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FEATURES

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A Review of the *Industrial Health Monthly* June 1946–June 1951

THE INDUSTRIAL HEALTH MONTHLY, issued by the Division of Industrial Hygiene, Public Health Service, was first published in December 1939 to serve as a medium for the exchange of news among the State and Federal industrial hygienists. It was then called the *Industrial Hygiene Newsletter*. Interest in the publication grew rapidly through the war years till, by December 1945, the mailing list had grown to 2,900, comprising largely physicians, nurses, engineers, and chemists in public health work and in industries.

In the meantime, the publication had outgrown its original multilithed form, and by authority of the Bureau of the Budget, on March 29, 1946, it graduated to a printed publication. The first copy, issued in June 1946, contained 12 pages, about 6,000 words and 4 illustrations. In November 1946, a new cover page carried an industrial photograph. A month later, the two-column page of 10-point type was discarded for a three-column page of 8-point type, which increased the wordage to about 9,000.

In the spring of 1947, with the approval of the Bureau of the Budget, the number of pages was increased from 12 to 16, with the privilege of using eight additional pages a year for an index.

Except for a slight change in the cover page beginning with the September 1949 issue, the publication remained substantially the same in appearance until the change in name and cover was made with the April 1951 number.

Distribution

With the cooperation of the State units the mailing list grew so rapidly that it was necessary to request the Superintendent of Documents to offer paid subscriptions. The announcement of the availability of the publication through the Superintendent of Documents for $1 a year was made in the fall of 1947 through a wide distribution of flyers and other media. By this means many more persons have been able to obtain it than would have been possible with the limited number of copies available for free distribution.

Beginning in 1946 with a carefully selected list of names, the mailing list has increased steadily as the publication has been introduced through per-

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Studies of Health Hazards in Industry

By J. J. Bloomfield*

CARBON MONOXIDE

Tests

Although this discussion will not go into the details of methods of detection and estimation of carbon monoxide, it is of interest to list some of the methods available.

(1) Use of canaries and Japanese waltzing mice.

The small animals are more rapidly affected by carbon monoxide than are human beings.

(2) Absorption methods.

These methods are used for the relatively high percentages of carbon monoxide found in fuel gas or in badly contaminated atmospheres. A known volume of the gas is shaken with an absorbent in a volumetric gas analysis apparatus, and the resulting decrease in volume is measured. The absorbent used will be ammoniacal or acid cuprous chloride, cuprous sulfate-B-naphthal, or iodine pentoxide in oleum. Absorption methods are not generally practical when used for the estimation of carbon monoxide which is present in less than 0.2 percent quantity. Since this percentage is far above the toxic limits of carbon monoxide (100 parts per million by volume for continuous exposure), absorption methods are almost valueless from the standpoint of health and safety.

(3) Oxidation methods.

a. Reduction of palladium chloride or ammoniacal silver nitrate.

These solutions react with carbon monoxide, yielding metallic palladium and silver, respectively.

b. Hoolamite method.

This method depends upon the oxidation of carbon monoxide by an activated iodine pentoxide indicator. The amount of carbon monoxide present is shown by a color change produced by the co-liberation of iodine from the iodine pentoxide.

c. Iodine pentoxide method.

A known volume of air is passed through a tube containing iodine pentoxide at a temperature of 150° C. The liberated iodine is then trapped in potassium iodide solution and estimated by titration. An alternate procedure would be to ascertain the amount of carbon dioxide formed.

(4) Combustion methods.

a. Platinum wire.

***This article is one of a group of lectures which Mr. Bloomfield gave to a class of physicians in Rio de Janeiro, Brazil. In view of the constant demand for basic material on industrial hygiene techniques and for practical help in this field, a number of these lectures are being printed in the* Industrial Health Monthly.**

Any carbon monoxide present in a sample is burned on the surface of an electrically heated platinum wire. The heat developed by the reaction of forming carbon dioxide is then measured by some electrical device such as a Wheatstone bridge.

b. Hopcalite method.

Hopcalite is a catalyst which has the property of enabling carbon monoxide to be burned to carbon dioxide at ordinary temperatures. With a special apparatus the concentration of carbon monoxide may be read directly from the dial of a milliammeter, registering the heat evolved, which is calibrated to read parts per million of carbon monoxide.

(5) Colorimetric methods.

These methods are based upon the production of characteristically colored compounds with the hemoglobin of blood. The concentration of carbon monoxide is estimated by the amount of color produced. Pyrotannic acid method and the Haldane carmine method are examples.

(6) Blood methods.

Blood containing carbon monoxide may be examined by spectrophotometric methods for the determination of the degree of blood saturation.

As far as determination of carbon monoxide in the field is concerned, industrial hygiene personnel usually use either a hand-operated carbon monoxide indicator, or an electrically operated carbon monoxide indicator, both of which depend upon catalytic oxidation of the carbon monoxide to carbon dioxide by hopcalite, or the recently developed United States National Bureau of Standards detection tubes of carbon monoxide.

This Bureau of Standards method produces varying degrees of color within the tubes which are proportionate to the concentration of carbon monoxide. This method is sufficiently accurate for the usual estimation of the degree of hazard from this gas.

Treatment of Carbon Monoxide Poisoning

The treatment of carbon monoxide poisoning should always be carried out by a qualified physician, although first aid must be given pending his arrival. To summarize experience with the treatment of carbon monoxide poisoning, the following procedure, outlined by Sayers, is recommended:

(1) The victim should be removed to fresh air as soon as possible.

(2) If breathing has stopped, is weak and intermittent, or present in but occasional gasps, artificial respiration by the Schafer method should be given persistently until normal breathing is resumed or until after the heart has stopped.

(3) Pure oxygen or a mixture of 5-percent carbon dioxide and 95-percent oxygen should be administered using an inhaler, beginning as soon as possible and continuing for at least 20 minutes in mild cases and as long as 3 hours, if necessary, in severe cases if the patient does not regain consciousness. The administration of oxygen or of the mixture of carbon dioxide and oxygen when given immediately will greatly lessen the number and severity of the symptoms from carbon monoxide poisoning and will decrease the possibility of serious after effects.

(4) Circulation should be aided by rubbing the extremities of the patient and keeping the body warm with blankets, hot-water bottles, hot bricks, or other devices, care being taken that these objects have been wrapped or do not come in contact with the body and cause burns.

(5) The patient should be kept at rest, lying down to avoid any strain on the heart. Later he should be treated as a convalescent and should be given plenty of time to rest and recuperate. Exercise was at one time recommended; however, the procedure is hazardous, as

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the patient quite often loses consciousness, and in some cases death occurs.

Control of Carbon Monoxide Exposures

Some of the common industrial operations in which carbon monoxide may constitute a hazard are forging, heat treating, and motor testing.

In forging operations, whenever the atmosphere of carbon monoxide exceeds 100 parts per million, canopy-type hoods with large-diameter stacks should be installed above the furnaces and, if necessary, this ventilation should be improved by the use of propeller-type fans in the discharge stacks. The point of discharge of these stacks should be so located that the exhausted air cannot reenter any occupied building.

Heat-treating furnaces should be examined particularly for defective equipment which would permit the escape of carbon monoxide into the workroom air. Partial control of the gas may be obtained by the use of hoods and enclosures around the furnace which allow the carbon monoxide to be removed by convection currents. If excessive concentrations of the gas still exist, exhaust fans should be provided.

In the United States the testing of motors of automobiles, airplanes, tanks, and so forth, presents a very significant hazard from carbon monoxide. If the motors are tested while the conveyance is in a fixed position, the exhaust gas should be discharged to the outside air if the workers are in the same room with the motors. Commercial garages in the United States are often equipped with a mechanical exhaust ventilation system by which the exhaust gases may be removed. The main ventilation duct may be located in an overhead position or under the garage floor, and the discharge line from each motor may be connected to the duct by the use of flexible tubing. The overhead system is favored for its ease of maintenance and simplicity of installation. It is avoided by some proprietors who desire to create the best possible appearance in their garage in keeping with the trend toward simplified and streamlined interior construction.

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Educational Opportunities in Industrial Hygiene

This listing of educational opportunities has been compiled from information submitted by the State and Local Industrial Hygiene units and directly from the schools involved. We do not present the list as a complete one and will welcome any additional information.—**Managing Editor.**

Courses for Physicians and Dentists

School of Public Health, University of California at Berkeley.	M. P. H. (one calendar year) and Dr. P. H. (2 years) open to physicians and others qualified. Special courses in industrial toxicology, sanitary air analysis, survey course in industrial health and hygiene, and a seminar in industrial health.
School of Public Health, University of California at Los Angeles.	Course in industrial health offered to physicians, nurses, public health students, and undergraduates; 30 hours with credit of two units.
School of Medicine and Institute of Occupational Medicine and Hygiene, Yale University, New Haven, Conn.	M. P. H. (1 year) and Dr. P. H. (1 to 2 years) with specialization in occupational health open to physicians. Course work in occupational health for senior medical students. Fellowship in occupational medicine for graduate physicians. Course in industrial toxicology for seniors and graduates.
College of Medicine, University of Illinois, Chicago.	Required course in industrial medicine for juniors; 12 lectures in winter and spring terms.
Indiana University School of Medicine, Department of Public Health, Bloomington.	Course in industrial medicine for junior medical students. Seniors spend 20 hours visiting plants.
College of Medicine, State University of Iowa, Iowa City.	Four courses dealing with industrial hygiene.
University of Louisville, School of Medicine, Department of Preventive Medicine and Public Health, Louisville, Ky.	Three-hour course in industrial medicine for junior medical students.
Postgraduate School of Public Health, Tulane University, New Orleans, La.	M. P. H. in public health with elective specialization in industrial health; 15 lectures and 7 field trips.
School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.	M. P. H. (one academic year) and Dr. P. H. (2 years) with electives in industrial hygiene open to physicians, nurses, and engineers.
University of Maryland, College Park__	Two-hour course in industrial hygiene education.
University of Massachusetts, Amherst__	Course in industrial hygiene for students in public health and sanitation.
School of Public Health, Graduate School of Engineering, Harvard University, Boston, Mass.	Courses in industrial hygiene open to physicians and engineers as part of public health program; may be applied toward M. P. H. or Dr. P. H. and S. M. or S. D.

School of Public Health, University of Michigan, Ann Arbor.	M. P. H. degree with study in industrial health offered to physicians, qualified engineers and administrative nurses. Fellowship program provides for one year at School of Public Health and one year at hospital and in association with a General Motors plant. Leads to M. P. H. degree. 18 hours of work in industrial health for students in School of Medicine.
University of Michigan, Extension Division, Detroit.	Course in industrial hygiene and health, open to all qualified students, non-credit; two semester hours, given one semester a year.
College of Medicine, Wayne University, Detroit, Mich.	Course in industrial health for sophomores.
School of Public Health, University of Minnesota, Minneapolis.	Course in industrial health programs—organization of services, State programs.
School of Medicine, University of Buffalo, Buffalo, N. Y.	Fourth year students have 4 hours of lectures on industrial toxicology and a 3-hour symposium and field trip on industrial medicine.
School of Public Health, Columbia University, New York, N. Y.	M. S. in industrial hygiene open to qualified physicians, nurses, engineers, and chemists. M. P. H. open to physicians and others with considerable previous experience in industrial hygiene and public health. Courses extend one calendar or academic year.
Institute of Industrial Medicine, Post-Graduate Medical School, New York University-Bellevue Medical Center, New York, N. Y.	One year graduate course for physicians and engineers. Short post-graduate courses on specified subjects. Undergraduate courses in the College of Medicine.
New York Postgraduate Medical School, New York, N. Y.	Symposium on industrial medicine.
School of Public Health, University of North Carolina, Chapel Hill.	Elective courses in public health problems in industry.
Institute of Industrial Health, University of Cincinnati, Cincinnati, Ohio.	Doctor of Industrial Medicine degree offered, 2-year training plus 1-year experience; (limited number of fellowships offered to graduates of Class A medical schools who have completed 2 years of residency including internship in accredited hospital.)
School of Medicine, Western Reserve University, Cleveland, Ohio.	Course of environemental preventive medicine for sophomores; 8 hours of lectures, 24 of field demonstrations. Problems of environmental sanitation in communities and industries.
Jefferson Medical College, Philadelphia, Pa.	Graduate students in toxicology.
Woman's Medical College of Pennsylvania, Philadelphia.	Course in industrial medicine for seniors; 36 hours, lectures and field trips.
School of Medicine, University of Pittsburgh, Pittsburgh, Pa.	Graduate course for physicians only, leading to the degree of Doctor of Industrial Medicine.
Medical School, University of Utah, Salt Lake City.	Course in industrial medicine given for seniors; 1 hour in industrial hygiene laboratory and 22 hours of lectures.

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The underground system fulfills the desire to hide the ventilating equipment and is highly effective when carefully designed for easy maintenance. Since dirt, water, oil, and gasoline all may collect in the underground main, provisions must be made for drainage and periodic cleaning. Because of the danger of accumulation of flammable liquids, design should be based on continuous operation of the exhaust fan with some air flowing through each section of the system at all times. The drain to the sewer or sump must be provided with a trap sufficiently high to prevent surge of water back into the exhaust-fan line as a result of the negative pressure created.

The air flow required at the end of the flexible conduits varies with the size of engines serviced and is generally selected to be greater than the volume of exhaust gases discharged when the engine is operated at fairly high speed. The end of the flexible duct is slightly larger than the vehicle tailpipe to permit some room air to enter the system at this point. This prevents leakage and compensates for the variability in engine speed or displacement.

The following air-flow rates per flexible duct have given satisfactory control in many garages; automobiles and light trucks, 100 c. f. m.; heavy gasoline engine trucks, 200 c. f. m.; and diesel engine trucks, 300 c. f. m. The high rate for diesel engines is due in part to the highly irritating nature of the combustion products. Air velocities in the main ducts can be in the range of 1,000 to 2,000 c. f. m. Flexible branch ducts should be 2½ to 4 inches in diameter to avoid excessive velocity and air-flow resistance.

When the motors are tested on a moving assembly line, down-draft exhaust ventilation should be provided through grills in the floor beneath the assembly line. In all cases, the discharged gases should not be permitted to reenter the working area.

Exposure on Highway

Truck drivers who make long hauls are subjected to an exposure which might be termed the "subacute" carbon-monoxide poisoning. While that term

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has never been applied to this hazard by other writers, it is meant to designate those cases which fall short of exposure to a sublethal dose but exceed the minute chronic assault. The following investigation illustrates this contention and is an important contribution to the present status of carbon-monoxide poisoning.

Survey in California.—In a survey conducted in 1938 by the Industrial Hygiene Service in conjunction with the California Highway Patrol, 1,105 commercial motor vehicles of various types were tested during five-minute runs on the highway, under varying weather and road conditions, to determine the amount of carbon monoxide in the air breathed by the driver; 2.9 percent of these vehicles were found to be in a potentially dangerous condition, due to concentration in the driver's compartment of over 0.01 percent of carbon monoxide, which may cause headache, sleepiness, weakness, faulty judgment, and impaired driving ability, if inhaled continuously over a period of six hours or longer.

The 4-mile section of U. S. Highway No. 70 between Blythe, Calif., and the plant quarantine station at the State line, was selected as the location for the survey. The majority of automobiles entering Blythe from either direction have been run continuously for several hours. It is under such conditions of prolonged exposure that the driver and passengers are most likely to experience the toxic effects of relatively low concentrations of carbon monoxide in the car. Several instances have been reported in which the occupants of an automobile reaching Blythe, after a continuous 3 or 4-hour run, have gotten out of the car, walked a short distance, and collapsed, due to partial carbon monoxide asphyxia.

Automobiles to be tested were taken at random. The tester entered the car with the carbon monoxide indicator and rode to the other end of a 4-mile test run, making a continuous reading of the carbon monoxide concentration at the driver's breathing level, while the car was driven at a normal speed. Comparative readings were taken with windows open and closed. Cordial coopera-

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EDUCATIONAL OPPORTUNITIES—

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University of Washington, Seattle	Three-hour lecture course covering introduction to industrial hygiene and industrial toxicology offered to physicians, engineers, and chemists; elective for undergraduate medical, engineering, and chemistry students; required of industrial nurses.
	Industrial hygiene and air pollution service laboratory established. Two or three graduate students from College of Engineering assigned for 1-year graduate training.

Courses for Nurses

School of Public Health, University of California at Berkeley.	(See listing under courses for physicians.)
University of California at Los Angeles	B. S. degree with specialization in industrial nursing.
School of Medicine and Institute of Occupational Medicine and Hygiene, Yale University, New Haven, Conn.	M. P. H. and M. S. open to nurses.
School of Public Health Nursing, Loyola University, Chicago, Ill.	Three courses in the field of industrial nursing are offered during the academic year. Credit may be applied toward B. S. P. H. N.
Boston College, Boston, Mass.	Full program of studies in industrial nursing.
School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.	(See listing under courses for physicians.)
School of Public Health, University of Michigan, Ann Arbor.	(See listing under courses for physicians.)
School of Public Health, University of Minnesota, Minneapolis.	General courses related to industrial hygiene. May be applied toward B. S.
Seton Hall College, South Orange, N. J.	B. S. in nursing education with major of 30 semester hours in industrial nursing.
School of Public Health, Columbia University, New York, N. Y.	(See listing under courses for physicians.)
Teachers College, Columbia University, Division of Nursing Education, New York, N. Y.	Industrial nursing and industrial hygiene are part of major in public health nursing.
School of Nursing Education, St. John's University, Brooklyn, N. Y.	Beginning in September 1951, elective courses in industrial nursing and industrial hygiene offered in the public health nursing program.
School of Education, New York University, New York, N. Y.	Course in industrial nursing practice offered.
School of Nursing, University of Pittsburgh, Pittsburgh, Pa.	B. S. degree in nursing education with a major in industrial nursing; 2-year course which includes two months of industrial field experience.
University of Washington, Seattle	B. S. in industrial nursing offered graduate nurses, field work included.

Courses for Engineers

School of Public Health and College of Engineering, University of California at Berkeley.	M. S. in Engineering or M. P. H. open to qualified candidates; courses in sanitary engineering, sanitary air analysis, and industrial health.
School of Engineering, University of California at Los Angeles.	Undergraduate, elective course in industrial sanitary engineering, 45 hours, three units credit.
School of Medicine and Institute of Medicine and Hygiene, Yale University, New Haven, Conn.	M. P. H. and M. S. open to engineers.
Postgraduate School, Georgia School of Technology, Atlanta.	M. S. in public health with major concentration in public health engineering, sanitary biology, sanitary chemistry, and industrial sanitation.
School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.	(See listing under courses for physicians.)
School of Public Health, Graduate School of Engineering, Harvard University, Boston, Mass.	(See listing under courses for physicians.)
School of Public Health, University of Michigan, Ann Arbor.	(See listing under courses for physicians.)
University of Minnesota, Minneapolis	Three-credit course in industrial hygiene engineering. Other related courses.
School of Public Health, Columbia University, New York, N. Y.	(See listing under courses for physicians.)
Institute of Industrial and Social Medicine, College of Medicine, New York University, New York.	(See listing under courses for physicians.)
School of Public Health, University of North Carolina, Chapel Hill.	Elective course in industrial hygiene and sanitation.
School of Medicine, University of Pittsburgh, Pittsburgh, Pa.	Course offered in industrial hygiene engineering.
University of Texas, Department of Civil Engineering, Austin.	3-hour course in industrial hygiene.
University of Utah, Salt Lake City	(See listing under courses for physicians.)
University of Washington, Seattle	(See listing under courses for physicians.)

Courses for Chemists

School of Medicine and Institute of Occupational Medicine and Hygiene, Yale University, New Haven, Conn.	M. P. H. and M. S. open to chemists.
Postgraduate School, Georgia School of Technology, Atlanta.	(See listing under courses for engineers.)
School of Public Health, Columbia University, New York, N. Y.	(See listing under courses for physicians.)
School of Public Health, University of North Carolina, Chapel Hill.	Graduate courses in Department of Chemistry, dealing with instrumental analysis, industrial chemistry, and detection of poisons.
School of Medicine, University of Pittsburgh, Pittsburgh.	Course offered in industrial toxicology.
University of Washington, Seattle	(See listing under courses for physicians.)

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tion was obtained from drivers and passengers of all cars included in the survey.

When the concentration of carbon monoxide in the car was found to be higher than 0.01 percent, the source of the trouble was located by checking along the exhaust system with the car at a standstill and the engine idling. Large defects, such as broken mufflers and missing tail pipes, were obvious on visual inspection. Small leaks in the exhaust line, unnoticeable on casual inspection, were immediately apparent when the flexible hose attached to the carbon-monoxide indicator was held at these points. Defects were pointed out to the driver, with recommendations for repairs.

Summary of Findings.—Of the 1,605 automobiles in which determinations of carbon monoxide concentration were made, 30 cars, or 2.9 percent, contained concentrations of the gas in excess of the safe limit; 50 percent of these potentially dangerous cars were 10 or more years old.

In a majority of cars in which comparative readings could be made with windows both open and closed, the concentration of carbon monoxide was higher when one or more windows was open than when all windows were tightly closed. This was particularly noticeable in cars with tight floor coverings, and with no large openings in the dash. This illustrates the fallacy of the widespread belief that keeping windows open while driving is in itself a guarantee of protection against gas. On the contrary, if gases are escaping from the exhaust system, the suction created by open windows may draw into the car larger quantities of gas than would enter with windows closed.

In each of the 30 automobiles in which a concentration of carbon monoxide in excess of 0.01 percent was found, the trouble was traced to defects in the exhaust system. In the absence of exhaust-system leaks, the amount of gas reaching the breathing level of driver and passengers was greater in cars equipped with short exhaust pipes than in cars with long pipes.

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Determination of Paranitrophenol in Urine in Parathion Poisoning Cases

By J. T. Mountain, Harry Zlotolow, and Gregory T. O'Conor*

THE NEED FOR tests for detection of organic phosphate insecticides or their breakdown products in the blood or urine has been emphasized by Abrams (*1*). In studies on the detoxication of parathion in the animal body, it was found that p-nitrophenol appears in the urine as a result of enzymatic hydrolysis by the tissues (*2*). A procedure was developed for the determination of p-nitrophenol in the urine; with slight modifications this procedure has also been used for the determination of parathion as well as p-nitrophenol under various conditions.

Although very low concentrations of p-nitrophenol (as small as 0.125 mg/l), in alkaline solution, are distinctly yellow and have an absorption maximum at about 400 mμ. The presence of urinary pigments and other substances interfere with direct measurement of the color due to the nitrophenol. For this reason it was necessary to use some other procedure to attain a greater degree of specificity, sensitivity and freedom from interfering substances. Modifications of methods employing the indophenol blue reaction as applied in the estimation of p-nitrophenol (*3*) and p-aminophenol proved to be satisfactory.

Principle of the Method

The urine is treated with alkaline lead acetate, followed by disodium phosphate. This treatment removes part of the pigments of the urine, as well as excess lead and other ions. The p-nitrophenol is extracted from the urine, acidified with citric acid, into ether-isoamyl alcohol mixture. Alkali is employed to extract the compound from the organic solvent, and after neutralization with citric acid, the nitrophenol is reduced to p-aminophenol by treatment with titanium trichloride. The aminophenol, made to pH 7–8 by ammonium carbonate, is extracted into ether-isoamyl alcohol, returned to dilute hydrochloric acid, and measured as indophenol blue following treatment with phenol and borax buffer solution.

Apparatus

Centrifuge.
50 ml. centrifuge tubes.
125 ml. separatory funnels, with glass stoppers.
5 and 10 ml. graduated pipettes.
Photoelectric colorimeter with monochromator or filter to furnish light of 630 mμ wave length.

Reagents

Sodium hydroxide, 1N.
Lead acetate, 20 percent w/v.
Disodium phosphate, saturated.
Citric acid, 10 percent w/v.
Sodium citrate, 10 percent w/v.
Citrate-citric acid mixture—mix equal volumes of 10 percent solutions of citric acid and sodium citrate.

Ether-isoamyl alcohol solvent mixture—to each 100 ml. of ether taken, add 1.5 ml. of isoamyl alcohol. Reagent grade chemicals should be used. Should purification be necessary, the compounds are each washed once with 1N NaOH, 1N HCl and three times with water. The isoamyl alcohol is used in the mixture to minimize adsorption from solvent onto glass surfaces (*4*).

Titanium trichloride reagent—the 20 percent analytical reagent is diluted with water, 1:100. Prepare as needed; the dilute reagent should be free from turbidity.

Ammonium carbonate—the lump reagent is pulverized.

Borax buffer, pH 9.6—dissolve 30 g. borax crystals in 800 ml. hot water. Cool, bring to pH 9.6 by addition of NaOH solution.

Phenol, C. P., 5 percent w/v.

p-nitrophenol standard solution, 5 gammas/ml.—prepared by diluting with water, a solution containing 1.000 gram p-nitrophenol in 1 liter 0.05 N NaOH.

Procedure

A quantity of sample containing up to 100 gammas of p-nitrophenol is pipetted into a centrifuge tube. For each 10 ml. of urine there is added 1 ml. 1N NaOH and 1 ml. of lead acetate. After mixing, 1 ml. of disodium phosphate solution is added followed by a measured amount of distilled water to yield a total volume convenient for aliquoting. The precipitate is then centrifuged down.

An aliquot of the liquid is transferred to a 125 ml. separatory funnel and acidified with 10 percent citric acid, about 6 ml. of the acid solution being used for each 10 ml. of urine represented in the sample. Add 50 ml. of ether mixture and shake 1 to 2 minutes. Allow to separate, draw off and discard most of the aqueous layer. Add 25 ml. of citric acid-sodium citrate mixture, shake briefly, separate and discard the citrate layer, avoiding loss of any of the ether layer.

To the funnel add 7 ml. of 1N NaOH, shake 1 to 2 minutes and carefully drain the NaOH extract into a 25 ml. glass stoppered cylinder so as not to leave any of the alkali in the stem of the funnel. Add 5 ml. water to the funnel, shake, and again collect the aqueous layer in the cylinder. Add to the contents of the cylinder 7 to 10 ml. of 10 percent citric acid; the pH should be between 3 and 6. Add 3 ml. of 1:100 $TiCl_3$, mix, and make up to the 25 ml. mark with water, if necessary.

Transfer 10 ml. portions from the cylinder to each of two separatory funnels. To each add 0.5 gm. pulverized ammonium carbonate; shake to dissolve—the pH should be 7–8. Add 100 ml. of the ether mixture and shake vigorously for 5 minutes. (A funnel shaking machine is desirable for this part of the process.)

Allow the layers to separate; drain and discard the aqueous layer. Add 10 ml. of N/10 HCl to the funnel, shake again 3 to 4 minutes and carefully separate all the acid layer, draining it into a 25 ml. cylinder. Run 2 to 3 ml. of water into the funnel, allowing it to settle to the bottom; drain this into the cylinder. To the acid extract from one of the two funnels add 1 ml. of five percent phenol and fill cylinder to 25 ml. with borax buffer solution. Pour

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contents of cylinder into beaker or large test tube (25 by 250 mm.), let stand, with occasional shaking for 1 to 2 hours until maximum color has developed. Warming to 60° C. hastens this. The acid extract from the second funnel serves as a blank: phenol is not added to this, otherwise the procedure is identical.

Determine the optical densities of the solutions at 630 mμ, setting the instrument for 100 percent transmission with distilled water. In practice, it has been found that the procedure described above yields very low blanks in most cases, and frequently blank corrections are not essential.

Standard Curve and Recoveries

The standard curve for indophenol blue from p-nitrophenol obeys Beer's Law over the range of concentrations examined. For a convenient working range a curve may be prepared to check recoveries as follows: To glass stoppered cylinders containing 5 ml. of 10 percent sodium citrate add quantities of the standard p-nitrophenol solution (5 gammas per ml.), containing ½ to 20 gammas. To each cylinder add 3 ml. of $TiCl_3$, 1:100, 1 ml. of 5 percent phenol and dilute to 25 ml. with borax buffer. Measurements were made using a Coleman model #11 spectrophotometer, but a filter instrument may also be used.

Recovery of p-nitrophenol added to urine ranged from 90 to 100 percent when put through the centrifuging and extraction, comparing color produced by aliquots with that of p-nitrophenol treated as in the preparation of the standard curve. This held true when quantities as large as 120 ml. of urine containing 12 gammas of p-nitrophenol were put through the procedure. In analyzing samples of large volume, the quantity of ether used to extract the nitrophenol was increased to 100 ml. If emulsions formed, the funnel was held under running hot water to aid separation of the aqueous layer and extra ether was added. Foam in the ether layer will disperse during the alkali extraction step.

In analyzing tissues for total parathion and p-nitrophenol content, the tissue was homogenized in a Waring Blendor with N/10 NaOH. The suspension was heated to boiling for 10 to 15 minutes to complete the hydrolysis of the parathion, and then treated in the same way as urine, but with another centrifuging included after the acidification with citric acid.

Remarks

The transfer of p-nitrophenol from citric acid solution to ether and from ether to aqueous alkali appears to be a very efficient process. The extraction of p-aminophenol at pH 7–8 into ether and from ether into N/10 HCl depends on the volume of ether in relation to the volume of solution containing ammonium carbonate and citrates at pH 7–8. This process approaches 100 percent efficiency when the conditions described in the procedure are maintained.

The lead treatment and centrifuging may often be omitted when dealing with materials other than urine and tissues. If it is desired to remove unchanged parathion, this may be done by making the aqueous sample weakly alkaline (pH 8–9) and extracting it with some of the ether mixture. The alkaline solution is then treated in the regular way.

Acknowledgment

The authors are indebted to Dr. R. M. Lollar of the Tanners' Council Laboratory, University of Cincinnati, for helpful information.

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CALLING YOUR ATTENTION

An illustrated pamphlet, *Health Hazards Ahead in Automobile Repair*, has been issued by the Industrial Hygiene Service, Tennessee Department of Public Health, Nashville. The hazards discussed are those from carbon monoxide, spray painting, toxic metal fumes, solvents, and the lack of sanitation.

CARBON MONOXIDE—

(Continued from page 87)

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(7) Bloomfield, J. J. and Isbell, N. S.: The Problem of Automobile Gas in Streets and Repair Shops of Large Cities. Public Health Reports, Vol. 43, No. 13, March 30, 1929.

RECOMMENDED READING

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An Evaluation of the Methods Used by Various Laboratories in the Determination of Free Silica

By A. S. Landry [1]

HERE IN PERU, where mining is of major consequence in the national economy, the importance of free silica determinations for use in the evaluation of a silicosis hazard is apparent. For reasons of time economy, and to obtain increased accuracy, we worked out a modification of the phosphoric acid method of Durkan.

This laboratory was also interested in knowing what methods are in present use among other industrial hygiene laboratories of the various State, municipal and Federal units. A questionnaire was prepared and submitted to 55 different laboratories, 68 percent of which submitted a reply.

Our form requested information on five basic items, namely: Method used, number of determinations made including controls, maximum deviations, accessibility to platinum Monroe, and willingness to cooperate on checking our method.

The results of this study will be of interest and value to all chemists concerned in the determination of free silica. This is specially true if all the various methods could be checked through analyzing one standard sample. In this way the two interests as indicated in the first paragraph of this paper can be readily correlated.

Of the replies received, 50.8 percent indicated willingness to collaborate. Only 10 of these had the necessary Monroe crucibles inherent in the use of our procedure. Of considerable interest, however, is the fact that five laboratories had access to X-ray diffraction equipment.

Consequently, a standard free silica sample containing also orthoclase, mica, calcite, dolomite, and kaolinite, was carefully prepared, ground to pass 200 mesh, and successively quartered to produce approximately 20 separate portions that weighed 0.5 gram each. These were submitted to the collaborators on the basis of the popularity of the methods (as indicated by the replies to our questionnaire (see table I). Several of the laboratories were asked to do the analysis according to our procedure for purposes of statistical control. It is invariably true that the designer of a method is so familiar with it that he gets good results; the acid test, however, is how the method performs in other hands.

The results of these differential analyses and the statistical significance are shown in Table II (opposite page). Naturally, to evaluate each method completely, it would be imperative to analyze one sample many times by that same procedure. It is apparent, however, that this has been done in respect of our procedure; namely, portions SM-2-IV a, b, c, d, e, f, and SM-2-XI. In any case the single results obtained by the other methods represented can point out serious discrepancies and suggest an investigation for the location of the error on the part of the interested laboratory.

A statistical evaluation of the results has been made through the use of a "control chart", a well-known procedure explained in a previous paper.[2] The majority of the data falls within the mean ± one standard deviation. It is interesting to note further that practically all the results are within the mean ±5 percent, which figure had been mentioned as an acceptable range by several of the replies to our questionnaire.

As a general conclusion, it may be stated that the proposed method yielded uniformly accurate results when used by several different laboratories. Knopf's, Goldman's and X-ray diffraction methods can also perform satisfactorily, but large variations have been noted.

The obvious suggestion then is to hope that the Standards Committee of the American Conference of Governmental Industrial Hygienists become cognizant of the possible errors in the free silica determination and name a referee to control this analysis—not in the light of setting up a standard method but rather from the viewpoint of statistical control of presently existing procedures.

Any comments or suggestions that the reader may care to make will be cordially welcomed, and we would like to express again our appreciation to the laboratories that collaborated on this project.

TABLE I

Method	Number of laboratories using method	Total estimated number of analyses by method
Knopf	9	1,365
Goldman	4	131
X-Ray diffraction	2	290
Durkan	2	87
Trostel and Wynne	1	30
Line and Aradnine	1	12
Miscellaneous	7	569
No analyses	11	....
Total	37	2,484

[1] Industrial Hygiene Chemist, Division of Health and Sanitation, Institute of Inter-American Affairs, c/o American Embassy, Lima, Peru.

[2] Landry, A. S. Statistical Control in Industrial Hygiene Laboratories, *Industrial Hygiene Newsletter*, Vol. 10, No. 11. (Nov. 1950)

Bibliography on Small Plant Health Programs Compiled by PHS

A BIBLIOGRAPHY on small plant health programs is recently off the press and available from the Division of Industrial Hygiene, Public Health Service, Washington 25, D. C. It was compiled and annotated by Dr. Walter J. Lear.

Small plants, shops, and offices rarely provide industrial health services for their employees. With limited staffs, owners and managers of many small plants are too occupied with the details of production, sales, finances, and personnel, to give adequate attention to health problems. Then, too, they frequently do not know what an industrial health program is, and, if they do, they are not aware that it is an economically sound investment for a small plant.

Large establishments, on the other hand, usually acknowledge the desirability of industrial health programs and provide such services to their employees. Despite general impressions, however, large industries do not predominate in the United States. In fact, the contrary is the case: of all work establishments in the country, over 99 percent have less than 500 employees, and these employ over 70 percent of all workers.

Health hazards are just as real in these small concerns as in their larger counterparts. Nor is the smallness of a work place a valid reason to overlook the ever-present requirements for proper lighting, temperature, ventilation, and sanitary facilities.

With fewer workers, the small industry frequently depends more on the continuous and efficient productive efforts of the individual worker than does the large establishment. The economic importance of keeping workers on the job and healthy is obvious. This can be done by industrial health programs that include physical examinations, prompt care of occupational disabilities and general medical emergencies, and maintenance of a healthful working environment.

The need to develop small plant health programs is given new urgency by the present mobilization and the increasing importance of manpower conservation. This problem can be met only by the concerted and intensified efforts of all groups interested in and responsible for the health of workers—industry, labor, industrial health personnel, and governmental agencies.

This bibliography has been prepared to focus attention on this problem and help answer the many requests for information on small plant health programs. It is intended as a practical guide to the industrial health literature which, in part or in whole, relates specifically to work establishments having less than 500 employees.

The bibliography covers periodicals issued since 1939 and pamphlets and books now generally available. It does not include references concerning the clinical or technical aspects of occupational diseases and their control.

TABLE II

Laboratory Code	Curve Code Figure I	Percent Free Silica		Mean Difference	Mean Difference Squared or d²	Method
		Present	Reported			
SM-2	A	24.9	23.0	−1.4	1.96	X-ray diffraction.
SM-2-I	B	24.9	25.4	1.0	1.00	Collaborator's.
SM-2-II	C	24.9	23.7	−.7	.49	Landry's.
SM-2-III	D	24.9	24.9	.5	.25	Knopf's.
SM-2-IV-a	E	24.9	24.3	.1	.01	Landry.[a]
SM-2-IV-c	F	24.9	24.4	0	....	Landry.[a]
SM-2-IV-d	G	24.9	24.5	.1	.01	Landry.[a]
SM-2-IV-e	H	24.9	24.6	.2	.04	Landry.[a]
SM-2-IV-f	I	24.9	25.0	.6	.36	Landry.[a]
SM-2-IV-g	J	24.9	24.8	.4	.16	Landry.[a]
SM-2-IV-h	K	24.9	24.3	−.1	.01	Landry.[a]
SM-2-V	L	24.9	(20.4)	(−4.0)	....	Essentially Knopf's.
SM-2-VI	M	24.9	24.1	−.3	.09	Modified Durkan—Landry.[b]
SM-2-VII	N	24.9	(34.2)	(9.8)	....	X-ray diffraction.
SM-2-VIII	O	24.9	23.7	−.7	.49	X-ray spectrometer.
SM-2-IX	P	Unreported to date		....	....	
SM-2-X	Q	24.9	25.0	.6	.36	Hydrofluosilicic.
SM-2-XI	R	24.9	24.9	.5	.25	Landry.[a]

Mean (M)=24.44, $\Sigma d^2=5.48$. Mean does not include SM-2-VII value of 34.2 percent, or SM-2-V of 20.4 percent.

[a] All these analyses conducted in our laboratory.

[b] Petrographic technic used according to our procedure.

Public Health Service Issues Source Book on Industrial Health and Medical Programs

A SOURCE BOOK entitled *Industrial Health and Medical Programs* has been released recently by the Division of Industrial Hygiene, Public Health Service. Sample copies have been distributed to the State and local industrial hygiene units and other organizations primarily concerned with this phase of industrial hygiene.

Although much has been written about industrial health and medical programs, it is widely scattered in various journals, bulletins, and books. This reference book has been prepared to meet the need for a convenient compilation of published material on the subject.

The primary purpose of the compilation is to assist individuals either directly responsible for these programs or having a major interest in them, such as plant medical directors, company executives, industrial physicians and nurses, governmental industrial hygienists, trade union leaders, trade association officials, and public health officers.

The text consists entirely of direct quotations from the indicated sources. In selecting the material, statistical data were chosen wherever possible. No original items were included in the book.

Data for the reference book were selected from 260 books and publications, and arranged in eight sections. The first three provide background information about industry, the working population, the health of the worker, and the historical developments in the field of industrial health. The next three sections describe plant health and medical services—their type and extent, the professional personnel employed, and such other items as facilities and equipment, costs, and savings. The two final sections concern other health and medical programs for industrial workers, including general information on prepayment medical care plans, governmental industrial hygiene services, State disability insurance programs, and professional, research, and educational organizations engaged in industrial health activities.

The horizon of the field of industrial health has expanded in recent years from a circumscribed interest in the control of industrial health hazards to a comprehensive approach to the total health needs of the employed population.

This expanded concept has resulted from a growing recognition by management, labor, and the health professions of the great opportunities that the extension of all industrial health work offers for the prevention and early detection of illness, for the improvement of efficiency and productivity, and for the reduction of losses caused by absenteeism for medical reasons.

To facilitate the work of the Public Health Service and that of other agencies and individuals working in this field, the Division of Industrial Hygiene has prepared this source book of information. It should be useful to all those concerned with any aspects of the health of working people.

Leonard A. Scheele,
Surgeon General,
U. S. Public Health Service.

This source book of 397 pages was compiled by Margaret C. Klem, Margaret F. McKiever, and Walter J. Lear, M. D., staff members of the Division of Industrial Hygiene, Public Health Service. A limited supply of the volume is available for free distribution from the Division. Copies may be purchased for $1 from the Superintendent of Documents, Government Printing Office, Washington 25 D. C.

Because this is an anniversary issue in which we take cognizance of past achievements, we are reprinting from the source book selected events listed in chronological order in the section on historical development.

1607 First industrial workplace in the Colonies, a glass-bottle factory, was established in Jamestown, Va.

1780 Petersburg, Va., was the first locality to establish a board of health; New York had one of some sort in 1796, Baltimore in 1798, and the town of Boston in 1799.

1837 First paper to appear in the United States on the problems of industrial medicine was the prize essay *On the Influence of Trades, Professions, and Occupations in the United States in the Production of Disease*, written for the Medical Society of the State of New York by Benjamin W. McCready, later one of the founders of Bellevue Hospital Medical College and of the New York Academy of Medicine. He relied heavily on English authorities, principally Charles T. Thackrah.

1847 New Hampshire passed the first law of its kind in this country setting 10 hours of work a day as the general standard for all workers in the absence of "an express contract requiring greater time." It also passed the first law limiting hours of work for women in manufacturing establishments.

1848 Pennsylvania was the first State to pass a law forbidding child labor. It applied only to the employment in textile establishments of children under 12 years of age, a standard which, in the following year, was raised to age 13. In 1851 New Jersey forbade the employment of children under 10 in manufacturing establishments.

1855 Louisiana established first State board of health as a result of recurrent yellow-fever epidemics, but the board became quiescent and practically nonexistent. Massachusetts in 1869 established the first State board of health which remained effectively in existence from the time of its original organization.

(Continued in next issue)

CALIFORNIA

Doctors in Industry.—The Bureau physicians participated in health promotion week in Los Angeles, bringing problems of industrial health to the attention of the general practice section of the Los Angeles County Medical Association. As a result of this activity, further presentations of the subject to both the general practice and the industrial medical sections of the society are expected.

Administration.—The Bureau of Adult Health of the State Department of Public Health and the Division of Industrial Safety of the Department of Industrial Relations cosigned a letter to all new plants in California, explaining briefly the services of the two State units. The names of the new plants are supplied by the Division of Labor Statistics and Research to not only the State Board of Health but also the health officer of the city and county in which the factory is located. This cooperative informational program is only one of many that helps to insure the health of the workers and to aid industrial management in solving many problems.

LOS ANGELES, CALIF. (CITY)

Cyanide Fumigation. — Several months ago we made a series of tests in a large cereal firm for any excessive residual cyanide in the treated grain, as suspected by the Bureau of Foods and Drugs. We, of course, were directly concerned with the cyanide hazard to exposed workers in the mill. On the basis of our study we reported to the manager of the Los Angeles branch, the existence of serious potential hazards to the workers, and we proposed several methods for engineering control of these hazards. The production manager of the firm's countrywide operations wrote us that he had instructed all its mills to cease use of the cyanide fumigation method, and to substitute a safer fumigant.

Nursing in Industry.—During a recent follow-up visit to a plant where a practical nurse had been doing an excellent job, we were disappointed to find that she had been transferred back to production operations. However, because of her performance, management was so convinced of the value of industrial nursing, that they had replaced her with a registered nurse who had worked 5 years in a much larger firm.

The new nurse was surprised when the management permitted her to accompany us on the plant tour. In her previous employment, she was restricted to the plant dispensary and had never observed the actual plant operations. Now she will be able to correlate the worker's injury or illness with his work, and may help to prevent a recurrence. Her industrial education is being widened in the smaller plant.

Defense Plans.—A bulletin has been issued to industrial personnel to provide basic information as a guide for planning and building an emergency medical service. Dr. George M. Uhl, city health officer, mailed 14 pages of mimeographed instructions to area medical directors, plant managers, plant medical directors, industrial physicians and surgeons, nurses, and safety engineers.

MASSACHUSETTS

Institute.—Dr. Hervey B. Elkins, chief of laboratory, spoke at the Institute on Industrial Hygiene held at Chapel Hill, N. C. on April 4. The School of Public Health, University of North Carolina, in cooperation with the Department of Labor, Board of Health and Industrial Commission, held the institute to promote interest in industrial health.

University Seminar.—A group of graduate students in the School of Sanitary Engineering at Massachusetts Institute of Technology have been taking part in a series of seven weekly seminars on various technical phases of industrial health. Among the principal speakers leading the group were Dr. Harriet L. Hardy, and Dr. Harvey B. Elkins of the Division of Occupational Hygiene.

Conference.—The Division of Occupational Hygiene sponsored a session on industrial hygiene at the annual Massachusetts Safety Conference held on March 19 and 20. Director John B. Skinner, as chairman, introduced Stanley C. Ballard, field industrial hygienist with the Liberty Mutual Insurance Co., who spoke on "The Effect of Good Plant Housekeeping on Atmospheric Contamination." Benjamin P. W. Ruotolo, chemist with the Division, gave an address on "What's New with Carbon Tetrachloride," and Dr. George E. Morris, practicing dermatologist, talked on "Trauma and its Treatment as a Common Cause of Dermatitis." Discussion periods followed each speech.

Civil Defense.—Industrial nurses are taking the lead in organizing training programs for civil defense. Three classes have been held in Boston, with a total attendance of 85 nurses. The Boston instructors include Elsa Larsen, R.N., President, Massachusetts Association of Industrial Nurses; Ethel Hodgdon, R.N., President, Greater Boston Branch of the New England Industrial Nurses Association; Hannah Moore, R. N., President, Massachusetts Associa- and Sarah E. Almeida, R.N., Supervising Occupational Hygiene Nurse, Massachusets Department of Labor and Industries.

OREGON

Air Pollution.—The air pollution control bill drawn up by a subcommittee of the Governor's Committee on Natural Resources has undergone extensive revision since its introduction in the State legislature early in January. It is expected that the bill will be reported out shortly by the Senate committee on Public Health.

Personnel.—Mr. Robert K. Palmer recently joined the staff of the Industrial Hygiene Section, Oregon State Board of Health, as industrial hygiene engineer. Mr. Palmer is a chemical engineering graduate of Louisiana Polytechnic Institute.

(Continued on page 95)

From the Laboratory

DETERMINATION OF LEAD IN ATMOSPHERE AND URINE

By Robin E. Moser*

MY FIRST comment concerns the determination of atmospheric lead by the polarographic method given by Levine in the *Journal of Industrial Hygiene and Toxicology* for June, 1945 (vol. 27, p. 171). According to this procedure, nitric and hydrochloric acids are added to the sample suspensions, and they are evaporated to dryness. We have found that if ethyl alcohol has been used to wash the precipitator tubes, deposits of gummy material are formed, probably due to oxidation of the alcohol and subsequent polymerization. Samples containing this gum gave polarograms with very poor inflections and always high results. If alcohol has been used, it should be evaporated off before adding the acid. If both alcohol and nitric acid have been used to wash the tubes, the dish containing the dried suspensions and gum may be ignited at 500°–600° C. for a few minutes to destroy the gum. In either case, good polarograms resulted.

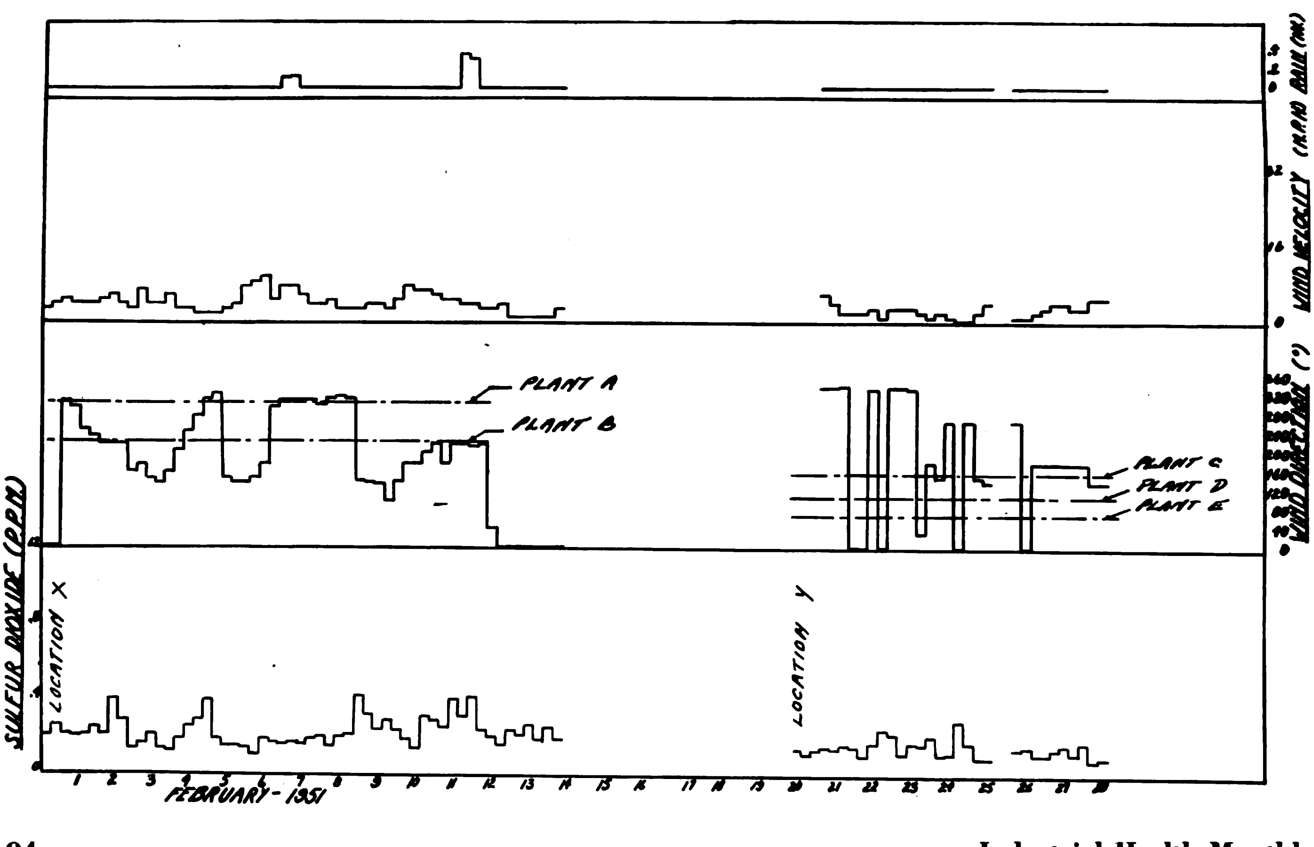
My second comment is concerned with the rapid screening test for urinary lead given by Cholak, Hubbard, and Burkey in the *Journal of Industrial Hygiene and Toxicology* for January 1948 (vol. 30, p. 39). In their discussion the authors refer to the fact that ammonium dithizonate is stable for long periods of time when stabilized by sodium sulfite. Possibly this remark should be sufficient to warn the person preparing the buffer solution that the ammonia solution of dithizone is quite unstable, and must be added to the solution containing the citrate, sulfite and cyanide as soon as possible. Our experience has shown that allowing the dithizone to stand in ammonia, sometimes even only a few minutes, results in decomposition to such an extent that extremely weak colors with lead are produced. It is not necessary to wait for the dithizone to dissolve completely in the ammonia before adding it to the citrate sulfite-cyanide solution. The ammonia solution must not be allowed to stand until it begins to bleach. In such cases the final buffer will be useless.

*Dr. Moser is a chemist with the Industrial Hygiene Section, Oregon State Board of Health, Portland 5, Oreg.

Detroit Bureau Uses Continuous Recording Instruments on Air Pollution Control Truck

By John F. Stephens and Philip Diamond

AROUND-THE-CLOCK air sampling is being done in Detroit by means of a mobile unit in cooperation with the Bureau of Smoke Inspection and Abatement. In order to determine specific sources of pollution and the effect of micrometeorological influences on atmospheric contaminants, various weather instruments are used. Continuous charts of wind direction and velocity are made by means of a Bendix-Friez anemometer. The vane propeller mast of this instrument is mounted on a specially built platform on top of the truck. On the platform is a Universal Rain Gauge. This gives an 8-day recording of rainfall to the nearest .05-inch.



Bendix-Friez hygrothermographs give a constant recording of temperature and humidity, and are mounted within a specially constructed weather shelter which is attached to the mast. Also attached to the mast of the truck are two filter paper collectors as previously described in the *Industrial Hygiene Newsletter* (*1*). A dual sampling head is used, and a Rockwell gas meter and Leiman pump are in the truck. The filter paper sampling is in an experimental stage and one filter paper is used for SO_2 determinations, while the other is for sampling airborne particulate matter.

A Thomas autometer within the truck samples continuously for sulfur dioxide. When properly adjusted and calibrated (*2*), this instrument records in parts per million the amount of SO_2 present in the air. Any other substance which increases the conductivity of the absorbing solution will also be recorded.

The directions from the truck of plants suspected of excessive SO_2 output are indicated on the monthly graph by broken horizontal lines. Sulfur dioxide readings may then be correlated with points where the plant direction agrees with the actual wind direction to observe the plants' influence. All of the original data have been condensed by using average values over a 6-hour period.

References

(*1*) Vol. 10, No. 5, Industrial Hygiene Newsletter.

(*2*) Vol. 11, No. 3, Industrial Hygiene Newsletter.

STATE AND LOCAL NEWS—

(Continued from page 93)

Osmium Tetroxide.—A college instructor developed minor symptoms after a short exposure to osmium tetroxide vapor. A one-gram capsule of the tetroxide was opened and the contents used to make a 1-percent osmic acid solution, the process requiring about 15 minutes. The highest exposure was at the opening of the capsule when the irritating vapor caused slight coughing. The symptoms consisted of giddiness, throat irritation, some coughing, and pain in the shoulder muscles. Vision was not affected. A cramping sensation in the chest on deep inhalation and headache were still felt 4 days after the exposure. One other man in the laboratory at the time the vial was opened experienced headache for several days thereafter.

TEXAS

Texas Section, AIHA.—The newly organized section of the American Industrial Hygiene Association has 17 members. Safety and sanitary engineers concerned with industrial health will be invited to become associate members.

The main project of the Texas section is to sponsor and assist in the promotion of the Annual Gulf Coast Industrial Health Conference. The fourth conference will be held this year on October 4–6 at the Rice Hotel, in Houston. The various committees have been formed, and the broad program has been proposed. The general topics that have been selected for this conference are the cancer problem in the industrial population, industrial dermatitis, exhaust ventilation, and the health aspects of an industrial disaster program.

Civil Defense.—Approximately 60 members of the Health Officers and Engineering Sections of the Texas Public Health Association heard a panel discussion on civilian defense at a recent meeting. In addition to participating in the panel, members of the central office staff also gave a lecture supplemented by slides and a demonstration of radiation detection equipment. Mr. Martin C. Wukasch was elected secretary of the Engineering Section for the coming year.

INDUSTRIAL HEALTH MONTHLY—

(Continued from page 82)

sonal contacts and sample distribution. Names have been added only on individual request. At the present writing, there are 5,367 names on the official mailing list and 1,077 paid subscriptions.

When the last breakdown of the mailing list was made, it showed that 60 percent of the readers were in industry, 25 percent in Government employment, and 15 percent in universities, libraries, hospitals and other organizations.

The surplus copies, which average 500 a month, have been used consistently to introduce the publication more widely. Part of the plan has been to place on the mailing list only temporarily, persons who are concerned with industrial health but are not entitled to receive it free officially. After a reasonable period of time, these persons are dropped from the free official list and are invited to subscribe to the publication through the Superintendent of Documents. By using the surplus copies regularly each month, it has been possible to introduce the publication to about 1,500 new readers a year.

Content

The subject matter in the early years was concerned with administrative problems, educational activities, committee work, personnel news, and reports of studies in industries. Some material on toxicology, ophthalmology, dermatitis, and engineering equipment was printed in the 1947–48 numbers.

Trends in developing industrial health programs and information on occupational disease reporting, oral health, illumination, and radiant energy were subjects of articles in 1948. Excellent contributions from the State units stimulated the interest of other State chemists and engineers in contributing interesting information on subjects such as lead hazards from sand buffing, new apparatus for collecting halogenated hydrocarbons, the health of tunnel workers, and sight conservation.

Contributors from outside the Federal and State staffs became more frequent, writing, for example, on silicosis, industrial nursing, and medical care. PHS staff members contributed articles on anthrax, sound, air pollution, and X-ray shoe-fitting machines. The "Here's How" column, though it did not appear in every issue, received contributions over a period of 18 months.

Interest in international industrial health affairs was fostered by numerous callers from foreign countries, one of the reasons the foreign mailing has increased so rapidly.

The Charlie Craftsman series of illustrated articles on common health problems, which ran during 1949, was an attempt to reach industrial house organs with reprintable materials. In September 1950, another series was started with the lectures that J. J. Bloomfield gave in South America. That series will probably continue for some months to come.

State participation in contributing articles reached its height in 1949 and has remained about the same since then. In 1950, 190 letters were received from the State and city units on publication business. Forty-one units contributed 134 articles during the year.

The States that have contributed material for feature issues are listed below:

March 1948—Utah.
April 1948—California.
September 1948—West Virginia.
October 1948—Connecticut.
November 1948—Nebraska.
December 1948—Georgia.
March 1949—Texas.
June 1949—New Jersey.
February 1950—Massachusetts.
October 1950—Wisconsin.
December 1950—Vermont.
January 1951—Hawaii.
April 1951—New York.

A review of the 1950 issues reveals that about 45 percent of the news is about or by the Division of Industrial Hygiene, PHS, while 38 percent is contributed by the States and 17 percent comes from others.

Invitation

With the broader service contemplated for the publication, specialists in the field of industrial health are invited to contribute articles on laboratory research, demonstration projects, plant programs, and other fields of endeavor. The INDUSTRIAL HEALTH MONTHLY offers a unique opportunity to industrial hygienists to share their ideas and findings with contemporaries in almost every country in the world.

Small Plant in Texas Reports Three Cases of Lead Poisoning

DURING a plant survey of the lead storage battery manufacturing industry in San Antonio, Tex., conducted jointly by engineers from the Texas State Department of Health and the San Antonio Health Department, it was learned that three workmen in one plant had recently become ill with lead poisoning.

The plant continued the manufacture of batteries on a very reduced scale since, out of a total of five employees, three were out due to lead poisoning.

One employee, the most severely ill, was under medical observation for 18 days. He was interviewed about 5 days after discharge from the hospital and exhibited the characteristic wrist-drop at the time of the interview. He was 44 years old and had worked in the battery industry for 23 years. This was his first case of lead poisoning. His duties at the time of his illness were burning groups, finishing, closing, and assembly. There were no provisions for local exhaust at any of the above-mentioned operations. The group burning was done in a corner of the plant where natural ventilation was negligible. An exhaust fan has since been installed at this location. Lead oxide from the dried plates was in evidence on the burning bench. The employee stated that he intended to resume his work as soon as he was able to do so.

Another employee, 65 years old, had worked in the battery manufacturing industry for a year and a half. He was only moderately ill and was back at work in a few days. His duties were of a general nature, including sweeping, and cleaning. Spilled lead oxides and dust were swept up from the wooden floor with a straw broom without any means being used to prevent the generation of dust.

The third employee sick with lead poisoning was only moderately ill and after recovery did not report back to work.

U. S. GOVERNMENT PRINTING OFFICE: 1951