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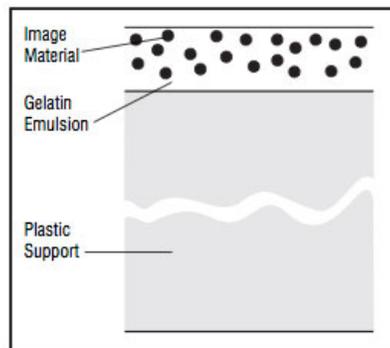
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## Acetate Film Base Deterioration - The Vinegar Syndrome

The structure of acetate film includes a support made of a sheet of transparent plastic (cellulose acetate), a gelatin emulsion coating, and an image of color dyes or metallic silver. The acetate base is susceptible to a form of chemical decay described as "vinegar syndrome" because of the characteristic vinegar odor of acetic acid which is produced by decomposing acetate. The degradation of cellulose acetate film base may also cause distortion, shrinkage, and brittleness. These chemical reactions are influenced by the storage environment (heat and moisture) and/or the presence of acidic vapors from film degrading nearby. Acid is initially generated within the cellulose acetate support layer, and from there it diffuses into the gelatin emulsion and often into the air, creating a sharp, acidic odor.



With support from NEH, the National Historical Publications and Records Commission, Eastman Kodak, and Fuji Photo Film, IPI did extensive research on film base stability using the Arrhenius approach to evaluate acetate films incubated at various temperatures and relative humidity levels. Of the properties measured after incubation, acidity generation proved to be the most sensitive indicator of acetate base decay. This discovery led to the development of **A-D Strips**, a diagnostic tool for detecting the presence and assessing the extent of vinegar syndrome in acetate film collections. IPI's research established the relationship between the storage environment and film base decay, and made possible the quantitative prediction of film life expectancy at given temperature and humidity conditions. These findings were the basis for the **IPI Storage Guide for Acetate Film**, used today in film archives throughout the world. Dr. Peter Adelstein of IPI won the Fuji Photo Film Gold Medal in 1998 for his acetate preservation research.

Acetate base decay is a continuing chemical process and film condition should be rechecked periodically. The frequency depends partly on the results of the initial survey and partly on the environmental conditions in which the collection is stored. Assuming that part of the collection has already started to decay (which is very likely), room temperature (72°F/21°C) storage areas should be rechecked at least every two to five years. Cool spaces (less than 72°F/21°C) need to be rechecked every five to ten years and cold (50°F/10°C to 41°F/5°C) even less often. Film collections kept in very cold or freezing vaults (less than 41°F/5°C) only need checking every 25 years.



Health Hazards

Close contact (touching or sniffing) severely degraded acetate and nitrate film could be hazardous to your health.

Acetic acid and other acidic products associated with film decay can produce contact burns and skin and mucous-membrane irritation. Dizziness and light-headedness can occur.

Wear protective gloves and work in a well ventilated area when handling degraded film.

Use of A-D Strips eliminates the dangers of "sniffing" degraded film. A-D Strips contain the non-toxic dye bromocresol green and sodium salt and are safe to handle.

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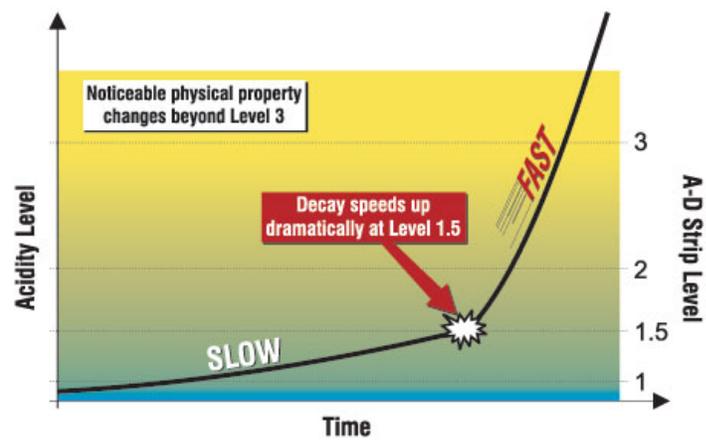
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