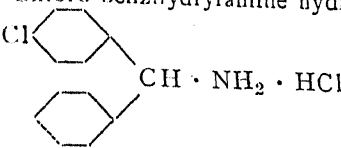
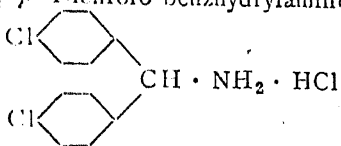
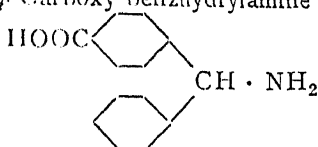
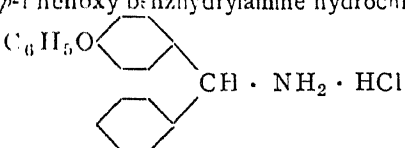
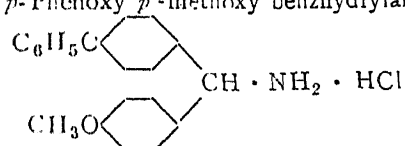
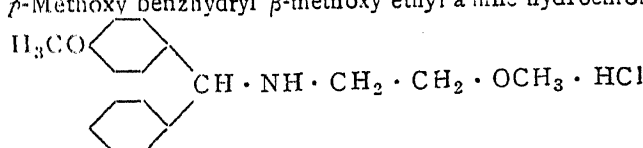
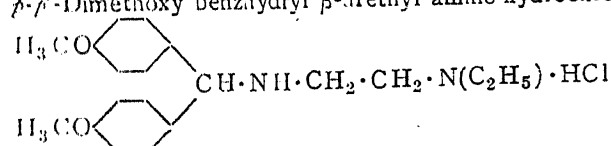


13	<i>p</i> -Chloro benzhydramine hydrochloride 	0.5	About 20
14	<i>p-p'</i> -Dichloro benzhydramine hydrochloride 	0.5	20
15	<i>p</i> -Carboxy benzhydramine 	0.1	less than 10
16	<i>p</i> -Phenoxy benzhydramine hydrochloride 	0.1	60
17	<i>p</i> -Phenoxy <i>p'</i> -methoxy benzhydramine hydrochloride 	0.1	50
18	<i>p</i> -Methoxy benzhydryl β -methoxy ethyl amine hydrochloride 	0.1	less than 10
19	<i>p-p'</i> -Dimethoxy benzhydryl β -diethyl amine hydrochloride 	0.5	20

From the above table it is clear that the following compounds are worth further investigation:—Nos. 8, 16 and 17.

Further work on the above compounds and a few more is in progress.

Our thanks are due to Dr. B. B. Dikshit, the Principal of the College who guided us throughout the work and to Prof. B. V. Bhide from S. P. College who supplied the compounds to us.

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July 11, 1949.

1. Fitzgibbon, *J.A.C.S.*, 1948, 70, 387.

PROCESSES OF SEPARATION INVOLVING DIALYSIS

IN a continuous dialysing unit involving a number of stages the operation is counter current, and the colloidal solution containing crystalloids, and water enter at the opposite ends of the system. Each stage will contain a semipermeable membrane between two cells into one of which flows the colloidal solution to be dialysed and into the other flows water for the removal of crystalloids. Such a process is analogous to multicontact processes like distillation, extraction, etc., and is sketched in Fig. 1.

Nomenclature.

G: mols of colloid flowing in the system per unit time, on a colloid-free basis.

L: mols of water flowing in the system per unit time, on a crystalloid-free basis.

Y: mols of crystalloid per mol of crystalloid-free colloid, in the colloidal system.

X: mols of crystalloid per mol of crystalloid-free water, in the water stream.

Subscripts:—1 refers to rich end streams and 2 refers to lean end streams.

Taking a crystalloid balance across a differential section of the unit shown in dotted lines, in Fig. 1.

$$G \cdot dY = L \cdot dX \quad (1)$$

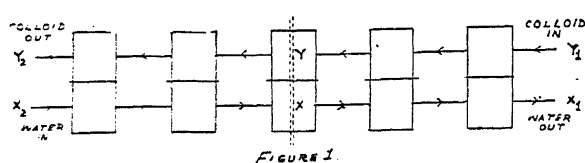


FIGURE 1.

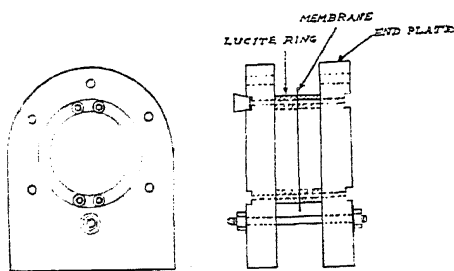


FIGURE 2

Integrating equation (1) between the variable compositions X and Y, and the terminal compositions X₁ and Y₁, we have, on the assumption that G and L are steady,

$$G \int_Y^{Y_1} dY = L \int_X^{X_1} dX$$

$$Y - Y_1 = \frac{L}{G} (X - X_1) \quad (2)$$

Equation (2) defines the operating line that relates the composition of the colloidal stream that enters any stage and the composition of the water stream leaving the same stage. If the equation of the equilibrium line relating Y to X is known then it is possible to determine the number of theoretical stages required for the separation of crystalloid from a colloid by dialysis, by the stepwise method, provided the material balance of the system can be established. Further if the over-all membrane efficiency is known the actual number of stages required for the process can be calculated. To determine over-all membrane efficiencies experimentally it would be necessary to set up a unit containing a known number of stages and dialyse known solutions such that Y₁, Y₂, X₁, X₂, L and G are all known. If the equilibrium data are available then the theoretical number of stages may be calcu-

lated by the stepwise method. The over-all membrane efficiency is simply the ratio of the theoretical number of stages to the actual number of stages.

The author has made attempts to obtain equilibrium (Y—X) data on the system albumin-water-sodium chloride, using cellophane membrane (du Pont, No. 600) stretched between two lucite rings which were components of a laboratory dialyser made by Brosites Machine Co., of New York, (details of which are provided in the *Chemical Engineering Catalog*, 1947-48, page 372 Reinhold Publishing Corporation, New York) fitted up with lucite end plates as sketched in Fig. 2. By means of orifices provided in the end plates the spaces within the rings could be filled with known solutions. One was filled with a known solution of albumin prepared by saturating blood albumin (supplied by Fischer Scientific Co., Pittsburgh, Pa.) in distilled water, filtering, and adding a known weight of NaCl to a known volume of solution. The other was filled with water. The assembled unit was stored away in a constant temperature enclosure maintained at 70° F. The solutions were analysed at the end of 24 hours, and duplicates were run and analysed at the end of 48 hours and 72 hours until constant values were obtained. The NaCl solution was analysed by argentometry while the NaCl in the presence of albumin was calculated by difference, knowing the amount of NaCl present in the colloidal solution and the amount that was present in the water compartment. The following results were obtained:

Weight fraction of NaCl in colloidal solution	Weight fraction of NaCl in water
0.00199	0.00202
.00572	.00598
.00954	.00980

The work could not be continued owing to total destruction of the laboratory by a fire accident. The author wishes to thank Dr. James Coull, Professor and Head of Department of Chemical Engineering, University of Pittsburgh, Pittsburgh, Pa., for his interest in the work and the University of Pittsburgh for providing apparatus and facilities for work. Correspondence on the work is invited.

Poona 5,
July 6, 1949.

S. L. SASTRY.