ETHYL CORPORATION

MANUFACTURING AND TRAFFIC DEPARTMENT

July 14, 1944

PLEASE ADDRESS REPLY TO
CHRYSLER BUILDING
405 LEXINGTON AVE., NEW YORK 17, N Y

Dr. R. A. Kehoe
College of Medicine
University of Cincinnati
Eden and Bethesda Avenues
Cincinnati 19, Ohio

Dear Dr. Kehoe:

Attached hereto for your information and files is a copy of Bulletin No. 36, "Abstracts of Recent Literature on Lead Poisoning", published by the Lead Industries Association.

Yours very truly

J. H. Schaefer

Per J. D. Rielle

1-4

LEAD INDUSTRIES ASSOCIATION

420 LEXINGTON AVENUE

NEW YORK 17, N.Y.

JHS	JAC		
MR. WEBB			
RECD. JUL 1 1944			MFG. DEPT
	COMMENT	DRAFT REPLY	
FILE	HANDLE	NOTE	

July 7, 1944

LEAD HYGIENE AND SAFETY BULLETIN NO. 36

To Members of the Lead Industries Association:

Attached please find:

ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING.

(5 Pages)

Very truly yours,

F. E. Wormser

Secretary.

ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

REPORT OF THE BUREAU OF INDUSTRIAL HYGIENE (State of Connecticut). A.S. Gray, Director. 57th Report of the Connecticut State Department of Health, pp. 285-320. (1942). This routine report testifies to increasing activity in the number of field trips, plants visited, laboratory determinations, etc., and variety of subjects investigated, which include extensive studies of particular hazards presented by benzene, lead, fluorides, lacquering solvents, electrolytic alkali cleaning, electroplating and degreasing, with a number of other hazards encountered on a smaller scale. The number of surveys of industrial conditions was 923, and 182 studies of specific hazards were conducted. Publicity features included 25 radio talks. The work in the various fields is tabulated.

THE INFLAMMABILITY AND EXPLOSIBILITY OF METAL POWDERS. I. Hartmann, J. Nagy and H.R. Brown. U.S. Bureau of Mines, Report of Invest. No.3722, 44 pp. (October, 1943). Obtainable from Div. of Information, U.S. Bureau of Mines, Washington, D.C.
An extensive and thorough study of inflammability and explosibility of 14 metals and 2 alloys in powder form, was made in the dust explosion laboratory of the Experimental Coal Mine Section of the Bureau of Mines. The tests made usually included: (1) minimum ignition temperature and minimum energy needed for ignition of dispersions in air and of quiescent layers; (2) relative inflammability with two different sources of ignition; (3) minimum concentration required in a dispersion in air to permit ignition; (4) maximum pressure and rate of pressure rise in small explosions; (5) reduction in oxygen content of the air needed to prevent ignition; and (6) effect of a humid atmosphere on the powders. Most of the results are presented in tables, and the summary covers 3 pages, so only a few of the most striking results will be given here. The wall temperature required in a heated furnace to ignite powder dispersions in air varied from 315° to 900°C. according to the metal and conditions. A dispersion of zirconium sometimes ignites at room temperature. Very little energy is required for ignition by spark. Maximum pressure attained and rates of pressure rise vary widely. Magnesium gives the highest figures for both, 72 lbs. per sq. in. and 5,000 lbs. per sq. in per second, respectively, and only 0.05 second was required to reach the maximum pressure. A large explosion of that intensity would wreck a plant, and large relief vents would not prevent damage. The metals in decreasing order of inflammability are: (1) zirconium, magnesium and its alloys, aluminum and titanium; (2) reduced and carbonyl iron, manganese, zinc, silicon, tin and antimony; and (3) cadmium, copper, chromium, lead and milled iron. In diluting air with nitrogen, carbon dioxide and helium to reduce inflammability, it was found that titanium, zirconium and magnesium and its alloys ignite in pure carbon dioxide, whether dispersed or in a quiescent layer, and in nitrogen in a quiescent layer when heated sufficiently. Much work remains to be done on the subject, and 9 fields for future investigation are listed. Members interested in metal powders should obtain the entire report from the above address.

TOXICITY OF LEAD CHROMATE. G.C. Harrold and others. J.Ind. Hyg. & Tox., 26, 46-54 (February, 1944). It must be concluded, that larger quantities of lead when in the form of lead chromate may exist in the breathing zone without causing lead absorption than is true in the case of lead oxide. The criteria of the amount of lead allowable in the atmosphere should be raised considerably in the case of this type of compound. Atmospheric determinations of lead may cause erroneous conclusions if not substantiated by other data. While this paper does not pretend to cover other insoluble lead compounds which may act in the same way as lead chromate, the frequently recognized possibility that other and higher standards should be set up for certain lead compounds is supported. The use of a "packed tube" type of collector has proved useful in this investigation and should aid in similar types of investigation where accurate evaluations of atmospheric lead contamination are needed. Work completed several years ago and being prepared for publication now, on the solubility of several lead compounds in blood serum and lung fluid, indicates that those lead compounds which are most insoluble in such media would provide a margin

ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

of safety in the use of lead compounds that does not exist with the relatively soluble compounds. This does not mean to say that solubility is the only factor to be considered, but that it is an important consideration. -- From Authors' summary and conclusions.

LEAD POISONING AS A CLINICAL ENTITY DURING THE RECONDITIONING OF WARSHIPS. F. D. Hankins. U.S. Naval Med. Bull., 41, 1785-1791 (November, 1943). Lead poisoning occurs with greater rapidity and severity from inhalation of lead contaminated dusts and fumes than from the ingestion of lead in various forms. Cases developed and continued to develop among the paint removal crews working on the ships until effective measures were taken and enforced to keep the respired air free from lead-laden dust and fumes. This proved to be the only effective control of plumbism. Dust control measures alone are not sufficient, but in addition adequate respirators must be worn. Cleansing and clean habits are important. A list of suggested regulations is included.

TREATMENT OF LEAD POISONING. CONFERENCES ON THERAPY. N.Y. State J. Med., 43, 2079-2086 (November 1, 1943). The discussion emphasizes the facts that ingested lead, especially in small amounts, rarely causes poisoning because of poor absorption, and that the greater danger of lead poisoning exists when fumes are inhaled; thus industry is the chief source of lead poisoning. The prevention of poisoning is very important. Control of exposure and proper industrial hygiene are necessary. Factors which control lead metabolism should be considered. The general state of health, and also nutrition, age, sex, and alcoholism are all important. Diagnosis of poisoning may be difficult. Therapy, except for purely symptomatic treatment, is based on the parallelism between the calcium and lead streams. Lead is either eliminated from the bones by a calcium deficient diet and drugs, and excreted, or it is fixed in the bones by a high calcium and vitamin D diet. The former runs the danger of episodes of acute poisoning during treatment, while the latter runs the danger of the latent supply of lead remaining fixed in the body becoming mobilized and again causing episodes of acute poisoning.

THE POSSIBLE TOXICITY OF LEAD ALLOYS. III. EXPERIMENTS ON THE RAT WITH A LEAD-TIN-ANTIMONY SOLDER. K. Saloman and G.R. Cowgill. J. Ind. Hyg. & Tox., 26, 22-28 (January, 1944). Young rats were used in a study of the possible toxicity of a lead-tin-antimony alloy administered in the form of solder pellets containing 63.89 per cent lead. These rats, receiving 300 parts of lead per million of diet, proved to be quite similar to the control group fed on identical diet but no lead, with respect to growth, concentration of blood hemoglobin and the appearance of stippled cells as well as with respect to the amount of lead stored in their carcasses. Rats fed an identical amount of a diet containing 300 parts of lead per million in the form of lead acetate exhibited all the signs of lead poisoning; their carcasses contained large amounts of lead. It is concluded that ingested solder of the composition here studied as a source of lead is non-toxic for the rats. -- Authors' summary.

HEALTH HAZARDS IN SOLDERING OPERATIONS. I. SURVEY OF HAZARDS CREATED BY THE VARIOUS TYPES OF SOLDERING AND PRACTICAL CONTROL METHODS. Illinois Labor Bull., 4, 10-11 (October 31, 1943). War production has required (1) an increase in lead content of solders as a tin conservation measure from 30% to as high as 98%, and (2) an increase in the use of silver solder. Gas-heated soldering irons, because of the danger of building up large quantities of dross in their gas muffler, may present a real lead hazard. The muriatic flux gives rise to irritating vapors and dermatitis. Electrically-heated soldering irons use rosin which is an irritant flux. The soldering of condensors which have been treated with chlorinated vapors presents an added

ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

toxic vapor hazard. Silver soldering may have harmful quantities of fluorides arise from the flux. Machine soldering is used extensively in making tin cans. Tinning pots create a certain amount of irritating smoke but the control of the lead used by adequate exhaust will also eliminate the smoke nuisance. Also when solder is removed in reclaiming metals by "sweating," the lead in the air is usually many times the maximum limit of 1.5 mg. per 10 cu. m. Control measures in soldering operations come under the headings of good housekeeping proper hooding and local exhaust, and conscientious personal hygiene.

CONTROL OF WELDING FUMES IN SHIPBUILDING OPERATIONS. Y. Rosenfeld, Ind. Med., 13, 103-105 (January, 1944). Thefollowing facts were determined as a result of air sampling and analysis in two major shipyards: (1) Where no control measures in the form of exhaust equipment were used, potentially toxic concentrations of metallic fumes primarily lead and zinc, were being released from welding operations on galvanized steel. (2) Where welding was done on ungalvanized materials only ferric oxide dusts and smokes were obtained. (3) A number of illnesses of a respiratory character were reported. (4) Nitrous oxides and carbon monoxide were generally negligible. (5) There was no hazard due to oxygen depletion. Control measures advised are the installation of local exhaust equipment and air-supply ventilation. The latter alone may suffice for electric arc welding on black iron. Respirators may be used for emergencies and for daily exposures of short duration.

THE PREVENTION OF LEAD POISONING IN BLAST-FURNACE OPERATIONS. Bauer. Reichsarbeitsblatt 22, III, Arbeitsschutz, 337-342 (1942). (German). Ordinarily the danger of lead poisoning from this source is not very serious; however, there is some danger with those furnaces which produce special grades of iron that are made from raw material containing lead. A typical case is the Duisburg Hochofenwerk which processes the so-called "Purpurerz." The leadcontent of the iron dross was 0.8-0.9% originally; however, the use of a new alkali process which dissolved the lead by means of a concentrated sodium chloride solution lowered the lead content of the iron dross to 0.18-0.20%. The new process increased the cases of lead poisoning which was traced back to the fact that in this new process the lead is converted to volatile lead chloride which escapes partly into the atmosphere. This danger was overcome by powerful mechanical ventilation and the use of full instead of partial gas masks.

OCCUPATIONAL DISEASES IN INDIANA. The occupational diseases reported to the Division of Industrial Hygiene of Indiana for the year ended June 30, 1943, were quite varied in character, dermatitis accounting for 389 out of 439 cases, cutting oils ranking highest as cause, tetryl second, and carrots third (see separate news item No. 385), with a total of 43 causes for dermatitis. Carbon monoxide poisoning ranks next to dermatitis, with 20 cases, and solvent intoxication, lead poisoning, silicosis, silico-tuberculosis and a few others account for less than 10 cases each. Lists of a creditable number of recommendations, laboratory determinations, and consultations by the Bureau are also given. -- Appendix to Annual Rept., Div. of Ind. Hyg., Indiana State Board of Health, July 1, 1942 - June 30, 1943.

LEAD POISONING. The Industrial Board found that on August 14, 1940, while claimant was engaged in the regular course of his employment and while working as a sprayer spraying picture frame moldings with paint, lacquers and varnish, he became disabled as the result of lead poisoning, lead absorption and a toxic condition which he contracted due to the nature of his employment, which caused his disability for which the award is made. There is ample evidence to support the findings and award. Guarnera v. Radio Picture Frame Co., Inc. New York Supreme Ct., Appellate Div., 3rd Judicial Dept. No. 8-8. (CCH).

ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

INDUSTRIAL TOXICOLOGY. D. Hunter. Quart. J. Med., Oxford (New Ser.), 12, 185-258 (October, 1943). This is a thorough article covering the toxicology of three groups of toxic compounds, the metals, (lead, arsenic, mercury) the aromatic compounds and the chlorinated hydrocarbons. The clinical findings, the pathological physiology and the treatment of lead metal and tetraethyl lead poisoning are given succinctly and comprehensively. Arsenical poisoning in industry occurs in two forms, the first from inhalation of, or contact with, the dusts of arsenic compounds, and the second from inhalation of arseniuretted hydrogen gas. The compounds of arsenic act as local irritants to the skin and mucous membranes. Arseniuretted hydrogen acts as a powerful hemolytic agent, causing hemoglobinuria, anemia and hemolytic icterus. The addition of nitro or nitroso groups in aromatic compounds usually produce a more toxic compound. The positions of the substituent groups in the benzene ring are discussed as regards toxic action. Toxic activity is found to depend not only on chemical constitution but also on physical properties in the aromatic compounds. Among chlorinated hydrocarbons the article covers methyl chloride, carbon tetrachloride, ethylene dichloride, tetrachlorethane, and chlorinated naphthalene. It is found that the entrance of chlorine into an aliphatic hydrocarbon increases its toxicity whereas the reverse is the case with an aromatic hydrocarbon. In the last section of the paper ethylene chlorhydrin and diethylene dioxide are reviewed.

I. LEAD POISONING. II. THE TREATMENT OF LEAD POISONING. Ontario Dept. of Health, Div. of Industrial Hygiene, 3 and 5 pp. No date. These pamphlets, distributed for the information of industry, follow the usual outline and present the fundamental facts of lead poisoning. The first deals with means of entry into the body, distinction between lead storage and lead poisoning, and means of prevention. The second discusses curative treatment, including abatment of toxic symptoms and removal of the accumulated lead available for mobilization, both of which are given in some detail, including treatment not to be given.

THE POTENTIAL HAZARD IN THE MILK CANNING INDUSTRY. W.L. Lea and W.Z. Fluck. J. Ind. Hyg. & Tox., 26, 94-98 (March, 1944). A study of the potential hazard to employees in the milk canning industry has shown that toxic atmospheric concentrations of lead are associated with some of the manufacturing process, especially at the body seam machines, floater solder baths, buffing cabinets and remelt kettles. Improved design of exhaust hoods for these operations resulted in lowering the lead concentration to a safe figure. Certain other processes were found to be non-hazardous, including casting solder pigs or solder wire, drawing solder wire to size and mechanical soldering operation of the filler machines.

DETERMINATION OF TETRAETHYL LEAD IN GASOLINE. H. Gonick and J.J. Milone. Ind. & Eng. Chem., Anal. Ed., 16, 4-6 (January, 1944). A method for the determination of tetraethyl lead in gasoline is described in which the tetraethyl lead is decomposed with iodine and the lead subsequently titrated by a new acidimetric method employing 8-hydroxyquinoline. The method is rapid and is applicable to all types of gasolines. -- Authors' summary.

WARTIME ACCIDENT PREVENTION IN THE PAINT AND VARNISH INDUSTRY. A.W. Steudel Paint Varnish Production Mgr., 23, 122-123, 132-143 (1943). Attention is called to (1) dust hazards, (2) nitration of cellulose beyond 12.4 per cent nitrogen, (3) inflammability of pyroxylin solvents, ester gum, dammar and plasticizers, (4) hazards in handling lead, chromium and barium compounds, (5) dermatitis from shellac varnish containing naphthalene or from solvent containing sodium carbonate, and (6) hazards in paint-spray structures.

ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

THE SOLUBILITY OF LEAD BOROSILICATES IN TISSUE FLUID. P.L. Beebe and F.S. Mallette J. Ind. Hyg. & Tox., 26, 109-112 (April, 1944) Experimental animals were exposed to spray mists of lead-containing fritted glass ceramic colors for a period of about 60 hours. Exposure chamber concentrations of lead averaged 0.035 milligrams per liter of air. The liver and bones of the exposed animals showed a much higher lead content than those of the control animals. The lungs of exposed animals showed a progressive decrease in lead content with increase in time from the last exposure. These studies indicate that lead silicates in the form of ceramic colors are soluble in animal tissue fluid. -- Author's summary.

HEALTH HAZARDS IN SOLDERING OPERATIONS. II. MACHINE SOLDERING. Illinois Lab. Bull., 4, 20-22 (Nov. 30, 1943). The tin conserving solders containing a higher percentage of lead are more hazardous because the higher working temperature results in more oxidation of the metal. When these solders are used, only the best control program will prevent a dangerous concentration of lead in the air. Where control was barely adequate with 30 per cent lead solder, it may be absolutely inadequate after changing to a solder containing 70 per cent or more of lead. This change results in higher working temperatures and frequently additional gas torches requiring more complete hood enclosure and more attention to maintenance of good housekeeping. -- Author's summary.

ARSINE, STIBINE, AND HYDROGEN SULFIDE - ACCIDENTAL GENERATION IN A METAL REFINERY. C.U. Dernohl, F.M. Stead and C.A. Nau, Ind. Med., 13, 561-562 (April, 1944). Three workers in a metal refinery were poisoned recently by a mixture of the three gases arsine, stibine and hydrogen sulfide. The gases were liberated when water was added to a hot dross containing metallic aluminum and compounds of arsenic and antimony. Laboratory studies under similar conditions showed that the addition of water to the hot dross causes the formation of nascent hydrogen which reacts with the arsenic, antimony and sulfur to form arsine, stibine and hydrogen sulfide. The reaction requires an elevated temperature for the production of amounts of these gases adequate to be detected by the use of lead acetate and silver nitrate solution.

A NEW ANTITODE FOR LEAD. L. Zancan. Atti, Soc. Med.-Chir. Padova, 18, 210-216 (1944 Italian). When freshly precipitated lead phosphate is shaken with a 10 per cent solution of sodium pyrocatecholsulfonate, lead is demonstrable in the filtrate. When a solution of lead nitrate is mixed with disodium phosphate in the presence of sodium pyrocatecholsulfonate there is no precipitation of lead sulfate even though the proportions are one molecule lead salt to 22 molecules of the sulfonate. Cattle serum was mixed with a 0.00372 molecular solution of lead nitrate, until precipitation appeared. The addition of 0.047 molecular solution of sodium pyrocatecholsulfonate prevents this precipitation. The precipitation formed in the serum by a lead nitrate solution can be redissolved by addition of the sulfonate. Sodium pyrocatecholsulfonate acts antagonistically to lead salts on isolated frog heart. When rats were injected subcutaneously with a 0.495 per cent solution of sodium nitrate together with a 7 per cent solution of the sulfonate there is an inhibition of the deposit of lead sulfate under the skin and a rapid resorption of lead salts. When rabbits received an intravenous injection of lethal dose of lead nitrate, and after no longer an interval than 3 minutes a corresponding dose of sodium pyrocatecholsulfonate the animals survived. This method was recommended for the treatment of lead poisoning.