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Introduction.

The eighth in our series of *The Ten Agents of Deterioration* is **Pollution**. A subject for which the literature is sparse and the science within the natural history collection environment is still in its infancy. The traditional concept of pollution as being merely a particulate deposit or some problem of air quality has been extended to include the affects of storage material off-gassing and residual traces of pollutants from previous treatments.

The effect of pollution on natural history collections is now widely acknowledged as a serious threat and conservators are beginning to give this the research it deserves. For example the first prize for Research and Innovation at the Jerwood Foundation and MGC1998 awards was won by Stuart Adams with the re-developed gloss meter that can indicate the levels of particulates settling within a store, thus determining whether the collections are at risk.

The use of new materials in collections should be done with caution, one should always try to use conservation quality materials or those listed in an 'acceptable materials' list. If a new material (i.e. its conservation quality unknown) is to be used, it should be tested by standard practices. For information on these see Lee, L.R. & Thickett, D. 1996 *Selection of Materials for the storage or Display of Museum Objects*, British Museum Occasional Paper 111: 60pp.

The contents of this issue have enlightened me about the problems of pollution, I hope that the same will be true for you.

Darren



Next Issue

The next in our series of *The Ten Agents Deterioration* is: **Physical Forces**. A subject for which I'm sure there are plenty of potential authors, especially with all the collection moves that are happening around the country at present. So, get your pens and keyboards going, and send me some articles.

Introduced Pollutants - The Risks of Treating Mineral Specimens with Ammonia

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Most pollutants are not deliberately introduced into collections, however, I feel that I ought to write of an unhappy experience I had last year whilst treating mineral specimens with gaseous ammonia (based on Waller, 1987), as part of an ongoing pyrite treatment programme.

There is a lack of published information on the consequences of treating pyrite decay in mineralogical specimens, especially where more than one species of mineral is present on one specimen. As a result, I have been cautious in treating only one of each type of specimen at any one time, especially if the localities from which they were obtained are no longer producing specimens.

My caution turned out to be fully justified when I discovered to my horror that what had been a rather nice green crystalline pharmacosiderite [$\text{KFe}_4^{3+}(\text{AsO}_4)_3(\text{OH})_4 \cdot 6-7\text{H}_2\text{O}$] on a pyritic matrix had, upon treatment in gaseous ammonia, become a red crystalline specimen. Whilst this was rather attractive, it was obviously no longer pharmacosiderite.

After one week in a dry environment (to allow the ammonia to dissipate) the colour changed from red to pinkish brown, which is how it has remained. I suspected that the potassium (K) in the formula had been replaced by NH_4 , as potassium is an exchangeable base. According to Hey's Mineral Index (1993), pharmacosiderite containing NH_4 , as an artificial compound is known, and I had just produced it. I was interested to know if this was only a surface phenomenon, so I looked at a small piece under the microscope, unfortunately it was a uniform red all the way through.

The next step was to check for the presence of the ammonium group using a Fourier Transform Infrared (FT-IR) Spectrometer, making a comparison with an untreated pharmacosiderite from the same locality. In the treated specimen, the peaks in the spectrum signature did appear to correspond