# THE APPLICATION OF DIAZOTYPE COLOR FILMS TO THE PRODUCTION OF PROJECTION SLIDES OF ELECTRON MICROSCOPIC MATERIAL

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In general, in the production of projection slides, one is limited to the use of standard lantern slide plates. If the original electron micrograph negatives vary in contrast, it is often difficult to produce, within an acceptable range of density, a series of slides for projection. In an attempt to overcome this difficulty, diazotype color films have been tested as an alternative to the standard lantern slide plates.

The light-sensitive chemical compounds in diazotype color films belong to a large class of benzene-derived compounds known as diazonium salts in which one of the hydrogen atoms in the benzene ring has been replaced by two atoms of nitrogen. In the presence of an alkaline agent such as ammonia, diazonium salts react with coal tar derivatives, usually phenols or aromatic amines (commonly referred to as "couplers" in this process), to form azo dyes. When a diazonium salt is exposed to ultraviolet light, it loses its nitrogen atoms and becomes converted to a colorless phenol incapable of coupling to form a dye. Today, the use of diazotype papers virtually has replaced the use of ferroprussiate papers for the reproduction of technical drawings and similar materials.

## METHOD

Projection slides of electron micrographs were prepared in the usual way, using Kodak medium lantern slide plates. Each slide was placed, emulsion side down, on top of a sheet of diazotype color film,[1] sensitive surface uppermost. The diazotype color films tested included black, magenta, red, orange, yellow, blue, green, yellow tint, and green tint. A commercial sun lamp, mounted on a tripod, was placed at varying distances above the plate and film. Trials established the optimal distance for even exposure to be 25 to 30 inches. Various exposure times were used, depending upon the diazotype color film used and upon the density of the lantern slide, and were found to be within the range of 3 to 5 minutes. Each exposed sheet of film was developed for 60 to 90 seconds in ammonia vapor. This was effected simply by placing the exposed film in a wide necked jar, in the bottom of which a sponge, soaked in ammonia, had been placed. Thus it was possible to observe the development directly. The developed film was then mounted between lantern slide cover plates prior to projection.

[1] Trade name, Technifax Diazochromes. Obtainable from Technifax Corporation, Holyoke, Massachusetts.

## RESULTS AND DISCUSSION

After numerous trials, it was found that black, magenta, and blue films gave the best results when projected. Orange, yellow, and green films were discarded since the density of color of these films proved to be insufficient for projection. The yellow and green tints (black on a background of either yellow or green) produced adequate results for direct viewing but lacked sufficient contrast for projection.

Apart from the novelty of having colored slides for projection, it is considered that diazotype color films possess certain advantages over routine projection slides. They offer a method by which one can control readily the contrast of the projection slide. Thus it is possible to prepare a series of slides similar in contrast from negatives of varying contrast and density. This has been found to be of particular advantage in preparing series in which electron micrograph negatives of both epon- and methacrylate-embedded material are present. For negatives which lack contrast, the best results are obtained by using an exposure time of 5 minutes or more to remove as much of the background as possible, without loss of detail. For negatives which are overexposed, or for negatives of sections stained with a heavy metal, one reduces the exposure time to 3 minutes or less to obtain the required contrast. By attention to the exposure time and, to a lesser extent, to the time of development, it is possible to rescue many negatives of otherwise marginal value.

I wish to thank Mr. P. Koen for technical assistance and Technifax Canada Limited for a generous supply of Technifax Diazochromes used in this study.

*Received for publication, July 3, 1962.*