

Heavy Metals

HEAVY METAL ANALYSES

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This topic covers many areas within the company. In order to acquaint the reader with the scope and problems involved in this type of analysis, a chronological and itemized report will be presented. Our initial work in this area began in August, 1971 with a request for analysis of several Chicago plant effluent water samples for the determination of lead, copper and mercury. Information relating to that initial project and subsequent projects is given below.

I. ADP-7490 Initiated August, 1971. Determination of Hg, Cu and Pb in Storm Sewer Effluents.

When this work was undertaken the necessary instrumentation was not available to this department. Permission was obtained to use the Perkin-Elmer Model 403 Atomic Absorption Spectrophotometer in the S-W Chemicals Laboratory. Since that time and through December, 1972 a total of 4,306 water samples have been submitted and 11,607 determinations were made. The major portion of this work involved the determination of Hg, Pb and Cu. Some analyses were also requested for Fe, Zn, Cd, Ba, Ni, Ag, Se, As and Cr.

To accomplish this new methods had to be developed and several people had to be trained. In addition two new pieces of laboratory instrumentation were obtained: a Perkin-Elmer Model 403 Atomic Absorption Spectrophotometer complete with Graphite Furnace and high speed recorder and a Mercury Monitor. The Mercury Monitor is used exclusively for mercury determinations. The Atomic Absorption Spectrophotometer can be used to determine 65 elements including mercury.

The number of samples submitted for water analysis has varied from a high of 250 samples per week to the current level of about 10 samples per week. The high number of samples were submitted during a study made by the Roy F. Weston Company to determine the best way that Sherwin-Williams could comply with Metropolitan Sanitary District standards for effluent water.

In addition to Chicago plant effluent water samples we have also analyzed water samples from Cleveland, Newark, Ashtabula and Los Angeles. We feel that we are able to analyze any variety of water samples in a rapid and accurate manner based on our past experience.

II. ADP-8139. Elemental Analysis of 98 Sherwin-Williams Paints for Pb, Sb, Ba, Hg, Cd, As and Se.

This project was undertaken to provide data for an FDA request in conjunction with pending legislation to regulate the quantities of toxic or heavy elements in paints used on or near residential structures.

0007-SWP-038214

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There was a time limit on this work and, therefore, about 50% of it was done by an outside laboratory. In addition to this, seven of the samples were analyzed for lead by Sherwin-Williams and three other laboratories including the Chicago Board of Health. This was done in order to get a feeling for the accuracy of the newly developed procedures. The data obtained indicated a close correlation between laboratories.

III. ADP-8222. ASTM Participation for the Development of Acceptable Procedures for Heavy Metal Determinations.

A task group was formed in March, 1972 to determine the best approach to setting up acceptable procedures for heavy element analysis in paint systems. Initially the group consisted of representatives from Glidden, DeSoto and Sherwin-Williams. DeSoto prepared a series of samples with known concentrations of eight heavy elements: Pb, Hg, Ba, As, Se, Sb, Cr and Cd. Each company utilized their own best procedures to determine the elements cited. The results of the first round robin indicated a wide variation between labs for several of the elements. It was decided that a slower more deliberate pace would be of greater merit. Therefore, in the next round robin, on a new set of samples, we were to concentrate on the determination of lead, barium, cadmium and chromium. Barium was subsequently dropped from this list.

Results reported for the determination of lead, cadmium and chromium indicated that a suitable method is available for lead. This method, based on a Sherwin-Williams procedure utilizing dry ashing and Atomic Absorption Spectrometry, will be submitted for ASTM approval in the near future. Work will continue on the determination of the other elements.

IV. ADP-8438. Random Sampling of S-W Products for the Determination of Lead.

At the request of H. E. Spitzer, a project was initiated to determine how well S-W was complying with regulations calling for less than 0.06% lead on a solids basis in paints used on or near dwellings. To date we have analyzed 147 different paint samples and have found eight that were slightly above the maximum. These were porch and floor enamels (A33) and may indicate the necessity for a raw material spot check program.

V. ADP-8498. Extraction of Lead from Aerosol Can Solder Seams.

A report from an outside can company stated that under certain conditions alkyd base paints in aerosol cans had been found to solubilize the lead solder seam. A project was initiated to determine the applicability of that report to our products. Evidence to date indicates that in seven of eight samples there was no measurable increase in lead content of aerosol paints. This initial experiment was relatively limited and involved the analysis of the bulk paints and the filled paints shortly after filling. The time intervals varied from two weeks to four months. The one sample that showed an increase had been filled two weeks prior to analysis. Further work is in progress on this project.

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VI. ADP-8626. NPCA Lead in Paint Ingestion Study.

The National Paint and Coatings Association has prepared a series of eight paints containing known input levels of lead as the octoate, chromate and carbonate. These paints are to be used in animal feeding studies to determine what effect metabolic processes have on ingested paints. We were asked to chemically analyze the samples in order to certify that the calculated lead input agrees with that found analytically. These samples may also be used for an ASTM round robin to further test the validity of our method..

VII: Summary.

During the past year and a half approximately 20-25% of this department's productive time has been devoted to the projects cited and to other associated environmental control work. We have acquired new equipment at a cost in excess of \$20,000. In the near future we will be involved in air pollution monitoring and in the identification of particulate matter including asbestos-like materials found in plant atmospheres.

0007-SWP-038216

0007-SWP-000110397