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A RATIONAL EXAMINATION OF STREAM POLLUTION ABATEMENT

By RICHARD D. HOAK

MELLON INSTITUTE OF INDUSTRIAL RESEARCH, PITTSBURGH, PA.

STREAM pollution, from all sources combined, is an extremely complex problem which has expanded gradually, largely through non-recognition of its effects or indifference to them. If it is borne in mind that the amount of pollutive substances discharged to streams has increased almost imperceptibly, in general, over many years, it is not difficult to understand how such pollution has become widespread before there has been a realization of its significance. As pollution abatement involves many conflicting factors it is desirable, from time to time, to re-examine the subject and consider its fundamentals. Numerous technical reports, treatises and results of surveys are in existence, couched in the language of the biologist, the chemist and the engineer. In this article an attempt will be made to discuss some pertinent considerations in the familiar words of the layman.

STREAM FUNCTION

The geological plan of the earth offered streams to carry away the waste products of natural processes. In conducting excess water from the land to the oceans, streams transport such a quantity of mineral and organic wastes that many watercourses support but little aquatic life and their waters are unsuitable for domestic or manufacturing uses without extensive treatment. Streams vary widely from basin to basin in their normal burden of silt, dissolved substances, organic matter and microorganisms, and the restoration of streams to their natural state by the elimina-

TABLE 1

THE INACTIVATION OF 1.0 MG. "MARFANIL" BY 300 MG. OF TISSUE SLICES AFTER 3 HOURS INCUBATION AT 37°

Tissue		Mg. N_2	Difference	Per cent. Inactivation
Rat kidney	a	0.267		
	b	0.340	0.073	
	c	0.293	0.026	65
	d	0.365	0.098	
Rat liver	a	0.245		
	b	0.322	0.077	
	c	0.317	0.072	6
	d	0.402	0.157	
Guinea pig kidney	a	0.205		
	b	0.297	0.092	
	c	0.262	0.057	38
	d	0.345	0.140	
Guinea pig liver	a	0.178		
	b	0.255	0.077	
	c	0.225	0.047	39
	d	0.305	0.127	

(a) is the value obtained from the tissue alone; (b) 1.0 mg added at the end of the incubation period (c) 1.0 mg added at the beginning of the incubation period; (d) 1.0 mg added at the beginning and then 1.0 mg at the end of the incubation period.

are several enzymes in the body which inactivate amines and possibly one of these or a still unidentified enzyme is responsible for the inactivation of the drug. Autoclaving the drug and tissue mixture of 20 pounds pressure for 30 minutes in strong acid after incubation causes no increase in the amino nitrogen, indicating that conjugation does not occur. The reaction does not proceed under anaerobic conditions.

FREDERICK BERNHEIM
MARY L. C. BERNHEIM
DUKE UNIVERSITY MEDICAL SCHOOL,
DURHAM, N. C.

FILTRATION ADAPTER[1]

THE usual technique in performing a bacteriological filtration requires that the material be passed through a bacteriological filter, such as the Berkefeld, Chamberland, Seitz or fritted glass type, which in turn is mounted on a filtrate receptacle. If the sterile filtrate, thus prepared, is to be stored for any time, it must then be transferred, aseptically, to a storage bottle. This last operation increases the danger of contamination and can be eliminated if the sterilizing filtration can be made directly into the final receptacle.

An excellent way to perform such filtrations has been suggested by Morton,[2] who combines in one piece a fritted glass filter and a suction arm. This apparatus may be united by means of a ground-glass joint to a filtrate receptacle which is an ordinary Erlenmeyer flask with a tapered male ground-glass joint.

While the filtrate receptacle in this apparatus may be used as a storage container for the sterile filtrate, it does not lend itself to this use too readily. Firstly, the taper of the ground-glass joint will not allow the use of a cotton plug or a rubber vaccine cap. Secondly, one would be required to stock a great number and variety of sizes of ground-glass jointed flasks to meet the normal requirements of a laboratory.

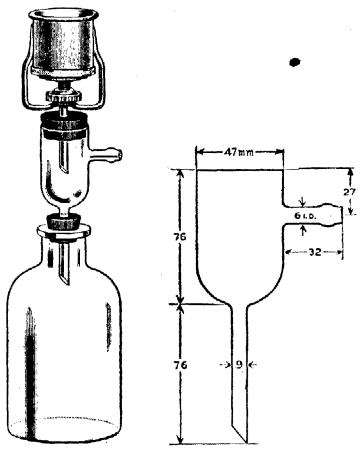

FIG. 1

Finally, this apparatus allows the use only of a fritted glass filter, the ceramic and asbestos types not being applicable.

The simple adapter illustrated above is designed to overcome these disadvantages. It will allow the use of any type of standard filter which may then be used with any type of storage receptacle, provided that this receptacle can withstand vacuum.

Thick-walled pyrex bottles suited for sterilization which are commonly used for storage of sterile liquids should serve as well for this purpose as do the usual filter flasks with side arms.

The use of this adapter makes unnecessary the attempt to mount the filter in a two-holed rubber stopper which, with small-necked bottles, is impossible and, in any case, awkward and unwieldy. The adapter is equally useful for chemical filtrations using Buchner or conical funnels.

NORMAN APPLEZWEIG
PRODUCTS DEVELOPMENT LABORATORY,
AMERICAN HOME PRODUCTS CORP.,
254 W. 31ST ST., NEW YORK, N. Y.

[1] The adapter illustrated in this article was blown by the Emil Greiner Company of New York and is available from them.

[2] H. E. Morton, *Jour. Bact.*, 47: 379, 1944.

BOOKS RECEIVED

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