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SEM/EDX Lead (Pb) in paint analysis



Lead pigments were taken out of most paints in the 1960s and lead pigments and driers (at very low levels) were completely removed from decorative paints by the early 1980s. Many wood or metal surfaces painted before the 1960s could contain significant levels of lead.

Lead pigments, either as a white pigment (lead carbonate/lead sulphate) or sometimes as a colouring pigment (yellow and red lead chromes) were widely used in decorative paints applied in houses and other buildings (schools, hospitals etc.) prior to the 1960's. Although leaded paint has not been used for many decades old lead painted surfaces can still be found, and can represent a possible source of exposure.

Test the painted surface if you suspect that lead may be present, especially if you are renovating an old house (> 40 years old) consider employing a professional testing Lab if old lead paint is present.

Hazards associated with lead

Lead is very hazardous to health.

It can be breathed in as dust, fume or vapour.

It can be swallowed in the form of paint chips, dust or dirt containing lead or in drinking water or in food, especially if you have not washed your hands. It can also be ingested by children sucking e.g. old cots painted with white lead paint.

If the amount of lead in your body gets too high it can cause: Headaches Tiredness Irritability

- Constipation
- Nausea
- Stomach pains
- Anaemia
- Loss of weight

Continued uncontrolled exposure can cause high blood lead levels that can have very serious health consequences, such as:

- Kidney damage
- Nerve and brain damage
- Infertility

Note: These symptoms can also have causes other than lead exposure so they do not necessarily mean that lead poisoning has occurred.

Very young children would be particularly vulnerable to these potential adverse health effects of elevated levels of lead in the blood. Children absorb lead mostly by eating it or touching contaminated dust or soil and then putting their fingers into their mouths.

An unborn child is at particular risk from lead exposure, especially in the early weeks before a pregnancy becomes known.

SEM-EDX Lead analysis

Our Carl Zeiss EVO Series Scanning Electron Microscope with Oxford X-max EDX detector can detect lead in your paint samples with extreme precision

SEM-EDS can produce structural information or material composition information. It additionally provides images of the surface of an object at extremely high magnifications. The main information presented by SEM is the surface detail of an object — it essentially produces an extremely high magnification image of the object. In addition, EDS can produce the change in material composition across a surface or the surface composition at a specific point.

Comparison table SEM/EDX Vs Hand held XRF Vs Lead check swabs

	SEM/EDX	Hand Held XRF	Lead Check Swabs
Elemental composition	Yes	Yes	No
Elemental mapping	Yes	No	No
Finding the Lead layer in the paint	Yes	No	No
SEM pictures	Yes	No	No
User friendly report	Yes	No	No
Faster sample turnaround time	Yes	-	-

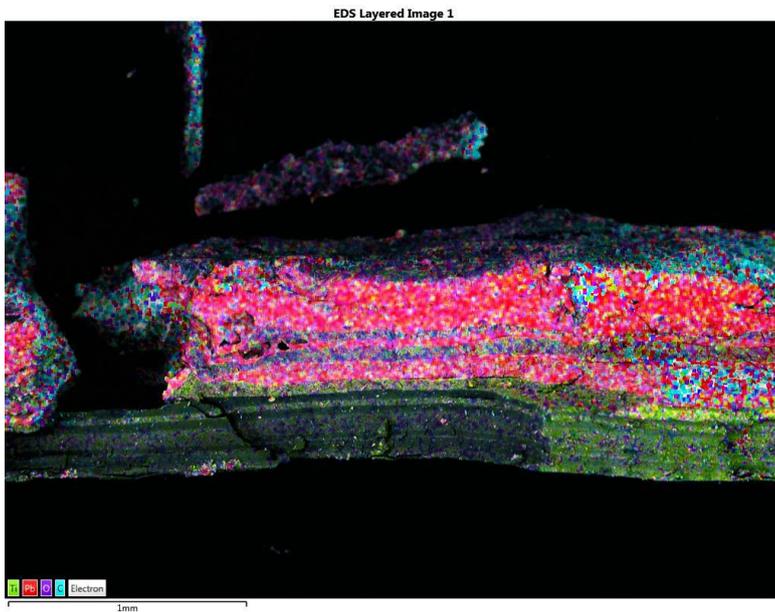


Fig.1 Elemental mapping shows which layers have the Lead

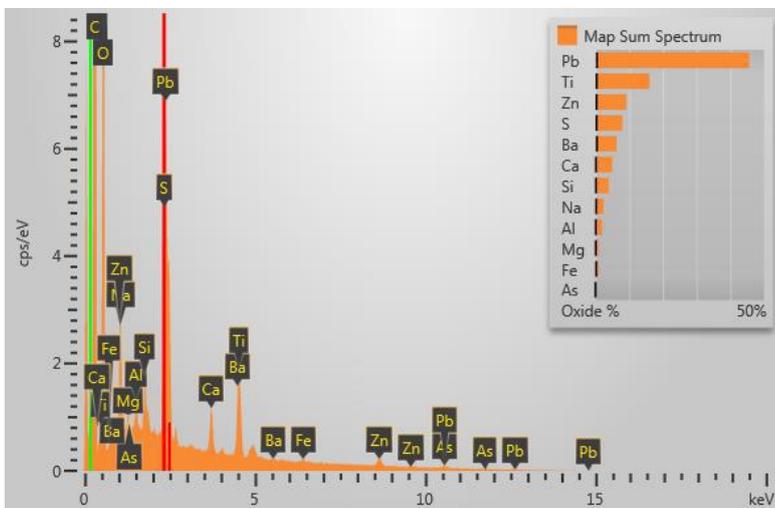


Fig.2 Show the elemental found in the sample.

Fig.3

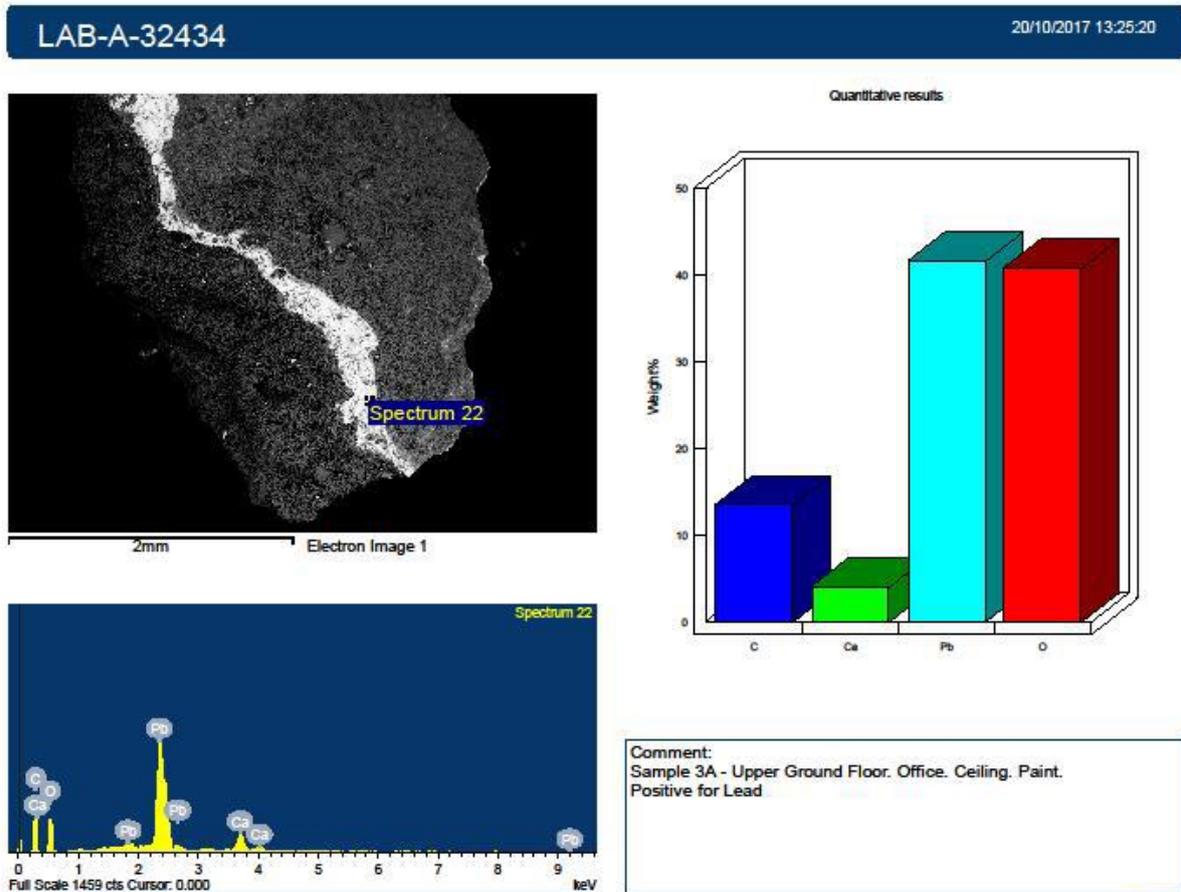


Fig.3 show the sample report with highly magnified SEM picture with Elements found.

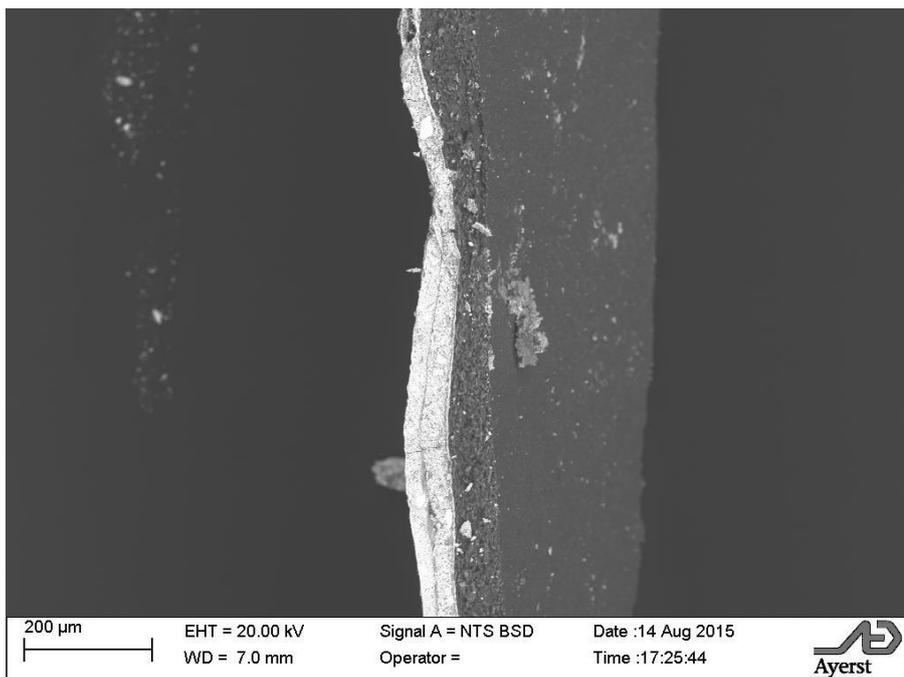


Fig.4 SEM picture

Fig.4 shows the SEM picture. Due to heavy mol.wt of Lead, it tends to glow under a beam of electrons. (Left bright layer is Lead)

Recommended approach

Has the presence of lead been confirmed?

No- consider further (professional) testing, before proceeding as normal practice

Yes- consider employing professionals

If you decide to proceed with decorating a lead-painted surface yourself

Is the surface in good condition, or over coated with a non-lead paint layer?

Yes - don't disturb the surface, paint over as normal practice

No - prepare the area for activity.

Use Personal Protective Equipment (overalls, rubber or latex gloves, particulate filter mask)

Treatment of old lead paint surface

1. If the surface can be prepared without needing complete removal, rub down wet with waterproof abrasive paper & make sure the debris does not produce a dust.

2. If the whole paint film needs to be removed, use a standard paint stripper and wet scraping and abrasion. Infra-red stripping or a hot-air gun may be used to soften the film, with caution – do not burn the paint or create paint fumes.

Clean-up, removal and disposal of debris

1. Wash all surfaces (the specific work area and all surrounds) thoroughly

2. Vacuum all surfaces with a vacuum that has a HEPA filter

3. Carefully dispose of all debris, including face masks and all filters, in a heavy duty plastic bag, ensure that this does not get damaged in transit to the dustbin.

4. How do I know if a painted surface contains lead?

To determine whether or not lead-containing paint is present on any particular surface, the paint may be tested by:

(a) An experienced professional decorator with lead expertise;

(b) Using a specialist company;

(d) A specialist laboratory.