



Testing for Lead in Consumer Items for Children

The recent recalls of children's toys, jewelry, clothing and other products have prompted consumers to seriously consider what lead hazards may be in their homes. When it comes to lead, the greatest hazard is most likely invisible lead dust from deteriorated lead-based paint. If you live in a home built before 1978, have a licensed lead risk assessor check your home. Parents or caregivers should consult their child's pediatrician about getting a blood lead test if they believe their child may have been exposed to lead. For more information about the risks of lead see NCHH's fact sheet "Toys and Childhood Lead Exposure" available at www.nchh.org/factsheet-toysleadexposure.pdf.

For children's toys, jewelry, clothing and other products, the Consumer Products Safety Commission (CPSC) advises manufacturers and importers to test their products for lead using two types of laboratory tests.¹ For paint and coatings on children's toys and on furniture, manufacturers are required to test for the total lead in the product (or component of the product). The total lead in the coating must be below 600 ppm.

For metal jewelry, CPSC recommends using the total lead as a screening test. If the levels are over 600 ppm, the manufacturer or importer should use a more complicated test which measures how much lead can be leached out of the product under conditions that simulate a child's stomach. For all other products, CPSC requires manufacturers and importers to weigh six factors in determining whether the product is hazardous. For most consumers, these two laboratory tests are not practical since the tests are costly and damage the product. If a product has been recalled, follow the recall notice instructions to contact the manufacturer or point-of-purchase to get a refund or a replacement for the product.

If a product has not been recalled and you want to test it, there are two available tests that generally do not damage the product and can give you quick results: color change test kits and XRF tests. Each has its strengths and weaknesses that are described below.

XRF Testing

X-Ray Fluorescence (XRF) is a non-destructive method of testing for lead content. It has been used successfully for measuring lead in soil and paint, including paint on children's toys, furniture, and other objects. Lead-based paint inspectors and some laboratories may have these devices, which exist in both portable and fixed forms. Portable XRF devices allow consumers to have items tested in their homes. Consumers can also request measurement of lead in paint in their homes using these devices. Consumers should only use state or EPA-licensed or certified lead-based paint inspectors to perform these tests. A list of such inspectors can usually be obtained from the State Health Department or by contacting the National Lead Information Center at 1-800-424-LEAD. Consumers should confirm with the inspector that the XRF instrument they use has a Performance Characteristics Sheet, which is an independent evaluation of the device from the federal government. XRF

¹ See www.cpsc.gov/BUSINFO/frnotices/fr99/lead.pdf for general guidance from CPSC on lead in consumer products. See www.cpsc.gov/BUSINFO/pbjewelgd.pdf for CPSC's interim enforcement guidance on children's metal jewelry containing lead.



testing of toys or other objects may depend on the object's shape and size. Objects with irregular surfaces or surfaces less than a square inch may not be easily measured with this method. Results are sometimes available within a few minutes or less for some objects. For paint, XRF analyzers typically report results in terms of milligrams of lead per square centimeter of surface area (mg/cm^2) and may report results in parts per million (ppm). For lead in or on toys, consumers should request that the results of XRF analysis be reported in parts per million (ppm) or weight percent (%), not mg/cm^2 . Readings above 600 ppm is the limit set by the Consumer Product Safety Commission for painted toys. Some XRF analyzers may not be able to detect lead at this concentration. The cost per reading depends on the amount of the inspector's time. Children's products should not contain lead.

Color Change Tests

These tests, which are available at many hardware and home repair stores as kits (sometimes called "swab" tests), rely on a color change to determine the presence or absence of lead. In the most common consumer kit, chemical reagents are mixed within a tube, which has an applicator on the end. The reagents then soak the end of the tube. The applicator end of the tube is rubbed on the surface to be tested and the tester then determines if a pink or other color change is observed on the applicator after a short time. These tests rely on the ability of the reagents in the kit to contact the lead directly and to dissolve some of it. If an overcoating is present, or if the lead is embedded within a plastic, no color change may occur, even though lead may be present. If an object is tested using this method, it should be thoroughly washed after the test to remove any remaining chemical residue. The results are available within minutes. Lead may still be present even if it does not turn red because:

- The liquid did not contact the lead surface or dissolve the lead;
- The amount of lead removed with the swab was not enough to cause the color change;
- If the paint is bright yellow (which may be lead chromate paint) the swab may not adequately detect lead in this type paint²

The cost for these tests is generally about \$2-\$5 per sample, depending on the kit size.

Laboratory Tests

Consumers can send products including, but not limited to, dinnerware or children's toys, furniture, vinyl bibs, lunch boxes and other similar items to a laboratory for analysis. A portion of the object or the paint on the object will be weighed and then subjected to an acid or other dissolving agent. The dissolving agent depends on the object being tested. This step enables the lead to be dissolved so that it can be quantified. This method is the most precise and accurate measure of the amount of lead in a product. However, they are destructive because part of the product has to be removed and destroyed to do the analysis. However, it may not be necessary to destroy the entire object, because sometimes only a very small sample is needed for analysis. If the object is to be used again after testing, it should be thoroughly washed to remove any chemical residue. Consumers should only use laboratories that are recognized under EPA's Lead Laboratory Proficiency Analytical Testing Program, which can be found at: www.epa.gov/lead/pubs/nllaplist.pdf.

Always contact the laboratory before any sample or object is sent to them for analysis to find out the laboratory's specific procedures regarding shipping, specific analysis requested, cost and other details.

² NISTR 6398: "Spot Test Kits for Detecting Lead in Household Paint: A Laboratory Evaluation" (May 2000).



The laboratory can help consumers interpret the results. Some laboratories may report the results in weight percent or other units ($600 \text{ ppm} = 0.06\% = 600 \text{ micrograms/gram} = 600 \text{ milligrams/kilogram}$), which is the limit set by the Consumer Product Safety Commission for the allowable level in new residential or toy paint. Depending on local factors, the cost can be between \$5 - \$35 for each component of the product.

Laboratory Tests for Leachable or Accessible or Bioavailable Lead

Unlike the above laboratory methods, which determine how much lead is present in a product, tests for “leachable” lead determine how much lead in an object might be dissolved in the saliva and digestive tract of a person. The federal government uses this method to determine the safety of many types of children’s products such as jewelry and plastics. These methods are sometimes used for dinnerware, cups and glasses, utensils and other objects. This method may not detect lead that is beneath an intact coating on a product. As a product is used or if it is damaged, the coating may be worn away, increasing the exposure to lead. There is also no agreement that this method adequately represents what happens in the digestive tract. The Food and Drug Administration has set standards for dinnerware of no more than $3.0 \mu\text{g/mL}$ (micrograms of lead per milliliter of leachate). California has adopted lower levels: $0.226 \mu\text{g/mL}$ lead for flatware, and $0.100 \mu\text{g/mL}$ for hollowware, such as cups and bowls. Depending on local factors, the cost can be between \$20 - \$80 for each component of the product.

For more information, contact the following agencies:

The Consumer Product Safety Commission, www.cpsc.gov

The U.S. Environmental Protection Agency, www.epa.gov/lead

The U.S. Food and Drug Administration, www.fda.gov

The U.S. Centers for Disease Control and Prevention, www.cdc.gov

A pamphlet on what families can do about lead poisoning from lead-based paint, dust and soil is available at: www.hud.gov/offices/lead/outreach/pyf_eng.pdf

NCHH is the only national technical and scientific non-profit organization dedicated to developing and promoting practical measures to protect children from residential environmental hazards while preserving affordable housing. NCHH develops scientifically valid and practical strategies to make homes safe from hazards, to alert low- income families about housing-related health risks, and to help them protect their children. NCHH also works with governmental and non-governmental organizations to develop standards and programs and guide their implementation through insurers, lenders, federal and state laws and regulations, community organizations, and the courts.