

# ATS Techniques and Tips

Selected ATS Journal articles useful for  
restoring, cleaning maintaining telescopes, books, etc.



## A Professional Method for Cleaning Optics

by Robert Ariail - (From the Journal of the ATS - 1995, Issue #8)

The proper cleaning of optical surfaces, while not in itself a restorative process, is an integral part of the proper care and function of any optical instrument - antique or modern. Furthermore, every telescope owner should be aware of the process that I am about to describe.

There are many avowed cleaning techniques which in fact work very well and have been used throughout the years by professionals and knowledgeable amateurs as well. It is also a reality that **all cleaning methods and techniques, no matter how refined or skillfully applied, result in a minute amount of damage to the delicate optical surface each time it is cleaned.** All techniques, that is, **except one.** This single exception is in many ways the best method of all. It involves the simple application of a chemical substance to the lens or mirror on hand. Its use requires little skill, eliminates completely the rubbing or touching of the surfaces, and thoroughly removes all grease, dust and dirt with a single application. The final result is an almost antiseptic surface. **This magical cleaner of mirrors and lenses is Collodion.**

This technique was apparently first reported by James B, McDaniel in 1964. He stated: "Perhaps the most complete cleaning of an optical surface short of doing an ion glow discharge cleaning in a vacuum bell jar is achieved by using the Collodion technique of mirror cleaning. Surfaces cleaned by this method have perhaps **10 times less residual contaminants and particulates** as compared to a methanol-distilled water cleaned surface."

In 1970, John B. Tyndall produced a concise report with improvements on this procedure. Essentially, Tyndall introduced the addition of a **layer of cheesecloth embedded in the Collodion.** This aided in peeling the dry Collodion from the mirror. He recommended applying a series of thin coats with a camel's hair brush.

At the suggestion of Dr. Donald E. Brownlee of the University of Washington Astronomy Department, Edward J. Mannery (Manastash Ridge Observatory, University of Washington) tried the technique on several small mirrors with beautiful results. Following that success, he dared to try it on the University of Washington 30" telescope which needed cleaning once a year. Again, **the results were better than could have been obtained by any other method.**

My personal experiences have been similar. On small to mid-sized mirrors, **Collodion is a dream to use.** Another excellent advantage not yet mentioned is the fact that the mirror can be cleaned in its holder without the need of removing it. Objective lenses can likewise be cleaned while retained in their cells. I am of the opinion that Collodion adheres more efficiently to the aluminum of the mirror than to the glass of the objective lens. That is not to say that the lens can not be cleaned as effectively, but a modicum of finesse may be required. In the case of the lens, the Collodion tends to part and leave small residual patches on the surface. These can be removed with a strip of masking or scotch tape gingerly touched to the errant patches.

Certainly one of the largest lenses ever cleaned with Collodion has to be the great 23-inch Alvan Clark objective now at the Charles E. Daniel Observatory, Greenville, S.C. After it was taken out of the container where it had been stored for many years, it was in dire need of cleaning. The R1 surface of the crown was especially dirty. I suggested to Doug Gegen, Astronomer of the observatory, that we attempt to clean it with Collodion. He agreed, and we went to work. I can still vividly remember how apprehensive I was as we poured the sticky substance over the giant lens! My fears abated when the Collodion peeled off in even sheets ... save a few patches ... leaving **a magnificently clean surface.** Incidentally, the remaining surfaces had to be cleaned while in the cell conventionally. The 7-inch air spacing between crown and flint allowed for such procedure. Dick Nelson, founder of The Optical Craftsman telescope company and engineer for the observatory project accomplished this.

**In using Collodion, simply remember the following guidelines:**

1. **Use only U.S.P. Collodion** (cellulose nitrate in ether-methanol solution). It may be obtained from any drug store or pharmacy. Flexible Collodion should not be used.
2. Apply the Collodion by simply **pouring, spraying, or laying it on with a camel's hair brush**.
3. If the mirror or lens is in its cell, it may be necessary to make **a dam of masking tape**, cardboard or other material to prevent the collodion from seeping between glass and cell. If applied with a brush in thin coats, the dam may not be necessary.
4. Adding **a layer of cheesecloth or surgical gauze** while the Collodion is still wet will make it easier and simpler to peel the substance off in a single sheet when dried. For small optics, the gauze may not be necessary or desirable.
5. After application, let the Collodion dry before removal. Generally, telltale signs that it is ready for removal are slight shrinkage, and curling or lifting of the leading edges. At this stage, simply (slowly and carefully) **peel it off in a single sheet**, if possible. If patches remain, mop up carefully with masking tape.
6. **Work in a well ventilated area** (Collodion is ether-based). Also, gloves may be desirable for some.
7. Enjoy the cleanest optics you have ever seen!

(Note from Glenn Oclassen: You will probably need to have your druggist order your collodion supply from the manufacturer. Don't let him sell you flexible collodion, only plain Collodion USP. A 500 ml bottle cost me about \$30 in July 1995)