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U.S. DEPARTMENT OF
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Public Health Service
Center for Disease Control
National Institute for
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working with
mercury
INDUSTRY

WORKING WITH MERCURY IN INDUSTRY

Mercury, a silvery-white metal with the peculiar property of being liquid at room temperatures, is one of the first metals known to man. The Romans mined it in Almaden, Spain, about 415 B.C. and in about 350 B.C. Aristotle named it "quick silver," a name that is still used today. Man later learned that mercury begins to vaporize in detectable amounts at temperatures as low as 10° F, and that the vapor is colorless and odorless.

The Romans recognized the poisonous properties of mercury even at an early date. The history of mercury poisoning includes several instances of massive occupational exposure. In the early 19th century, for example, a fire in a quicksilver mine in Idria, Austria, resulted in the release of mercury vapor over the countryside. Not only the miners, but nearly all the townspeople and domestic animals showed symptoms of mercury poisoning.

Until the 1930's in the United States, mercury compounds — combinations of mercury with other elements — were used in preparing felt for making hats. The symptoms of chronic poisoning resulting among hatters gave rise to the expression, "mad as a hatter." Alarming incidents still occur, such as those involving farmers who eat seed grain that has been treated with mercurial fungicides and reported high concentrations of mercury compounds in fish and other wildlife.

How Mercury Is Used

Mercury and mercurial compounds are now widely used, not only in medicine and dentistry, but also in the chemical industry and in the manufacturing of paint, paper, pesticides, and fungicides. The major industrial uses are in the manufacture of electrical control instrumentation, electrolytic cells, and explosives; mercury compounds are also important in the chemical laboratory.

In these important applications, the use of mercury should be properly controlled to prevent serious illness. Avoiding illness requires, among other things, that each employee be made fully aware of mercury's potential hazards.

How Mercury Can Affect You

Breathing mercury vapor is the most common cause of industrial mercury poisoning. The vapor is formed when mercury is heated for chemical processes in the laboratory or for production, but it also may be present in the air anywhere mercury is used because it vaporizes at room temperature. If spilled, it breaks up into tiny globules that lodge in cracks, mix with dust, and readily penetrate porous substances such as wood, tile, iron pipe, and firebrick; this increases the surface area and hence speeds vaporization. Enough mercury can accumulate on surfaces, particularly on wooden floors, to cause a serious health hazard.

Excessive exposures to mercury vapor can produce mercury poisoning, either acute (short-term exposure) or chronic (long-term exposure). The symptoms of acute mercury poisoning include tightness in the chest, difficulty in breathing, coughing, and pain in the chest. Acute poisoning is rare in industry, but it can result from accidental exposure to the metal or its compounds. Acute skin reactions have also occurred following contact with mercury compounds.

Mercury poisoning in industry is more frequently chronic, resulting from mercury accumulating in the body over a period of time. Chronic mercury poisoning is characterized by emotional disturbances and tremor or shaking of the body, particularly of the hands. Some individuals also have inflammation of the gums, the roof of the mouth, and tongue, a condition often associated with loss of the teeth. Other signs and symptoms may include increase of saliva, loss of appetite and weight, and disturbances of the digestive and kidney functions. In the advanced stages of

chronic mercury poisoning, several body functions and organs, such as the kidney, liver, brain, heart, and lung may be affected.

On a lesser scale, mercury poisoning can result from eating foods that have been contaminated with mercury or its compounds, smoking contaminated tobacco, or from careless handling of contaminated objects. The substance can enter man's system through contact with the skin, where it is absorbed through the hair follicles and sweat glands, causing skin irritations (dermatitis). Contact of mercury or its compounds with the eyes can also result in injury.

Controlling Mercury Exposure

Effective control to prevent harmful exposure to mercury contamination requires an awareness of the potential health hazards, knowledge of the workplace and practices, and continuing effective preventive measures. The latter include engineering, processing, environmental, medical, and hygienic protective approaches.

For continued exposure protection, an adequate ventilation system is essential. Local exhaust ventilation is necessary where substantial quantities of mercury or its compounds are handled. The work areas should be vented in such a manner, however, as not to contribute to pollution of outdoor air. Where possible, enclosures that serve to isolate the mercury processes can be used to eliminate or reduce workmen exposures.

Occasionally situations may arise that require the use of respirator protection for brief periods. Respirators of the cartridge or canister type that are specifically designed for mercury can be used for low or moderate concentrations. High concentrations require the use of supplied-air respirators. Caution is advised in the use of canister type respirators, since mercury vapor or dust doesn't have any smell and consequently provides no warning when the respirator is no longer giving effective protection.

Working conditions must be continually monitored as part of a comprehensive industrial control program, including the taking of air samples regularly at all work area atmospheres. The samples must be analyzed according to recommended methods to determine the levels of mercury in air and the action that must be taken to keep the levels within the required limits.

A physical examination for each worker before being assigned to the work area should be part of the mercury exposure control program, with subsequent examinations being given periodically thereafter. Workers who have evidence of chronic nervous system disorders or kidney disease should not be permitted to work with mercury. The employer should keep a history of mercury exposure and other medical information in each worker's medical record to insure individual protection.

Where mercury and its compounds are present, good washroom facilities, locker rooms, and showers should be located convenient to the lunchroom. The lunchroom itself should be situated away from the work area, to make possible a contamination-free environment. Employees at such areas should wash their hands thoroughly before eating or smoking.

Reporting Effects Of Mercury Exposure

Any evidence of an employee suffering from disturbances of the digestive system or kidney function, oral hygiene problems, and undue irritability should be brought to the immediate attention of the supervisor, nurse, or plant doctor. Although such symptoms may not actually be due to mercury poisoning, there is the possibility of excessive exposure and the worker should be examined by a doctor to determine if this has occurred.

Management's Responsibility

Close surveillance of the industrial uses of mercury and its many compounds is necessary in order to provide safe working environments. Man-

agement has the primary responsibility for setting up mercury hazard controls and for maintaining a proper medical program. The plant physician should be on the alert to relate any symptoms to possible industrial mercury exposure. In addition, there should be a progressive employee educational program concerning mercury hazards and emergency procedures, including drills on use of emergency equipment, such as respirators. Safety signs and posters can be used to emphasize the importance of personal health habits and the need to follow safety regulations.

Workers' Responsibility

Each worker should be aware of the health and safety problems associated with using mercury and should follow the general rules given, as well as other safety rules issued to protect him on the job.

1. Be aware of the uses of mercury in your work situation.
2. Report accidental spills or contamination of materials with mercury to the management.
3. Abide by instituted precautions — use all safety equipment when specified by the employer, such as respirators and protective clothing.
4. Have periodic physical examinations.
5. Change into special work clothes at work and after work thoroughly shower and change into street clothes.
6. If ill for any reason, always tell the doctor that you work with mercury and return to your work only with his approval.

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