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BLOOD PROTEINS AND THEIR THERAPEUTIC VALUE[1,2]

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RECOGNITION of the role of the National Research Council in making available to Government Agencies the knowledge and advice of civilian experts in the medical sciences appears to be peculiarly appropriate at this time. I am honored to have been asked to participate in this ceremony, and to discuss blood proteins and their therapeutic value. The Blood Substitutes Sub-Committee of the National Research Council is a small group, the membership of which has changed but little from the time, many months before Pearl Harbor, when it was reorganized and charged with the responsibility of advising the Armed Forces and Government Agencies as to the methods to be employed and the products to be accumulated against military emergency or civilian disaster. Although it has carefully and critically examined the properties of every blood substitute that has been suggested, it

[1] Address delivered on December 11, 1944, at the ceremony of the award to the National Research Council by the American Pharmaceutical Manufacturers Association, New York, N. Y.

[2] The observations on which this appraisal is based involve so many fields and have appeared in such diverse publications that even a partial bibliography would be longer than this address. "A Plan for Collection, Transportation and Administration of Whole Blood and of Plasma in Warfare," by DeGowin and Hardin (*War Medicine,* 1: 326, 1941), reviews the earlier experience on blood transfusions, "The Preparation and Preservation of Human Plasma," by Strumia, McGraw, and Reichel (*Am. Jour. Clin. Path.,* 11: 480, 1941), that on the drying of plasma from the frozen state, and "The Properties and Functions of the Plasma Proteins," (*Chem. Reviews,* 28: 395, 1941), the methods available for their separation and purification. Other references are given in a more recent report on "Blood, Blood Derivatives, and Blood Substitutes" (*Proc. Am. Philos. Soc.,* 88: 159, 1944), in a series of twenty-three communications from different laboratories under the title, "Chemical, Clinical and Immunological Studies on the Products of Human Plasma Fractionation" (*Jour. Clin. Investigation,* 23: 1944), and in four clinical papers that have appeared lately (*Jour. A. M. A.,* 126: 469, 674, 680 and 944, 1944).

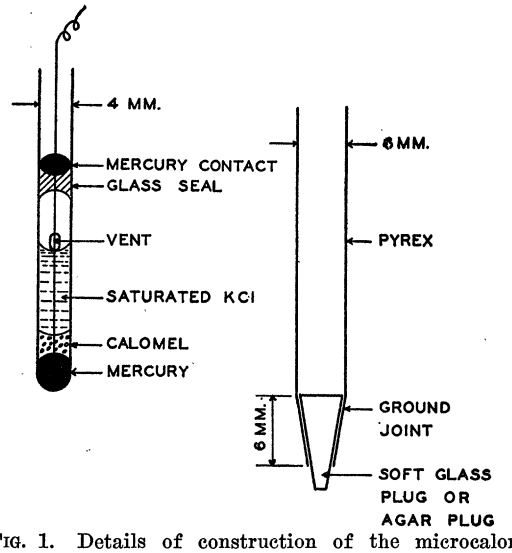

FIG. 1. Details of construction of the microcalomel electrode.

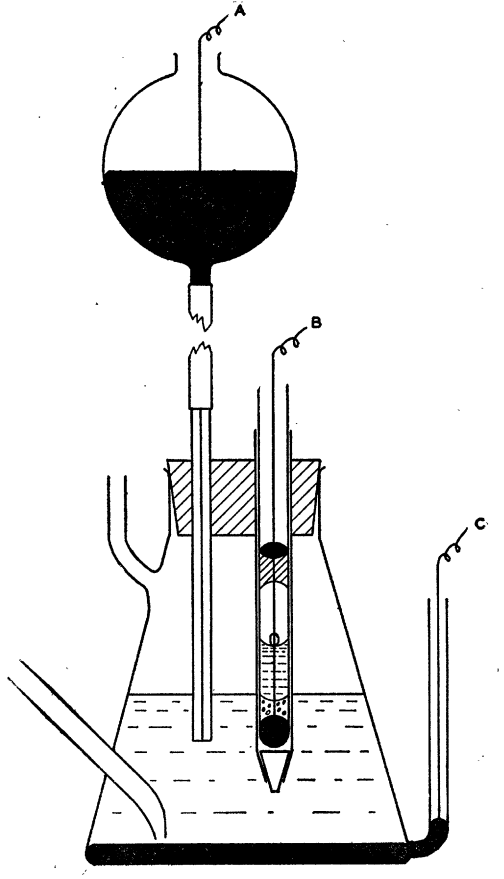

FIG. 2. Assembled electrode and cell. The half-wave potential is most readily measured by determining the potential difference between A and B at the half wave.

tive of whether a glass or agar plug was used in the microcalomel electrode.

Since the value of the internal resistance of the entire cell was only 1,500 ohms, the resistance of the microcalomel electrode and bridge alone must be less than this value. This compares favorably with the reported "several hundred ohm" resistance of the H-cell of Kolthoff and Lingane, and the 600 ohm resistance claimed for the bridge alone in the case of Hume and Harris. It is to be noted that where ground glass plugs are used, the contact surface of the plug should not exceed the length given in Fig. 1, since the resistance of the electrode will increase rapidly with the length of this surface. Where potassium chloride is detrimental to the electrolysis it is recommended that agar plugs made up to contain ions common to the supporting electrolyte be used.

In Table 1 we list half-wave potentials of various ions as measured against our electrode and the corresponding half-wave potentials recorded in various standard references. This table shows that the micro electrode gives values comparable with the values recorded in the literature.

TABLE 1

COMPARISON OF DETERMINED HALF-WAVE POTENTIALS WITH THOSE RECORDED IN LITERATURE

Ion	Supporting electrolyte	Recorded half-wave potential (V.S. Sat. calomel electrode)				Our value
		Kolthoff Lingane	Sargent (Brochure)	Majer (Chart)	Average	
Tl+	0.1N.KCl	−0.460	−0.467	−0.45	−0.459	−0.460
Cd++	0.1N.KCl	−0.599	−0.647	−0.59	−0.612	−0.605
Co++	0.1N.KCl	−1.20	−1.20	−1.22	−1.21	−1.24
Zn++	0.1N.KCl	−0.995	−1.03	−1.03	−1.02	−1.00
Ni++	1.0N.KCl	−1.10	−1.06	−1.05	−1.07	−1.15

Note: The values attributed to Majer were estimated from his chart on the Polarographic "Spectrum" of the elements. The exact conditons of electrolysis are not known in the case of the values given in his chart.

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BOOKS RECEIVED

EDDY, WALTER H. and GILBERT DALLDORF. *The Avitaminoses. The Chemical, Clinical and Pathological Aspects of the Vitamin Deficiency Diseases.* Illustrated. Pp. xi + 438. Williams and Wilkins Co. $4.50. 1944.

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