *M* urea (ionic strength 0.15), sedimentation diagrams of a fibrinogen–thrombin system show, after 24 hours, two peaks; the sedimentation constant of one corresponds to that of unaltered fibrinogen, and the other is about 25 *S*.

Urea, unlike hexamethylene glycol, can in concentrated solution dissolve fibrin clots prepared in the absence of calcium and an unidentified serum factor.[3] A solution of fibrin in 3.5 *M* urea at *p*H 7.5, ionic strength 0.15, shows a single component in the ultracentrifuge with a sedimentation constant of 8 to 9 *S*; and its intrinsic viscosity is the same as that of fibrinogen, so that the fragments appear to

(1) This is paper 4 of a series on "The Formation of Fibrin and the Coagulation of Blood" from the University of Wisconsin, supported in part by research grants from the National Institutes of Health, Public Health Service. Grateful acknowledgment is made also of a grant from Eli Lilly and Company.

(2) S. Shulman and J. D. Ferry, *J. Phys. Coll. Chem.*, **55**, 135 (1951).

(3) E. Mihályi, *Acta Chem. Scand.*, **4**, 344 (1950); L. Lóránd, *Nature*, **166**, 694 (1950).