nicotinamide gives rise to a greater fluorescence intensity than an equivalent weight of N-methyl-nicotinamide chloride. This unexpected increment is quite pronounced, and, as a result, one may measure as little as one microgram of nicotinamide. The fluorescence is stable, and measurements are reproducible. The method appears to be simpler, more sensitive, and more reproducible than existing colorimetric methods.

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Chloride-free Filter Paper

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In recent years considerable emphasis has been placed on the purity of reagent chemicals—so much, in fact, that manufacturers have found it necessary to include the analysis on the labels. Nevertheless, no restrictions upon the purity of the filtering media used in analytical work have been mentioned in laboratory procedures. Small quantities of impurities have little significance in macroanalytical work, but become proportionately serious when microanalytical procedures are used.

Benedetti-Pichler (*1*) has recommended Schleicher and Schuell filter papers No. 589 (black or blue ribbon) and No. 601 (spot test paper) in the experiments which he has outlined. In no instance has he indicated the degree of chemical purity of the above papers, although it is stated that "as a rule, the efficiency of the tests is greatly affected by the type of paper used." In an earlier work the above author and Spikes (*2*) have referred the reader to the silver test of the caution group in a discussion of the identification of the chloride ion. No caution concerning possible contamination by the filtering medium was mentioned. Chamot and Mason (*3*) in their descriptions of filtering methods for chemical microscopy, have not indicated that the filtering medium must be of any particular quality. It may be that the false concept that filter paper is pure cellulose still persists.

The recent Federal specifications (*6*) for filtering paper have not mentioned the chemical purity of the product; however, by private communication it has been found that they refer to the usual analytical operations and that no consideration was given to special tests such as might be required in biological or microanalytical work.

There are some analyses in the biological and metallurgical fields where the presence of certain ions, particularly chloride ion, in the filter paper could lead to false conclusions. An example of ion interference in metallurgical work is that of the chloride ion in corrosion studies. Here microanalytical filtering technique is employed together with microscopical identification methods. In studying the corrosion of metals, particularly that of stainless steel, the test for chloride ion is very important. Filter paper is often necessary when analyzing the minute quantities of films and deposits by the various techniques of chemical microscopy. Inasmuch as such corrosion studies call for definite negative results as well as uncontaminated positive results, it can be seen readily that traces of chloride ion would introduce serious interference.

If a circle of a commercial filter paper is shaken with redistilled water until it is well pulped, the fact that chloride is present can be easily confirmed. When the water is removed by decantation or centrifuging and tested for chloride ion, a positive result will be obtained.

Proper and Green (*4*) have stated that a hypochlorite bleaching is usually used in the preparation of pulp for filter paper, and that all of the bleach must be removed with pure water. W. Schmid (*5*) has indicated that chlorine gas as well as hypochlorite is used in the manufacture of high-grade Swedish filter papers, and that thorough washing must be done to remove the chlorides. Nevertheless, chloride ion has been found in all of the papers tested.

Since chloride-free filter papers are not available commercially, a method for obtaining these has been worked out. The demand for a filter paper of this type would normally be rather small, and, since it would not be practicable to store much material for long periods of time, the method has been so arranged that any chemist can prepare his own filter paper as required.

The Federal specifications have called for 100 per cent rags as raw material. But, the history of the rags being unknown, it would be quite possible for traces of chloride to be present from previous bleaching operations. Therefore, unbleached sulfite wood pulp was chosen as the raw material.

The pulp was bleached with sodium peroxide, although any bleaching agent which contained no chlorine could have been used. First, 5 per cent sodium peroxide, based on the pulp weight, was dis-

solved in water and then thoroughly mixed with the pulp at approximately 10 per cent consistency. The reaction was allowed to proceed overnight at room temperature, after which the temperature was raised to 50° C. for an hour. The spent liquor was drawn off, and a second treatment with sodium peroxide of the same strength was carried out for an hour at 50° C. Inasmuch as the unbleached sulfite pulp was not iron free, the bleached pulp was steeped for 15 minutes in a 1-per cent oxalic acid solution in order to remove the iron. It was then washed free of oxalates with distilled water, since tap water usually contains chlorine. A filter paper made from a pulp thus treated was chloride free, but its ash content corresponded to that of qualitative paper.

Reduction of the mineral content of the pulp without introducing chloride could be accomplished in several ways. Such acids as sulfuric, phosphoric, and oxalic, or mixtures of them in various strengths, could be used. In the present work, the pulp was mixed with a sufficient quantity of 10 per cent orthophosphoric acid to result in a consistency of about 5 per cent. It was heated to 50° C. for 15 minutes, the acid was filtered off, and the filter cake was washed free of phosphates.

In commercial preparation, it could be expected that traces of phosphate ion might remain in the pulp even though it was thoroughly washed. Therefore, when microdeterminations are made for phosphate ion, it would be best to use a standard filter paper from which the ash has been removed by hydrochloric acid. Pulp treated thus had an ash content comparable to that of commercial quantitative filter papers.

A high-speed laboratory stirrer was used to break up the pulp at a consistency of 1 to 2 per cent, after which it was thickened to the desired degree for bleaching. The purified pulp was dispersed in a similar manner in distilled water at about 0.5 to 1 per cent consistency. The filter paper was formed on a finely woven, cotton fabric which had been placed over the holes of a Buchner funnel of the size desired. The sheet was formed while the water was removed slowly by reducing the pressure slightly in the filter flask. When the water had been removed, full suction was applied. Then the sheet was wet with alcohol (chloride free) to harden it. The sheet was transferred to a glass plate, pressed, and then dried.

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Letters to the Editor

Science and Mankind's Plight

In his recent address at the AAAS meeting in St. Louis (*Science,* 1946, 103, 337), Dr. A. J. Carlson clearly depicts the dilemma mankind is in about the state of human affairs.

Dr. Carlson sees a helplessness in every direction that has us puzzled, much as a doctor who gazes baffled at a person very sick with some disease he does not understand. All leading scientists who have given thought to the world's troubles feel about them as he does.

This was very frankly admitted by Wesley C. Mitchell, then of Columbia University, in his striking address as president of the AAAS at the annual meeting of the Association in Columbus, Ohio, in December 1939, when with other things he noted:

"If we can come to a clearer understanding of how we behave, perhaps, and perhaps is all we can say, we can learn how to condition men so that their energies will go less into making one another miserable. . . .

"The outside limits of what scientists can accomplish as citizens are set by their ignorance. Not only does no individual have more than a tiny fraction of the knowledge that is needed; all scientists of the country put together do not know enough to solve many of the problems that a democracy faces."

Since Dr. Mitchell's address, great changes for the worse have come over the world, and the darkness now is much darker than at the time he expressed those views. The baffling problem now is to know how science can break through this darkness to save mankind, for only science can do that.

Dr. Carlson sees hope for betterment if the integrity ruling in science can be injected into the common life of the people. He now sees dishonesty, guile, deceit, and the Golden Rule in reverse, which is only too true, pervading and governing so much that is going on in the Nation and the world.

Since the desire for money is mainly the cause of this, it being regarded as an end rather than the means, which it really is, perhaps the social evils and human deterioration caused by money being so regarded will pass away when money ceases to be the power it now is.