37 ± 0.1° C. Several series were run; in a typical experiment the digestion times were 46, 46, 49, 50, 53, and 53 minutes (average, 49.5).

Globulin. A 5-per cent solution of bovine globulin (Armour) was prepared. The preparation and digestion of the coated lens-paper strips were the same as for albumin except that a 1-per cent trypsin solution was used. Each strip was found to be coated with 0.30 mg. globulin. In a typical series the digestion times were 8, 11, 11, 11, 12, and 15 minutes (average, 11.3).

Hemoglobin. A 2.5-per cent suspension of hemoglobin (Merck) was prepared. The preparation and digestion of the lens-paper strips were the same as for albumin except that 0.5 per cent trypsin was used. Each strip was found to be coated with 0.20 mg. hemoglobin. Digestion times in a typical series were 7, 7, 8, 8, 8, and 9 minutes (average, 7.8).

Casein. A 5-per cent solution of casein (technical) was prepared in 0.1 N NaOH. The lens paper was coated in the usual way and the casein rendered insoluble by washing with 0.1 N HCl followed by distilled water. A 1-per cent solution of trypsin was used for the digestion. Each strip contained 0.40 mg. casein. In a typical series the digestion times were 18, 18, 19, 22, and 23 minutes (average, 20).

Collagen. A dilute collagen gel (about 1 per cent) was prepared by blending with distilled water beef tendon, which had been swollen in 1 per cent acetic acid. After coating in the usual manner, the collagen was precipitated onto the lens paper by washing with saturated sodium bicarbonate followed by distilled water. An average of 0.015 mg. collagen was found on each strip. Typical digestion times by 2 per cent trypsin in a series were 9, 9, 10, 10, 10, and 13 minutes (average, 10.2).

Carbohydrates

Starch. The edge of the lens paper was coated with a boiling, 5-per cent suspension of potato starch (Baker's). Each strip was sealed with 0.43 mg. starch. The amylase used was 1.0 per cent taka-diastase (Parke, Davis, pH 6.9). Typical digestion times of a given series were 3, 3, 3, 4, 4, and 5 minutes (average, 3.7).

Pectinic acid (de-esterified). The coating agent was 2 per cent de-esterified pectinic acid.[2] It was precipitated with $CaCO_3$ followed by washing with distilled water. Each strip was sealed with 0.23 mg. pectinic acid. The digestion was carried out at pH 4.0 (acetate buffer) in 1 per cent pectinase.[3] The following digestion times characterized the series of coated lens-paper strips: 8, 10, 10, 11, 11, and 12 minutes (average, 10.3).

Lipids

Several fats were tried, but oils would not seal the two pieces of lens paper together. On the other hand, very hard fats like tristearin and diglycol stearate were found refractory to enzyme action. Soft fats such as the mixtures present in the commercial products, oleomargarine, Crisco, and Spry, were found very satisfactory.

Spry. Spry was melted and then spread on the overlapped area of the lens papers. Each strip contained 1.30 mg. Spry. Small beads, weighing 427 mg., were employed instead of the usual 830-mg. ones. The enzyme solution was a 10-per cent suspension of steapsin (Eimer and Amend) in phosphate buffer (pH 8.1) containing the detergent, Tween-20 (0.1 per cent). The digestion times were 10, 10, 11, 11, 17, and 17 minutes (average, 12.7).

Methyl stearate. The edges of the lens papers were sealed with hot, liquid methyl stearate, which solidified on cooling. Each strip contained 0.68 mg. stearate. Digestion was carried out in a 2.5-per cent filtered solution of the mold enzyme, keralin (American Cyanamid, pH 5.6). The digestion times were 34, 34, 34, 35, and 43 minutes (average, 36).

[2] Kindly furnished by Dr. Speiser, Eastern Regional Research Laboratory.

[3] Kindly furnished by the Food Technology Laboratory, M.I.T.

Summary

A rapid, simple, quantitative technique has been developed for the study of the action of hydrolytic enzymes on certain insoluble substrates. The end point of digestion is indicated by the release of a glass bead, when two pieces of lens paper sealed together by the substrate separate due to its digestion by the enzyme.

References

1. Jenkins, H. P., and Hrdina, L. S. *Arch. Surg.*, 1942, **44**, 894.
2. Kraissl, C. J., and Meleney, F. L. *Surg. Gynec. Obstet.*, 1934, **59**, 161.
3. Lion, K. S., and Sizer, I. W. *Arch. Surg.*, 1944, **48**, 120.
4. Sizer, I. W. *Ann. Surg.*, 1945, **121**, 231.
5. Sizer, I. W. *J. biol. Chem.*, 1945, **160**, 547; 1946, **163**, 145.

Method for Making Filters Transmitting the Near Ultraviolet and Absorbing Visual Light

Burgess Smith

Rochester, New York

The development of simple and inexpensive sources for the near ultraviolet light has resulted in great interest in that band of the spectrum that is transmitted by glass. Filters for absorbing the visual light either are of glass, both expensive and limited in size, or are precision gelatin filters that are also quite expensive. Preparation of filters that serve the usual experi-

mental purposes is neither difficult nor expensive and permits variations in transmission that may at times be desirable.

The greater number of dyes, particularly those approximating black, strongly absorb the range that we wish to transmit, but a combination of methylene blue, fuchsin and phosphine, all of which transmit considerably in the near ultraviolet, will make an approximate black. These can be used in a liquid cell, but it is much better to incorporate them in a gelatin film, as they are then fairly stable and very much more convenient.

To make a glass filter the use of old photographic negatives is recommended but not essential. The old gelatin or emulsion may be readily removed with a 1-per cent solution of caustic or half-strength nitric acid. Either method leaves the glass sufficiently clean so that a substratum is not necessary provided the emulsion side is marked and used to receive the new gelatin coating, which is prepared as follows:

Dissolve .4 gram of methylene blue in 100 cc. of hot water to which is added 1 drop of glacial acetic acid. Make a similar solution of fuchsin and phosphine, omitting the acetic acid. Make a 10-per cent solution of gelatin by allowing it to stand until it is swollen, and melt with gentle heat. Add 2 drops of glycerin to each 25 cc. Pipette 10 cc. of the phosphine, 8 cc. of the methylene blue, and 3 cc. of fuchsin into a cylinder, and add 19 cc. of the gelatin. Mix thoroughly and, if necessary, add 1 drop of normal butyl alcohol to break the bubbles. This amount should be flowed over an accurately leveled 8×10 glass and, when gelatin sets, this may be dried in an upright position.

One of these glasses will be sufficient when the fluorescent ultraviolet tubes are used, but it may be desirable to use two, gelatin surfaces face to face, when screening out the visual light from the mercury arc. Visual appearance of fluorescent materials with filters made in this way is comparable to the nickel oxide glass, although the transmission for a given amount of screening the visible light is not quite as good. As commercial dyes were used, it is not expected that the proportions given will produce the most efficient results unless an accurately standardized dye is used. This ratio is based on using Heller and Merz Blue 2 B Dustless, Fuchsin RTN Powder, and Phosphine 3 G 100 per cent. Of course, dyes of other manufacture can be used, and the variation can be adjusted by altering the proportions. Visually, these filters almost screen out an illuminated white cloud with a residual color of deep red, modified by a slight blue transmission. Very thin layers appear to be a rusty gray.

By doubling the concentration of the gelatin and correspondingly increasing the glycerin, it is possible to strip the film from the glass if desired. By treating plate glass with a silicone stopcock grease and polishing off the last visible trace, the gelatin film can be easily stripped merely by cutting around the margins of the plate of glass. In this way the transmission can be extended further into the ultraviolet that would be absorbed by glass.

Letters to the Editor

Some Notes on the Cancer Problem

In writing the following lines of comment on K. S. Pilcher's letter (*Science*, 1946, **104**, 167) concerning an organized attack on the cancer problem, I wish to acknowledge his well-done, traditionally constituted argument for a coordinated, well-financed research program. Certainly I do not wish to argue against a program of such highly important and humanitarian purpose. I merely wish to point out a point of view which, in my opinion, may not be basically correct.

The argument for a planned and completely coordinated cancer program on a national scale is based on the rapid results obtained in the fields of atomic fission, penicillin and other antibiotics, etc. by means of highly coordinated research efforts. However, an examination of the background of these problems shows that the rapid practical evolution was really in the region defined as "development" rather than "research" or "discovery." Thus, the rapid development of the atomic explosive was subject to the fortuitous discovery of the fission of a particular nucleus under a particular treatment, the fission occurring in a particularly desirable manner. I believe that I am correct in saying that the fundamental idea of a self-perpetuating atomic fission chain is relatively old, including the general ideas of power generation and the causation of explosive decomposition. That is to say, the principle of generation of such a reaction was seen to lie in finding a nucleus capable of producing enough of the right kind of secondary particles to carry on the chain. On the basis of knowledge in the 1930's, the finding of such a nucleus may well be called fortuitous. In the case of penicillin, too, I believe that it is correct to say that it was essentially chance that the particular conditions were accumulated simultaneously to show the antibiotic effect in a spectacular manner; once the goal was seen, the mass-development of the processes, etc. was a foregone conclusion.

However, in a field in which no clearly defined line of approach can be said to exist, it is quite doubtful that a rigidly planned program would produce results more