UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
DIRECTORATE FOR LABORATORY SCIENCES
DIVISION OF CHEMISTRY
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Standard Operating Procedure for Determining Lead (Pb) in Paint

This document provides information on the test methodology that is used by the U.S. Consumer Product Safety Commission's (CPSC) Product Testing Laboratory, Chemistry Division (LSC) in the analysis of paint and certain painted products. The methodology is used to determine the total lead content of paint or a painted surface, on a dry paint basis.

This methodology is provided to inform interested parties of the methods used by LSC for assessing the total lead in paint. Other laboratories making such assessments are not required to follow these methods; however, other laboratories should consider using these procedures to ensure they obtain results that are consistent with CPSC staff's for purposes of compliance to the Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead Containing Paint, Code of Federal Regulations, Title 16, Part 1303 (16 CFR 1303) (http://www.access.gpo.gov/nara/cfr/waisidx_08/16cfr1303_08.html).

CPSC staff has concluded that these test methodologies are sufficient to make appropriate determinations concerning lead in paint, as defined in 16 CFR 1303, with a regulatory limit of 0.06% by weight. Screening tests by x-ray fluorescence may sometimes be employed by CPSC staff to determine samples in need of such testing.

Materials and Reagents: The materials used for sampling and analysis are as follows:

1. Nitric acid, trace metal grade
2. Disposable plastic digestion vessels, 50 ml, or glass test tubes
3. Hot block digester or hot plate with test tube block
4. Disposable razor blade or scalpel
5. Methylene chloride (optional)
6. Distilled water

Method: The digestion method is based on the Association of Official Analytical Chemists (AOAC) standard AOAC 974.02 (Lead in Paint). Alternate microwave digestion based on

ASTM E1645[1] may be used as well. Analysis by Inductively Coupled Plasma (ICP) spectroscopy is based on ASTM E1613[2].

1. For testing of wet paint, apply a thin coating to a glass slide, and dry completely prior to testing by heating in an oven at nominally105 °C (105 °C $\pm$ 2 °C) until weight is stable for at least two successive readings separated by 30 minutes of heating in the oven.

2. For products coated with paint or a similar surface coating, remove and digest the coating, separately from the substrate material, for lead content. Care should be taken to remove as little of the substrate as possible. It may be necessary to add a few drops of solvent, such as methylene chloride, to soften the paint and aid in its removal from the substrate. If used, such solvent must be evaporated away prior to analysis. The scraped paint should be finely divided to help in digesting.

3. Scrape approximately 5-20 mg of paint from the product. If it is not possible to collect this much paint, it may be necessary to combine more than one unit of such product to collect sufficient paint.

4. Prepare a reagent blank sample and digest and test a standard reference paint material, such as National Institute of Standards and Technology (NIST) SRM 2581 - Powdered Paint Nominal 0.5% Lead,[3] with each batch of samples tested.

5. Digest appropriately according to AOAC 974.02 or ASTM E1645 in either a disposable glass test tube with a heating block, a disposable plastic digestion vessel in a hot block digester, or in a suitable digestion vessel and digestion microwave oven system.

6. Dilute samples so that Pb results are within calibration range of instrument.

7. Analyze diluted samples for Pb concentration using an ICP spectrometer. The analysis procedure is based on methodology found in ASTM E1613. Further details on the parameters for the ICP analysis are available in the CPSC publication, "Standard Operating Procedure for Determining Lead (Pb) and Its Availability in Children's Metal Jewelry, 2005. (http://www.cpsc.gov/businfo/pbjeweltest.pdf)"

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[1] ASTM E1645 *Standard Practice for Preparation of Dried Paint Samples by Hotplate or Microwave Digestion for Subsequent Lead Analysis*

[2] ASTM E1613 *Standard Test Method for Determination of Lead by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometry (FAAS), or Graphite Furnace Atomic Absorption Spectrometry (GFAAS) Techniques*

[3] NIST SRM 2581 and other standard reference materials are available from the National Institute of Standards and Technology. See http://ts.nist.gov/measurementservices/referencematerials/index.cfm.