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## Sodium Sulfide Instantly Reveals Lead on Surfaces

**A simple procedure, "The Sodium Sulfide Test," allows visual detection of lead on skin & other surfaces. The procedure is effective as a training aid to reinforce the importance of personal hygiene to workers in any environment where lead is processed. It is also effective in comparing the ability of soaps and cleaners to remove lead.**

Lead is absorbed into the body two ways, through inhalation of small dust particles and ingestion through the mouth by contact with lead dust on hands, skin, gloves, clothing, tools and food.

The requirements for lead users are detailed in the OSHA Lead Standard 1910.1025 and Appendixes B, C & D. Certain precautions help prevent lead from becoming a health hazard and maintain a clean work environment, including hygiene facilities and practices, engineering and work practice controls, respiratory protection, protective work clothing and equipment, compliance programs, mechanical ventilation and housekeeping.

The standard stresses that food, beverage or tobacco products are forbidden in areas where employees are exposed to lead. Change rooms and shower facilities must be provided and used. Employees must wash their hands and faces prior to eating, drinking, smoking or applying cosmetics. Good personal hygiene habits are crucial to minimize contact exposure to lead.

While the lead standard recognizes the potential for ingestion, it only defines permissible levels of lead in air and in blood. Variables other than lead in air many account for changes in blood lead levels, and lead contamination occurs with workers in "low and no lead" areas.

Many lead processors use the Sodium Sulfide Test to help teach plant workers and other personnel – including contractors and even office personnel – good personal hygiene and encourage them to clean properly before breaks and before leaving the plant for the day. Individuals may unknowingly carry lead away from the plant into their cars and homes, where others, including children, may be exposed.

The sodium sulfide test is a qualitative test that reveals the presence of inorganic lead on skin and other surfaces. Sodium sulfide ( $\text{Na}_2\text{S}$ ) reacts with inorganic lead to form a dark brown or black lead sulfide. Although it does not quantitatively measure the lead contamination, it gives instant results for a visual comparison of the amount of lead on any surfaces.

The materials needed to perform the test are:

- \* Cotton balls or other wipe
- \* Distilled water
- \* Spray bottle of 1/2% sodium sulfide (use Analytical Grade  $\text{Na}_2\text{S}$ ) solution in water (2.55 grams of reagent grade sodium sulfide dissolved in 4 oz. (110 ml.) of distilled water).
- \* Latex gloves (if desired)
- \* Hydrogen Peroxide, 1/2%

Two methods are commonly used to perform the procedure. Both should be performed in a ventilated area.

1.) Apply the sodium sulfide solution directly to the hands, forearms and under the fingernails. If any lead is present, a brown-to-black color will appear instantly. The more intense the color, the more lead is present. This

method is a better indicator of the exact location of lead on an individual's skin and to check under the fingernails.

Note that the lead sulfide stain can be difficult to remove. Washing with vinegar (4% acetic acid), hydrogen peroxide or some lead-specific soaps will remove the stain. Hydrogen peroxide also neutralizes the smell.

2.) Use a wipe (cotton ball, paper or gauze) soaked in vinegar to clean the test surface. The vinegar on the wipe will dissolve most of the lead present. Then spray sodium sulfide solution directly onto the wipe and note the extent of the color change. This method can test both skin and other surfaces and is the preferred method if individuals object to having the solution sprayed directly on their skin.

Dispose of wipes from positive tests as lead contaminated waste, in accordance with plant procedures and applicable regulations.

Any concentration of sodium sulfide in water between 1/2 to 1 1/2% will work, but the suggested minimum concentration appears to be 1/2%. Since the sulfide solution has a distinct hydrogen sulfide odor, use the smallest volume and lowest concentration needed for results. The test does not appear to be lead-specific. Dark sulfides also will form if iron, nickel, mercury, molybdenum or copper are present. Since heavy metals on the skin are ingested easily, false positives should not interfere with results or with the applicability of the test in a particular work environment, given knowledge of the metals present.

The sodium sulfide solution is strongly alkaline, but no skin irritation has been reported at concentrations up to 8%. Skin contact with crystals of higher concentrations of the solution should be avoided. Consult the sodium sulfide material safety data sheet (MSDS) for further health hazard information. This method is simple to perform, effective, inexpensive and is incorporated easily into existing lead safety training programs. Minimal training is needed to understand the results. Suggestions about when and how to check for contamination include:

- \* As employees begin their scheduled breaks, perform a random spot check on their hands. Be sure to check under the fingernails.
- \* In the break room and lunch room check tabletops, countertops, vending machine buttons, coffee pot handles, chairs and telephones.
- \* Check the straps and other parts of respirators.
- \* Check respirator storage areas
- \* Perform the test on employees who are not directly exposed to lead, such as: office personnel, engineers, truck drivers, warehousemen.
- \* Check the hands & shoes of contractors as they leave.
- \* Using existing hand washing techniques, evaluate the effectiveness of your present hand cleaners to see how well they remove lead.

This list is not exhaustive. Industrial hygienists, safety engineers, plant engineers and others can test any surface that may be contaminated with lead dust. Spot checks can indicate how effective current hand washing and housekeeping methods are and where improvements are required.

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