



Industrial Hygiene Digest

INDUSTRIAL HEALTH NEWS

LITERATURE ABSTRACTS

MEDICAL

ENGINEERING

CHEMICAL

TOXICOLOGICAL

LEGAL

SEPTEMBER, 1969

(Vol. 33, No. 9)

INDUSTRIAL HYGIENE FOUNDATION

5231 CENTRE AVENUE • PITTSBURGH, PA. 15232

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FOUNDATION FACTS

INDUSTRIAL HYGIENE HIGHLIGHTS-VOLUME I \$20.00 per copy
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Pittsburgh, Pennsylvania 15232

NEW MEMBER: We are pleased to welcome the Asbestos Cement Products Association (New Jersey) into IHF membership.

STAFF ACTIVITIES: Executive Vice President, Harry M. Bowman, spoke to the Mon-Yough Chamber of Commerce in McKeesport, Pa., on "Work Environment and Employee Health," September 9.

Dr. Paul Gross, Director of IHF's Research Laboratory, participated in a Conference on Coal Workers' Pneumoconiosis, September 10-13, in Lexington, Kentucky, serving as advisor for the session on pathological aspects. This international conference, planned and implemented by Spindletop Research, Inc., centered around questions and problems of medical research as they apply to "Black Lung," "Miners' Asthma," and "Coal Workers' Pneumoconiosis" in an effort to identify the medical problems requiring resolution. (Also see Abst. No. 875, this issue, on the First Australian Pneumoconiosis Conference.)

Dr. Gross has accepted an appointment to the U.S. Public Health Service Select Review Committee on Asbestos. Recently formed, this Committee sought to develop criteria and make recommendations for standards utilizing the expertise of authorities in the field at its first meeting on September 16 in Cincinnati. Significant progress will be reported later.

Dr. Gross presented "Filamentous Glass, the Pulmonary Reaction to High Concentrations of Coated and Uncoated Dust Particles (A Preliminary Report)" before the International Congress on Occupational Health in Tokyo, Japan, September 22-27. His paper resulted from the industrially sponsored Fibrous Glass Study now in progress in the Foundation's Research Laboratory.

Dr. Robert T. P. deTreville, IHF President, and Madeline C. Carey, Information Specialist, attended a meeting of the Advisory Committee of the Toxicological Information Project, September 17, at the University of Pittsburgh. This National Library of Medicine project is seeking to improve the handling and availability of toxicological information and developing more extensive and accessible computer-based files of toxicological information. We noted with interest several articles in the July-August, 1969, issue of the American Industrial Hygiene Association Journal which mentioned the Industrial Hygiene Digest as one of relatively few (5) existing sources of toxicological data. Ways are being investigated to interrelate IHF's program with the overall National Library of Medicine project.

IHF NURSING COMMITTEE MEMBER HONORED: Miss Mary Louise Brown, Chief of Nurses Training in Occupational Safety and Health, U.S. Public Health Service, recently received the 1969 Alumni Award from the University of Pittsburgh School of Nursing for her "outstanding leadership in occupational health nursing." Miss Brown was also awarded the U.S. Department of Health, Education, and Welfare's Meritorious Service Medal at a special ceremony July 1, 1969, in Washington, D.C., for her "unfailing dedication to the objectives of better training for occupational health nurses and improved nursing care for the patient." Miss Brown, who was appointed to the Foundation's Nursing Committee in January, 1969, has been an advisor to IHF since 1963 and spoke at the Foundation's 31st Annual Meeting in 1966.

ANNUAL MEETING NEWS:* General Chairman of the 34th Annual Meeting Management Conference is Dr. Miles O. Colwell, Vice Chairman of the Board of Trustees and Vice President and Medical Director of Aluminum Company of America. Chairman of the Board, Dr. G. A. Webb, will welcome members and guests and open the conference by presenting "Foundation Facts" occurring since last year's meeting.

Mr. Douglas Soutar, a member of IHF's Board and Vice President-Industrial Relations and Personnel of American Smelting and Refining Company, will serve as General Chairman of the Second day's Technical Conference and also will present a paper on "How Industrial Hygiene Engineering Contributes to Good Personnel Administration." Others on the technical program include Margaret Barry, Assistant Director, Labor Rehab Liaison Project of the New York City Central Labor Council, AFL-CIO, speaking on "Labor's 'Project Rehab'—A Progress Report"; Dr. J. Herbert Dietz, Jr. of the Institute of Rehabilitation Medicine's Out-Patient Services (New York) who will discuss "Cancer Patient Rehabilitation in the Workforce"; and Dr. Herbert A. Haessler, Medical Director of Medidata Sciences, Inc. (Waltham, Mass.), describing "Industrial Experience with Automated Multiphasic Health Examinations." Invitational, preliminary programs have been mailed; contact IHF headquarters if you need additional copies.

NEW PUBLICATIONS LIST: An updated IHF Publications List is enclosed with this issue of Industrial Hygiene Digest.

* 34th ANNUAL MEETING - OCTOBER 14-15, 1969

CHATHAM CENTER - PITTSBURGH, PA.

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INDUSTRIAL HYGIENE FEATURES

A new health professional, the environmentalist, is discussed in Abst. No. 880.

The case of Mary, Queen of Scots, is reviewed in Abst. No. 881.

Consult Abst. No. 887 for a report on tennis leg.

Peptic ulcer in Massachusetts physicians is reviewed in Abst. No. 894.

Information on human louse infestation is presented in Abst. No. 896.

A fatal case of inhalation anthrax is described in Abst. No. 905.

Abst. No. 909 is concerned with the evaluation of hand antisepsis.

Information on potassium chloride treatment in thallotoxicosis is given in Abst. No. 920.

Abst. No. 935 investigates experimental pulmonary carcinogenesis with asbestos.

See Abst. No. 946 for a report on laser damage thresholds for ocular tissues.

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IHF welcomes editorial matter from all member companies pertaining to industrial hygiene programs, problems and developments.

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EDITORIAL

NATIONAL INDUSTRIAL HYGIENE WEEK BILL INTRODUCED

In a recent article, a past president of American Industrial Hygiene Association remarked that the public needs a greater awareness of the "professionalism" associated with occupational health and safety in order to gain needed financial support and prestige for the field. Such recognition and support are essential to improve the incentive for desirable career candidates to be attracted to and remain in the field.

In recognition of its indebtedness to the field and to improve public awareness, in January, 1969, industry (in IHF) requested President Richard M. Nixon to designate the week of IHF's 34th Annual Meeting (October 12-18) as National Industrial Hygiene Week. The bill was introduced concurrently in the Senate and House on September 12, jointly sponsored by the late Senator Everett M. Dirksen (R-Ill.) with Senators Hugh Scott (R-Pa.) and Richard S. Schweiker (R-Pa.). In the House of Representatives the bill was jointly sponsored by Congressmen William S. Moorhead (D-Pa.) and James G. Fulton (R-Pa.). Senator Scott read the following message into the record:

CONGRESSIONAL RECORD—SENATE

September 12, 1969

SENATE JOINT RESOLUTION 150—
INTRODUCTION OF JOINT RESOLUTION TO DESIGNATE "NATIONAL INDUSTRIAL HYGIENE WEEK"

Mr. SCOTT. Mr. President, I introduce for appropriate reference a joint resolution authorizing the President to designate the week of October 12 to 18 of this year as "National Industrial Hygiene Week." I am pleased to have the following distinguished Senators joining me as cosponsors in this effort: RICHARD S. SCHWEIKER, Republican, Pennsylvania; WALLACE F. BURNETT, Republican, Utah; J. CALES BOGGS, Republican, Delaware; JOHN SHERMAN COOPER, Republican, Kentucky; CHARLES E. GOODSELL, Republican, New York; CLIFFORD P. HANSEN, Republican, Wyoming; JACOB K. JAVITS, Republican, New York; JACK MILLER, Republican, Iowa; GAYLORD NELSON, Democrat, Wisconsin; ROBERT W. PACKWOOD, Republican, Oregon; WINSTON L. PRATT, Republican, Vermont; JENNINGS RANDOLPH, Democrat, West Virginia; STROM THURMOND, Republican South Carolina; and HARRISON A. WILLIAMS, Jr., Democrat, New Jersey. *

Industrial hygiene is, of course, that part of occupational health concerned with the anticipation, evaluation, solution, and prevention of health problems arising out of industrial operations. It reflects the attempt of industry to work in concert with scientists and engineers from related fields to develop sound scientific knowledge and to aid in the application of this knowledge to the protection and conservation of the health of workers in all types of industry.

The designation, which my joint resolution proposes, would coincide with this

year's 34th annual meeting of the Industrial Hygiene Foundation of America, an organization, unique in all the world, composed of several hundred nationally known U.S. companies and organizations which have voluntarily joined together to coordinate the efforts of industrial management with those of labor, the educational community, and government, in helping to further genuine health progress within industry.

I am proud to note that IHF has its headquarters in my Commonwealth of Pennsylvania, in Pittsburgh, which will again be the scene of the foundation's annual meeting, on October 14 and 15. Some 400 participants, representing not only the foundations corporate members, but leading experts from universities and government as well, will attend the 2-day session. Organized originally in 1935 because of a concern over the silicosis problem in industry, the Industrial Hygiene Foundation this year will be considering a greatly broadened agenda that addresses itself to the ever-expanding list of recognized industrial health problems, including air quality, noise abatement, mental health and other matters related to the total industrial and community environment.

The purpose of the proclamation, which my joint resolution would establish, is to call the focus of public attention to the field of industrial hygiene so that the average citizen can better understand and appreciate the past and present benefits he and his family may be receiving. Such knowledge will provide the basis for improved public confidence in the willingness and ability of American industry to solve not only current health problems, but such new

problems as may be expected to arise out of future industrial technological progress.

Mr. President, I believe the purposes of this joint resolution are fully meritorious. I urge immediate and favorable consideration.

I also ask, Mr. President, that the full text of this proposed legislation be printed at this point in the RECORD:

The ACTING PRESIDENT pro tempore. The joint resolution will be received and appropriately referred; and, without objection, the joint resolution will be printed in the RECORD.

The joint resolution (S.J. Res. 150) to authorize the President to designate the period beginning October 12, 1969, and ending October 18, 1969, as "National Industrial Hygiene Week," introduced by Mr. Scott (for himself and other Senators), was received, read twice by its title, referred to the Committee on the Judiciary, and ordered to be printed in the RECORD, as follows:

S.J. Res. 150

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That, in recognition of the need to preserve the Nation's primary natural resource, its employed population, and in recognition of those individuals and organizations seeking to protect and improve the health of the Nation's work force through the coordinated scientific measures, technological and engineering controls which characterize industrial hygiene, the President is authorized and requested to issue a proclamation designating the period beginning October 12, 1969, and ending October 18, 1969, as "National Industrial Hygiene Week," and calling upon the people of the United States and interested groups and organizations to observe such week with appropriate ceremonies and activities.

* Birch Bayh, Democrat, Indiana; Ted Stevens, Republican, Alaska

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Industrial Hygiene includes the combined efforts of health professionals and scientists, technologists and engineers, all represented in the membership of the American Industrial Hygiene Association (AIHA) and the American Conference of Governmental Industrial Hygienists (ACGIH), the principal associations of industrial hygienists; and the governing bodies of both of these organizations have indicated their support for an Industrial Hygiene Week in conjunction with IHF's Annual Meeting.

As with scientific management generally, it is imperative to discriminate between numerous pressing problems related to health, those which do and do not lend themselves to measurement. The key occupational health discipline responsible for such differentiation is Occupational Medicine, and the leading professional organization of fully qualified occupational physicians whose members devote full time to the field is the American Academy of Occupational Medicine (AAOM). The president of AAOM called attention to the important progress which has been made so far through the concerted efforts of occupational physicians and industrial hygienists in a letter to Senator Dirksen.

IHF, through its members, is unique in all the world and has a long record of service which provides visible indication of the interest of industrial management in collaborating with labor and government to help further genuine health progress to the maximum practical advantage, as rapidly as possible.

Willingness of the legislative body to consider this proposal indicates the importance of the field of Industrial Hygiene and recognition of the vital benefits being received by a large segment of our population—the nation's workforce.

-- R. T. P. deTreville, M. D.

01 132 4374

IHF MEMBERSHIP NEWS AND ACTIVITIES

ALERT NURSES TO EYE SAFETY

Over the years, a great deal has been written to acquaint the occupational health nurse with the knowledge and skills needed to carry out effective eye programs in industry.

The eye emergency is one of the most threatening emergency situations confronting an occupational health nurse. Yet, in her basic education, very little is learned about handling an eye emergency.

Authoritative sources warn that complications can develop from what appears to be a relatively minor industrial accident. A foreign body sensation does not always mean that a foreign body has entered the eye, because serious eye disease can start with a foreign body sensation.

The eye condition must be properly diagnosed, because ophthalmic drops and ointment are contraindicated in certain conditions. What appears to be a foreign body could be a viral infection, where appropriate treatment and time are important in saving vision.

Considering the responsibilities the occupational health nurse carries in diagnosing and initiating action for treatment of eye injuries, there should be greater depth to her orientation in eye care. Doctor Hedwig S. Kuhn, an authority on industrial eye injuries, recommends that this orientation, training, and continuing guidance be given by an ophthalmologist. Learning proper techniques for inspecting an eye and being aware of the adverse effects from improper diagnosis and treatment will make her a more skilled practitioner.

Doctor Kuhn adds some "don'ts" to the medical directives for eye care that she provides to occupational health nurses:

Don't accept a worker's self-diagnosis of a flash burn. He may have a foreign body in the eye, or an infection. Flash burns rarely affect only one eye, although the presenting complaint of many workers has been a flash burn in one eye.

Don't insert ointment of any kind in an eye just prior to sending the patient to an ophthalmologist.

--Employers Insurance of Wausau

--from Safety Newsletter (National Safety Council), July, 1969

AN AIR OF SATISFACTION

Armco Steel Corporation's efforts to bring pollution problems to heel are paying off—due largely to the successful start-up of much of Armco's massive Project 600 expansion program.

New facility start-ups mean that some of the company's more aging profit-producers—that also just happen to be some of the major pollutant-producers—are being phased out of the picture. Butler's new electric furnace shop is effectively signaling the closing of that plant's open hearth furnaces. Middletown's new basic oxygen furnace shop has eliminated half the open hearth capacity at that works. Ashland Works plans to eliminate its open hearths within the year, and Houston Works follows a year after Ashland.

Equally important to clearing the air, shutting down open hearth furnaces has an additional benefit—reduced melting costs.

If the problem of pollution is great, the solution is gigantic. To date, ridding Armco plants of waste has involved the commitment and expenditure of millions of dollars worth of non-profit producing pollution controls. The future? Probably additional millions of dollars in equipment just to keep pace with our growth.

Since the turn of the century, you could tell a steel town by the dirt and the smoke. But Armco's steel producing plants are ridding themselves of the red smoke, and developing a real air of satisfaction—and furthering Armco's reputation as a good citizen.

--Armco Steel Corporation, Quarterly Report to Shareholders, Second Quarter, 1969

INDUSTRIAL HYGIENE DIGEST
Literature and News

NEWS ITEMS

854 Job Safety Board Asked.

President Nixon asked Congress to set up a five-member board to establish sweeping occupational health and safety standards. Under the Occupational Safety and Health Bill being prepared by the Labor Dept., the board would set forth and begin enforcing its standards on July 1, 1972. The board would be directed to look first to "national consensus standards" already established by hundreds of voluntary industry, labor, and other organizations. Violation of the standards, said Nixon in a special message to Congress, would be subject to a civil penalty of up to \$10,000. The board, headed by a \$40,000-a-year chairman, would be authorized to bar companies from government contracts for up to three years. The legislation would authorize the states to adopt their own health and safety regulations if they were at least as strong as the federal standards. The federal law would continue to apply in states not producing approved plans. "Few people realize the extent of needless illness, needless injury, and needless death which result from unsafe or unhealthy working conditions," Nixon said.

--American Medical News, 10 (Aug. 25, 1969)

Editor's Note: Under Secretary of Labor James D. Hodgson will present a paper entitled "The Intent of Industrial Hygiene Standards" at the 34th Annual Meeting of Industrial Hygiene Foundation. Secretary Hodgson will be the opening speaker at 9:10 a.m. in the morning session of the first day's Management Conference, Tuesday, October 15, 1969, at Chatham Center, Pittsburgh, Pa., on "Understanding Industrial Hygiene Legislation—1969."

855 National Safety Council.

The National Safety Council's 57th Annual Safety Congress and Exposition will be held October 27-30, 1969, in Chicago, Ill. More than 200 program sessions are being planned, and the largest collection of safety equipment and products ever assembled will be on display during the Congress and Exposition. Further information may be obtained by writing Al Henderson, National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611.

--Am. Ind. Hyg. Assn. J. 30, A-4 (May-June, 1969)

856 American College of Chest Physicians—First Fall Scientific Assembly.

The Thirty-Fifth Annual Meeting, the first fall scientific assembly, of the American College of Chest Physicians will be held on October 29 to November 2, 1969, in Chicago, Illinois. Further information may be obtained from Alfred Soffer, M.D., American College of Chest Physicians, 112 East Chestnut Street, Chicago, Illinois 60611.

--Am. Rev. Resp. Dis. 100, 108 (July, 1969)

857 American Public Health Association.

The 97th Annual Meeting of the American Public Health Association will be held at the Civic Center, Philadelphia, Pa., November 10-14, 1969. During this meeting, the 55th annual meeting of the Occupational Health Section, APHA, will hold three sessions. The Section luncheon will be on Wednesday, November 12, with Katherine Boucot, M.D., as the luncheon speaker. Information may be obtained from Victoria Trasko, Bureau of Occupational Safety and Health, 1014 Broadway, Cincinnati, Ohio 45202.

--Am. Ind. Hyg. Assn. J. 30, A-4 (May-June, 1969)

858 Presentations Invited for Air Pollution Conference.

The Air Pollution Control Association invites the submission of papers for the December, 1970, Conference of the International Union of Air Pollution Prevention Associations to be held in Washington, D. C. The deadline for submission of proposals to present papers is January 31, 1970. Papers must be submitted by April 30, 1970, to Professor Arthur C. Stern, Department of Environmental Sciences and Engineering, School of Public Health, University of North Carolina, P. O. Box 630, Chapel Hill, North Carolina 27514.

--Am. Rev. Resp. Dis. 100, 108 (July, 1969)

859 Health Physics Symposium.

The recent Radiation Control for Health and Safety Act (P. L. -90602) has placed increased demands on the health physicists, industrial hygienists and others in positions responsible for personnel safety. The Fourth Annual Midyear Topical Symposium of the Health Physics Society, to be held January 28-30, 1970, at the Brown Hotel, Louisville, Kentucky, will be devoted to practical problems concerning the use of lasers and microwave generating equipment, etc. The program will include invited papers and contributed papers. Abstracts not exceeding 200 words should be submitted to the Symposium Chairman by October 1, 1969. All persons with an interest in the topic are invited to participate. For additional information regarding the program and exhibits, contact the Symposium Chairman, Dr. Wordie H. Parr, U. S. Army Medical Research Laboratory, Fort Knox, Kentucky 40121. --Am. Ind. Hyg. Assn. J. 30, 317 (May-June, 1969)

860 Proceedings of Tenth and Eleventh Aspen Emphysema Conferences Available.

Copies of the proceedings of the Tenth and Eleventh Aspen Emphysema Conferences, "Current Research in Chronic Obstructive Lung Disease," are now available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Prices of the tenth and eleventh conference proceedings are \$2.75 and \$2.25, respectively.

--Am. Rev. Resp. Dis. 100, 108 (July, 1969)

861 Commerce Surveys Smelters' Air Pollution Abatement.

In its series of air pollution control surveys, the Department of Commerce's Business and Defense Services Administration (BDSA) examined a representative 23 smelters of the secondary nonferrous metals industry, an industry primarily engaged in recovering nonferrous metals and alloys from scrap and dross. BDSA finds that the cost for such control equipment—usually dry baghouse, electrostatic precipitator, wet scrubber, or a combination of these devices—can be moderately significant elements of overall cost. BDSA finds that the annualized installed cost, plus the annual cost of operating and maintaining the systems, is less than 1% of the annual value of shipments (\$1.6 billion in 1967), and is in the range of \$1.35-1.70 per year for each cubic foot per minute of gas cleaning capacity. In the U.S., there are approximately 500 plants.

--Environ. Sci. Technol. 3, 697 (Aug., 1969)

862 Smoke.

According to the Washington, D. C., Inter-agency Council on Smoking, these are some of the gases or chemical compounds in smoke from cigarettes: acetone, acetaldehyde, acetylene, acrolein, ammonia, butane, carbon dioxide, carbon monoxide, ethane, formaldehyde, hydrogen cyanide, hydrogen sulphide, methane, methanol, methyl ethyl ketone, methyl chloride, methyl nitrate, nitrogen dioxide, propane, and propylene.

--Am. Ind. Hyg. Assn. J. 30, 244 (May-June, 1969)

863 Aviation Agency Announces Noise Studies.

The effects of aircraft noises and sonic booms on people and structures form the basis of recent contracts awarded by the Department of Transportation's Federal Aviation Administration to Stanford Research Institute (SRI) (Menlo Park, Calif.) and Wyle Laboratories (WL) (Huntsville, Ala.). Under a \$129,893 contract, SRI will study and analyze unusual noise effects (including the sonic boom) upon special population groups. WL will study the effect of pressure waves on glass structures, under a \$63,328 contract. Both studies were recommended in the "Report on Human Response to the Sonic Boom."

--Environ. Sci. Technol. 3, 697 (Aug., 1969)

864 West German Rules for Tetanus Prevention.

All children should be immunized as early as possible with the active toxoid suspension by receiving three injections at four-week intervals. Injuries should be treated as follows: (1) Those who have had at least two toxoid injections should be given a booster. (2) those who have received one or no toxoid injections should be given human immune globulin (tetanus), at least 250 units, and immunization with toxoid would be started immediately. Additionally, early surgical wound debridement and administration of antibiotics was recommended to the injured patients. These rules, leaving out the use of antitoxin except in cases where immune globulin is not available, have been worked out by a special task force of the German Surgical Society.

--J. Am. Med. Assn. 208, 2170 (June 16, 1969)

865 Radiological Effects of Nuclear Power Plants.

Radiological effects of nuclear power plants on Lake Michigan will be monitored in a continuing program. The first phase of the project will be a 15-month study directed by University of Michigan oceanography professor John C. Ayers and G. Hoyt Whipple, professor of radiological health. The Michigan team will draw up a balance sheet of presently occurring radioactive materials, including their distribution in the Lake Michigan biosphere. The question, Dr. Ayers says, is how many nuclear power plants can be installed and operated without adversely affecting aquatic life. The outlook: You could probably ring the lake with nuclear plants, Dr. Ayers says, without significantly altering the radiological background.

--Chem. Eng. News 47, 39 (Aug. 4, 1969)

866 Labeling Requirements for Hazardous Substances.

The Commissioner of Food and Drugs concludes that changes in current hazardous substances regulations are necessary to provide for adequate labeling of certain products because the degree of hazard for articles requiring the signal word "Danger" or "Poison" is such that if all cautionary information is not on the main panel of the label, the statement "Read _____ panel for precautions and emergency instructions," the blank being filled with the identification of the specific label panel which bears the precautions and emergency instructions, should appear on the main panel in addition to the signal word and statement of principal hazard or hazards. Any interested person may, within 30 days from the date of publication of this notice in the Federal Register, file with the Hearing Clerk, Department of Health, Education, and Welfare, Room 5440, 330 Independence Avenue SW., Washington, D.C. 20201, written comments (preferably in quintuplicate) regarding this proposal.

--Federal Register 34, 14129 (Sept. 6, 1969)

867 Gamblers Face Double Risk.

Rodale's Health Bulletin for July 26 mentions that some kinds of gamblers are taking chances with their health as well as with their money. Card players, the publication says, can contract "blackjack dermatitis," which is caused by a reaction to the chromatic salts used to dye the green felts on the tables. Crap shooters, moreover, can develop varicose veins.

--Chem. Eng. News 47, 84 (Aug. 11, 1969)

COMING EVENTS

- 868 Oct. 1- 5 American Society for Information Science, 32nd Annual Meeting, San Francisco, California
Oct. 2- 4 American Association for the Surgery of Trauma, Portland, Oregon

- Oct. 3 Academy of Pharmaceutical Sciences, 9th Annual Eastern Regional Meeting, New York, New York
- Oct. 5-8 American Oil Chemists' Society, 43rd Fall Meeting, Minneapolis, Minnesota
- Oct. 5-9 Water Pollution Control Federation, Dallas, Texas
- Oct. 5-10 17th Annual Joint Engineering Management Conference, ASME, IEEE, AIChE, ISA, Montreal, Quebec, Canada
- Oct. 5-10 Electrochemical Society, Fall Meeting, Detroit, Michigan
- Oct. 6-10 American College of Surgeons (Annual), San Francisco, California
- Oct. 7-8 Symposium on Diabetes and Insulin Research, Omaha, Nebraska
- Oct. 9-10 Eye Bank Association of America, Chicago, Illinois
- Oct. 11-12 American Association of Ophthalmology, Chicago, Illinois
- Oct. 12-16 American Society of Plastic and Reconstructive Surgeons, Saint Louis, Missouri
- Oct. 13-16 Association of Official Analytical Chemists, Annual Meeting, Washington, D. C.
- Oct. 13-17 American Association for Laboratory Animal Science, 20th Annual Meeting, Dallas, Texas
- Oct. 14-15 Industrial Hygiene Foundation, 34th Annual Meeting, Chatham Center, Pittsburgh, Pennsylvania
- Oct. 16-17 American Association of Automotive Medicine, Minneapolis, Minnesota
- Oct. 16-17 Clinical Orthopaedic Society, Louisville, Kentucky
- Oct. 18-23 American Academy of Pediatrics, Chicago, Illinois
- Oct. 19-22 American College of Gastroenterology, Houston, Texas
- Oct. 20 American Association of Poison Control Centers, 12th Annual Meeting, Chicago, Illinois
- Oct. 25-29 American Society of Anesthesiologists, San Francisco, California
- Oct. 27-29 Interscience Conference on Antimicrobial Agents and Chemotherapy, Washington, D. C.
- Oct. 27-30 57th Annual Safety Congress and Exposition, National Safety Council, Chicago, Illinois
- Oct. 29-30 American Association for the Study of Liver Diseases, Chicago, Illinois
- Oct. 29-31 Parenteral Drug Association, Annual Convention, New York, New York
- Oct. 29-Nov. 2 American College of Chest Physicians, Chicago, Illinois

LEGAL DEVELOPMENTS

869 Registration of Fuel Additives.

The Government has proposed rules for mandatory registration of fuel additives. This was the first formal step in implementing provisions of the 1967 Clean Air Act Amendments which prohibit the interstate sale of any fuel unless its additives have been registered with the Department of Health, Education, and Welfare. Purpose of this requirement, which applies to all fuels, is to take a hard look at health effects of fuel additives and their combustion products. Manufacturers have 60 days from the time the rules become effective to notify HEW's National Air Pollution Control Administration that they are selling the designated fuel. They then have 30 more days to submit information about the additives: recommended concentration, composition, combustion and emission product breakdown, and toxicity. One requirement that is likely to draw industry fire is that all necessary research to provide air pollution emission and toxicity data "in those cases where such information is not currently available" must be completed within a year.

--Chem. Eng. News 47, 33 (Aug. 4, 1969)

870 Smoke Emission Standards.

The Federal Aviation Administration (FAA) has served notice that it is considering establishing smoke emission standards based on more technical information from its own and industry's research programs, notably efforts by Du Pont. The FAA move parallels, in part, Commerce's activities under the amended Flammable Fabrics Act. FAA's notice asks for participation by interested parties such as aircraft manufacturers and material producers in the proposed rule making. Existing FAA regulations require cabin materials to pass flammability tests, but do not provide for practical smoke emission levels.

--Chem. Eng. News 47, 25 (Aug. 11, 1969)

T Threshold Limit Value in ppm.
 C Vapor concentration in ppm.
 p Vapor pressure of component in solution.
 p⁰ Vapor pressure of pure component.
 F Mol fraction of component in solution.
 a A constant of proportionality.
 Subscripts 1, 2, . . . n relate the above quantities to components 1, 2, . . . n, respectively.
 Subscript i refers to an arbitrary component from 1 to n.
 Absence of subscript relates the quantity to the mixture.

Solution to be applied when there is a reservoir of the solvent mixture whose composition does not change appreciably by evaporation.

Exact Arithmetic Solution of Specific Mixture				
	Mol. wt.	Density	T, °C	Mol fraction in half-and-half solution by volume
Trichloroethylene (1)	131.4	1.46g/ml	100	73mm Hg 0.527
Methylchloroform (2)	133.42	1.33g/ml	350	125mm Hg 0.473

$$F_1 P_1^0 = (0.527) (73) = 38.2$$

$$F_2 P_2^0 = (0.473) (125) = 59.2$$

$$T = \frac{38.2 + 59.2}{100} = \frac{(97.4) (350)}{133.8 + 59.2} = \frac{97.4}{193.0} = 177$$

T, 177 ppm (Note difference in TLV when account is taken of vapor pressure and mol fraction in comparison with above example where such account is not taken.)

2. A mixture of one part of (1) parathion (TLV, 0.1) and two parts of (2) EPN (TLV, 0.5).

$$\frac{C_1}{0.1} + \frac{C_2}{0.5} = \frac{C_m}{T_m} \quad C_2 = 2C_1$$

$$C_m = 3C_1$$

$$\frac{C_1}{0.1} + \frac{2C_1}{0.5} = \frac{3C_1}{T_m}$$

$$\frac{7C_1}{0.5} = \frac{3C_1}{T_m}$$

$$T_m = \frac{1.5}{7} = 0.21 \text{ mg/M}^3$$

1C. TLV for Mixtures of Mineral Dusts.

For mixtures of biologically active mineral dusts the general formula for mixtures may be used. With the exception of asbestos, pure minerals are assigned TLV of 2.5, 20 or 50.

For a mixture containing 80% talc and 20% quartz, the TLV for 100% of the mixture "C" is given by:

$$TLV = \frac{0.8 \cdot 0.2}{20} + \frac{0.2}{2.5} = 0.4 \text{ mppcf}$$

Essentially the same result will be obtained if the limit of the pure (most) toxic component is used provided the effects are additive. In the above example the limit for 20% quartz is 10 mppcf.

For another mixture of 25% quartz 25% amorphous silica and 50% talc:

$$TLV = \frac{0.25 \cdot 0.25}{2.5} + \frac{0.25}{20} + \frac{0.5}{20} = 7.3 \text{ mppcf}$$

The limit for 25% quartz approximates 8 mppcf.

APPENDIX C

BASES FOR ASSIGNING LIMITING "C" VALUES

By definition in the Preface, a listed value bearing a "C" designation refers to "ceiling" value that should not be exceeded; all values should fluctuate below the listed value. In general the bases for assigning or not assigning a "C" value rest on whether excursions of concentration above a proposed limit for periods up to 15 minutes may result in a) intolerable irritation, b) chronic, or irreversible tissue change, or c) narcosis of sufficient degree to increase accident proneness, impair self rescue or materially reduce work efficiency.

T.L.V. RANGE ppm or mg/M ³	Test T.L.V. Factor	Examples
0 to 1	3	Toluene diisocyanate - T.L.V., 0.02 ppm, if permitted to rise above 0.06 ppm may result in sensitization in a single subsequent exposure. "C" listing recommended on category 1b.
1 to 10	2	Manganese - T.L.V., 2mg/M ³ , contains little or no safety factor. All values should fluctuate below 5mg/M ³ . "C" listing recommended on category 1b.
10 to 100	1.5	Methyl styrene - T.L.V. limit, if encountered at levels of 150 ppm will prove intolerably irritating. "C" listing recommended on category 2.
100 to 1000	1.25	Methyl chloroform - T.L.V. 350 ppm, at 438 ppm for periods not exceeding 15 minutes is not expected to result in untoward effects relating to category C. No "C" listing recommended.

PERMISSIBLE EXCURSIONS FOR TIME-WEIGHTED AVERAGE (TWA) LIMITS

The test TLV Factor in the Table serves also as a guide to the magnitude of the permissible excursion above the limit for those substances not given a "C" designation i.e. the TWA limits. Thus for HF, with a TWA limit of 3 ppm, a concentration of 6 ppm is permissible for periods not exceeding 15 minutes, provided an equivalent exposure below the limit is experienced.

APPENDIX D

Some "Inert" or Nuisance Particulates q)

Aluminum (Al ₂ O ₃)	Limestone
Calcium carbonate	Magnetite
Cellulose	Marble
Portland Cement	Pentaerythritol
Corundum (Al ₂ O ₃)	Plaster of Paris
Emery	Plunge
Glycerine Mist	Silicon Carbide
Graphite (synthetic)	Starch
Gypsum	Sucrose
Vegetable oil mists	Tin Oxide
(except castor, cashew	Titanium Dioxide
oil, or alimular irritant	
oil)	

q) When toxic impurities are not present, e.g. quartz < 1%.

APPENDIX E

Some Simple Asphyxiants - "Inert" Gases and Vapors

Acetylene	Hydrogen
Argon	Mercury
Ethane	Neon
Ethylene	Nitrogen
Helium	Nitrous Oxide
	Propane

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ERRATA

Page 6 — delete separate listing for n-Butyle acetate

Page 7 — the substance diazomethane and the corresponding TLV's of 0.2 ppm and 0.4 mg/M³ should be listed independently. For the TLV of 1, 2 Diaminoethane, see Ethylenediamine.

Page 13 — Teflon[®] decomposition products, appendix reference should be A 2.

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Documentation of Threshold Limit Values. A separate companion piece to the TLVs is issued by ACGIH under this title. This publication gives the pertinent scientific information and data with reference to literature sources that were used to base each limit. Each documentation also contains a statement defining the type of response against which the limit is safeguarding the worker. For a better understanding of the TLVs it is essential that the Documentation be consulted when the TLVs are being used.

Information concerning the availability of Xerox copies of the 2nd edition of the Documentation of Threshold Limit Values should be directed to the Secretary-Treasurer.

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n}$$

exceeds unity, then the threshold limit of the mixture should be considered as being exceeded. C_1 indicates the observed atmospheric concentration, and T_1 the corresponding threshold limit. (See Example 1A.a.)

Exceptions to the above rule may be made when there is good reason to believe that the chief effects of the different harmful substances are not in fact additive, but independent as when purely local effects on different organs of the body are produced by the various components of the mixture. In such cases the threshold limit ordinarily is exceeded only when at least one member of the series $\left(\frac{C_1}{T_1}\right)$ or $\left(\frac{C_2}{T_2}\right)$ itself has a value exceeding unity. (See Example 1A.b.)

Antagonistic action or potentiation may occur with some combinations of atmospheric contaminants. Such cases at present must be determined individually. Potentiating antagonistic agents are not necessarily harmful by themselves. Potentiating effects of exposure to such agents by routes other than that of inhalation is also possible, e.g., inhaled alcohol and inhaled narkotic (trichloroethylene). Potentiation is characteristically exhibited at high concentrations, less probably at low.

When a given operation or process characteristically emits a number of harmful dusts, fumes, vapors or gases, it will frequently be only feasible to attempt to evaluate the hazard by measurement of a single substance. In such cases, the threshold limit used for this substance should be reduced by a suitable factor, the magnitude of which will depend on the number, toxicity and relative quantity of the other contaminants ordinarily present.

Examples of processes which are typically associated with two or more harmful atmospheric contaminants are welding, automobile repair, blasting, painting, lacquering, certain foundry operations, diesel exhausts, etc. (Example 2.)

THRESHOLD LIMIT VALUES FOR MIXTURES EXAMPLES

1A. General case, where air is analyzed for each component.

a. ADDITIVE EFFECTS

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = 1$$

Air contains 5 ppm of carbon tetrachloride (TLV, 10), 20 ppm of ethylene dichloride (TLV, 50) and 10 ppm of ethylene dibromide (TLV, 25).

$$\frac{5}{10} + \frac{20}{50} + \frac{10}{25} = 0.5 + 0.4 + 0.4 = 1.3$$

Threshold limit is exceeded.

b. INDEPENDENT EFFECTS

Air contains 0.15 mg/M³ of lead (TLV, 0.2) and 0.7 mg/M³ of sulfuric acid (TLV, 1).

$$\frac{0.15}{0.20} + \frac{0.7}{1} = 0.75 + 0.7 = 1.45$$

Threshold limit is not exceeded.

1B. Special case when source of contaminant is a mixture and atmospheric composition is assumed similar to that of original material, i.e., vapor pressure of each component is the same at the observed temperature.

a. ADDITIVE EFFECTS, approximate solution.

1. A mixture of equal parts (1) trichloroethylene (TLV, 100), and (2) methyl chloroform (TLV, 350).

$$\frac{C_1}{100} + \frac{C_2}{350} = \frac{C_m}{T_m}$$

$$C_1 + C_2 = \frac{1}{2} C_m$$

$$\frac{C_1}{100} + \frac{C_2}{350} = \frac{2C_1}{T_m}$$

$$\frac{7C_1}{700} + \frac{2C_1}{700} = \frac{2C_1}{T_m}$$

$$T_m = 700 \times \frac{2}{9} = 155 \text{ ppm}$$

1B. b. General Exact Solution for Mixtures of N Components With Additive Effects and Different Vapor Pressures.

$$(1) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = 1;$$

$$(2) C_1 + C_2 + \dots + C_n = T;$$

$$(2.1) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = 1.$$

By the Law of Partial Pressures,

$$(3) C_1 = aP_1$$

and by Raoult's Law,

$$(4) P_1 = F_1P_1^0$$

Combine (3) and (4) to obtain

$$(5) C_1 = aF_1P_1^0 \quad 0.1 \quad 132 \quad 438$$

Combining (1), (2, 1) and (5), we obtain

$$(6) \frac{F_1P_1^0}{T_1} + \frac{F_2P_2^0}{T_2} + \dots + \frac{F_nP_n^0}{T_n} = \frac{F_nP_n^0}{T_n}$$

$$\frac{F_1P_1^0}{T_1} + \frac{F_2P_2^0}{T_2} + \dots + \frac{F_nP_n^0}{T_n} = \frac{F_nP_n^0}{T_n}$$

and solving for T ,

$$(6.1) T = \frac{F_1P_1^0}{F_1P_1^0 + F_2P_2^0 + \dots + F_nP_n^0} \cdot \frac{F_nP_n^0}{T_n}$$

$$\text{or } T = \frac{1}{\frac{F_1}{T_1} + \frac{F_2}{T_2} + \dots + \frac{F_n}{T_n}}$$

$$(6.2) T = \frac{1}{\frac{F_1}{T_1} + \frac{F_2}{T_2} + \dots + \frac{F_n}{T_n}}$$

Substance	ppm ^a	mg m ³ b)	Substance	ppm ^a	mg m ³ b)	Substance	ppm ^a	mg m ³ b)
Naphthalene	10	50	Phosphoric acid	-	-	Tellurium hexafluoride	0.02	0.2
β -Naphthylamine	-	A1	Phosphorus (yellow)	-	0.1	TEPP - Skin	1	0.05
Nickel carbonyl	0.001	0.007	Phosphorus pentachloride	-	1	C Terphenyls	-	9
Nickel, metal and soluble cmpds	-	1	Phosphorus pentasulfide	-	1	1, 1, 1, 2-Tetrachloro-2, 2-di-	-	-
Nicotine-Skin	-	0.5	Phosphorus trichloride	0.5	3	fluorochane	500	4,170
Nitric acid	2	5	Phthalic anhydride	2	12	1, 1, 2, 2-Tetrachloro-1, 2-di-	500	4,170
Nitric oxide	25	30	Picric acid-Skin	-	0.1	fluorochane	5	35
Nitric oxide	1	6	Pivalic (2-Pivalyl-1,3-	-	-	1, 1, 2, 2-Tetrachloroethane-Skin	-	-
p-Nitroaniline-Skin	1	5	indandione)	-	0.1	Tetrachloroethylene, see Per-	-	-
Nitrobenzene-Skin	-	1	Platinum (Soluble Salts)	-	0.002	chloroethylene	-	-
p-Nitrochloro-benzene-Skin	-	310	Polytetrafluoroethylene	-	A2	Tetrachloromethane, see Carbon	-	-
Nitroethane	5	9	decomposition products	1,000	1,800	tetrachloride	-	2
C Nitrogen dioxide	10	29	Propane	-	A1	1, 1, 1, 2-Tetrachloro-2, 2-di-	200	900
C Nitrogen Trifluoride	0.2	2	n-Propyl alcohol	1	840	Tetraethyl lead (as Pb) - Skin	-	-
Nitromethane	100	250	n-Propyl acetate	200	500	Tetraethyl lead (TMI.) (as Pb) -	-	-
1-Nitropropane	25	90	Propyl alcohol	25	110	Skin	0.5	0.05
2-Nitropropane	25	90	n-Propyl nitrate	75	350	Tetramethyl succinonitrile - Skin	1	1
N-Nitrosodimethyl-amine (DN-	-	A1	Propylene dichloride	2	5	Tetranitromethane	-	-
methyl-nitrosamine)-Skin	-	30	Propylene imine-Skin	100	240	Tetryl (2, 4, 6-trinitrophenyl-	-	-
Nitrotoluene-Skin	5	30	Propylene oxide	-	-	methylinitramine) - Skin	-	1.5
Nitrotrichloromethane, see	-	-	Propyne, see Methylacetylene	-	-	Thallium (soluble compounds) -	-	0.1
Chloropicrin	-	0.1	Pyrethrum	-	5	Skin	-	5
Octachloronaphthalene-Skin	-	2,350	Pyridine	5	15	Thiram	-	0.05
Octane	500	5	Quinone	0.1	0.4	Tin (inorganic cmpds, except SnH ₄	-	2
Oil mist (mineral)	-	0.002	• RDX-Skin	-	0.1	and SnO ₂)	-	0.1
Osmium tetroxide	-	1	Fluorine	-	0.1	Tin (organic cmpds)	-	15
Oxalic acid	0.05	0.1	Soluble salts	-	0.001	Titanium dioxide	-	0.1
Oxygen difluoride	0.1	0.3	Itinell	-	15	Toluene (solvent)	200	740
Ozone	0.1	0.5	Rutenone (commercial)	-	5	C Toluene-2, 4-dicyanate	0.02	0.1
Parquat-Skin	-	0.1	Selenium compounds (as Se)	-	0.2	o-Toluidine - Skin	5	2
Parathion-Skin	-	0.005	Selenium hexafluoride	0.05	0.4	Toxaphene, see Chlorinated cam-	-	-
Pentaborane	-	0.5	Silver, metal and soluble	-	-	phene	-	-
Pentachloronaphthalene-Skin	-	0.5	compounds	-	0.01	Tributyl phosphate	-	1
Pentachlorophenol-Skin	1,000	2,950	Sodium fluoroacetate (1080)-Skin	-	0.05	1, 1, 1-Trichloroethane, see	-	-
2-Pentane	200	700	Sodium hydroxide	-	2	Methyl chloroform	10	1
Perchloroethylene	100	670	Silane	0.1	0.5	1, 1, 2-Trichloroethane - Skin	100	50
Perchloromethyl mercaptan	0.1	0.8	• Stoddard solvent	500	2,900	Trichloroethylene	-	-
Perchloryl fluoride	3	13.5	Strychnine	-	0.15	Trichloromethane, see Chloro-	-	-
• Petroleum Distillates (naphtha)	500	2,000	• Styrene monomer (phenylethylene)	100	420	form	50	100
Phenol-Skin	5	19	Sulfur dioxide	5	13	Trichloronaphthalene - Skin	-	-
p-Phenylene diamine-Skin	-	0.1	Sulfur hexafluoride	1,000	6,000	1, 1, 2, 3-Trichloropropane	-	-
Phenyl ether (vapor)	1	7	Sulfuric acid	-	1	1, 1, 2-Trichloro-1, 2, 2-tri-	-	-
Phenyl ether-Biphenyl mixture	-	-	Sulfur monochloride	-	6	fluorochane	1,000	7,400
(vapor)	-	-	Sulfur pentafuoride	-	0.025	Triethylamine	25	100
Phenylethylene, see Styrene	-	-	Sulfuryl fluoride	5	20	Trifluoromondobromomethane	1,000	6,100
Phenyl glycidyl ether (PGE)	10	60	Synux, see Demeton	-	-	2, 4, 6-Trinitrophenol see Picric	-	-
Phenylhydrazine-Skin	5	22	2, 4, 5-T	-	10	acid	-	-
Phosadrin (Mevinphos) - Skin	-	0.1	Tantalum	-	5	2, 4, 6-Trinitrophenylmethyl-	-	-
Phosgene (carbonyl chloride)	0.1	0.4	TEPP-Skin	-	0.2	tramine, see Tetryl	-	1
Phosphine	0.3	0.4	Trifon	-	A4	Trinitrotoluene - Skin	-	0.1
	-	-	Tellurium	-	0.1	Trithiocresyl phosphate	-	-

• See Notice of Intended Changes

• See Notice of Intended Changes

Substance	ppm ^{a)}	mg/m ³ b)
Triphenyl phosphate.....	-	3
• Tungsten & Compounds, as W	-	1
• Soluble.....	-	5
• Insoluble.....	100	560
• Turpentine.....	-	0.2
• Urethane (natural) sol. & insol. compounds as U.....	-	0.5
• Vanadium (V ₂ O ₅ dust).....	-	0.1
• Vanadium (V ₂ O ₅ fume).....	-	0.1
Vinyl benzene, see Styrene.....	-	-
C Vinyl chloride.....	500	1,300
Vinyl cyanide, see Acrylonitrile.....	-	-
Vinyl toluene.....	100	480
Warfarin.....	-	0.1
Xylene (xylo).....	100	435
Xylidine - Skin.....	5	25
Yttrium.....	-	1
Zinc chloride fume.....	-	1
Zinc oxide fume.....	-	5
Zirconium compounds (as Zr).....	-	5

Radioactivity: For permissible concentrations of radionuclides in air, see U.S. Department of Commerce, National Bureau of Standards, Handbook 69, "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure," June 5, 1959. Also, see U.S. Department of Commerce National Bureau of Standards, Handbook 59, "Permissible Dose from External Sources of Ionizing Radiation," September 24, 1954, and addendum of April 15, 1959.

MINERAL DUSTS

Substance	ppm ^{a)}	mg/m ³ b)
SILICA	-	-
• Crystalline.....	-	-
• Quartz, Threshold Limit calculated from the formula.....	-	250 f)
• Cristoballite.....	-	-
• Amorphous, including natural diatomaceous earth.....	-	20
SILICATES (less than 1% crystalline silica)	-	-
• Asbestos.....	-	5
• Mica.....	-	20
• Soapstone.....	-	20
• Talc.....	-	5
• Tremolite.....	-	50
• Portland Cement.....	-	15
GRAPHITE (natural).....	-	50 (or 15 mg/m ³ whichever is the smaller) of total dust
"Inert" or Nuisance Particulates.....	-	< 1% SiO ₂

Conversion factors
 mppcf x 35.3 = million particles per cubic meter
 mppcf x 35.3 = particles per c.c.

NOTICE OF INTENDED CHANGES

These substances, with their corresponding values, comprise those for which either a limit has been proposed for the first time, or for which a change in the "Adopted" listing has been proposed. In both cases, the proposed limits should be considered trial limits that will remain in the listing for a period of at least two years. During this time, the previously Adopted Limit will remain in effect. If, after two years no evidence comes to light that questions the appropriateness of the values herein, the values will be placed in the "Adopted" list. Documentation is available for each of these substances.

Substance	ppm ^{a)}	mg/m ³ b)
• C Ammonia.....	50	35
• 2-Acetylaminofluorene.....	-	A ¹
• 4-Aminodiphenyl.....	-	A ¹
• Ammonium chloride fume.....	-	1
• Asphalt (petroleum) fume.....	-	2
• Butyl mercaptan.....	0.5	0.1
• Cadmium oxide fume (as Cd).....	0.1	A ¹
• Dichloroacetylene.....	-	A ¹
• 4-Dimethylaminobenzene.....	-	0.1
• Endosulfan (Thiodan ®) - Skin.....	0.5	-
• Ethyl mercaptan.....	-	-
• Fibrous glass.....	500	Appendix D
• Heptane.....	1	2,000
• Hydrogen peroxide.....	10	1
• Indene.....	-	-
• Mercury vapor, inorganic and organic compounds, excluding alkyl.....	0.1	0.1
• Mercury - Skin.....	2	0.1
• Methyl 2-cyanoacrylate.....	-	0.1
• Methyl demeton - Skin.....	-	47%
• Methyl isomyl ketone.....	100	-
• Methyl mercaptan.....	0.5	-
• Methyl parathion - Skin.....	-	0.2
• 4-Dimethylaminobenzene.....	-	A ¹
• Octane.....	400	1,000
• Oil mist (particulate).....	1	50
• Oil vapors.....	-	-
• Pentaerythritol (tetramethylene-thane).....	1	A ³
• Pentane.....	500	1,000

a) Millions of particles per cubic foot of air, based on impinger samples counted by light-field technique.
 b) The percentage of crystalline silica in the formula as the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.
 • See Notice of Intended Changes

Substance	ppm ^{a)}	mg m ³ b)	Substance	ppm ^{a)}	mg m ³ b)	Substance	ppm ^{a)}	mg m ³ b)
C Boron trifluoride	1	3	Chlorodiphenyl (54% Chlorine) - Skin	-	0.5	Dichlorodifluoromethane	1,000	4,000
Bromine	0.1	0.7	1, Chloro, 2, 3 epoxypropane, see Epichlorohydrin	-	-	1, 3-Dichloro-5, dimethyl hydantoin	-	-
Bromine pentafluoride	0.1	-	2, Chloroethanol, see Ethylene chlorohydrin	-	-	1, 1-Dichloroethane	100	100
Bromoform-Skin	0.5	5	Chloroethylene, see Vinyl chloride	-	-	1, 2-Dichloroethane	50	200
Butadiene (1, 3-butadiene)	1,000	2,200	C Chloroform (trichloromethane)	50	240	1, 2-Dichloroethylene	200	750
Butanethiol, see Butyl mercaptan	-	-	1-Chloro-1-nitropropane	20	100	C Dichloroethyl ether-Skin	15	50
2-Butanone	200	590	Chloroprene	0.1	0.7	Dichloromethane, see Methylene chloride	-	-
2-Butoxy ethanol (Butyl Cellosolve)	50	240	Chloroprene (2-chloro-1, 3-butadiene)-Skin	25	90	Dichloromethane, see Methylene chloride	-	-
Butyl acetate (n-butyl acetate)	150	710	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dichloromethane, see Pro-pylenedichloride	1,000	4,000
n-Butyl acetate	200	950	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	C 1, 1-Dichloro-1-nitroethane	10	10
sec-Butyl acetate	200	950	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	1, 2-Dichloropropane	10	10
tert-Butyl acetate	100	300	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dichlorotetrafluoroethane	1,000	7,000
Butyl alcohol	150	450	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dieldrin-Skin	-	0.2
sec-Butyl alcohol	100	300	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Diethylamine	25	75
tert-Butyl alcohol	100	300	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Diethylamine ethanol-Skin	10	50
C Butylamine-Skin	5	15	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Diethylene triamine-Skin	10	10
C tert. Butyl chromate (as CrO ₃) - Skin	-	0.1	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Diethyl ether, see Ethyl ether	-	-
n-Butyl glycidyl ether (BGE)	50	270	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Difluorodibromomethane	100	800
Butyl mercaptan	10	35	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	C Diglycidyl ether (DGE)	0.5	2
p-tert. Butyltoluene	10	60	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dihydrobenzene, see Hydroquinone	-	-
Cadmium (Metal dust and soluble salts)	-	0.2	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dibutyl ketone	50	200
Cadmium oxide fume	-	0.1	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Diisopropylamine-Skin	5	10
Calcium arsenate	-	1	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Diphenyl amine	-	-
Calcium oxide	-	5	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethoxybenzene, see Xylene	-	-
Camphor	2	5	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethyl 1, 2-dibromo-2, 2-dichloroethyl phosphate, (thiobrom)	-	-
Carbaryl (Sevin ®)	-	5	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethylformamide-Skin	10	35
Carbon black	-	3.5	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethylamine	10	10
Carbon dioxide	5,000	9,000	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethylaminobenzene, see Xylene	-	-
Carbon disulfide-Skin	20	60	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethylamine (N-dimethylamine)-Skin	5	25
Carbon monoxide	50	55	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethylbenzene, see Xylene	-	-
Carbon tetrachloride-Skin	10	65	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethyl 1, 2-dibromo-2, 2-dichloroethyl phosphate, (thiobrom)	-	-
Chlordane-Skin	-	0.5	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethylformamide-Skin	10	35
Chlorinated camphene, -Skin	-	0.5	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	2, 6 Dimethylheptamine, see Diisobutyl ketone	-	-
Chlorinated diphenyl oxide	-	0.5	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	1, 1-Dimethylhydrazine-Skin	0.5	1
Chlorine	1	0.3	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethylphthalate	1	5
Chlorine dioxide	0.1	0.4	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethylsulfate-Skin	1	5
Chlorine trifluoride	0.1	0.4	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dimethylsulfate (all isomers)-Skin	-	-
C Chloroacetaldehyde	1	3	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dinitrobenzene (all isomers)-Skin	-	-
α-Chloroacetophenone (phenacylchloride)	0.05	0.3	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dinitrobenzene-Skin	1	1
Chlorobenzene (monochlorobenzene)	75	350	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Dinitrobenzene-Skin	100	100
o-Chlorobenzylidene malonitrile (OCBM)	0.05	0.4	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Diphenyl	0.2	1
Chlorobromomethane	200	1,050	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Diphenylamine	-	-
2-Chloro-1, 3-butadiene, see Chloroprene	-	-	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate (MDI))	-	-
Chloroprene	-	1	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	-	-	-
Chlorodiphenyl (45% Chlorine) - Skin	-	-	Chromium, sol. chromic, chromic acid and chromates (as CrO ₃)	-	0.1	-	-	-

• See Notice of Intended Changes

• See Notice of Intended Changes

• 1969 Addition

Substance	ppm ^{a)}	mg/kg ^{b)}	Substance	ppm ^{a)}	mg/kg ^{b)}	Substance	ppm ^{a)}	mg/kg ^{b)}	Substance	ppm ^{a)}	mg/kg ^{b)}
Dipropylene glycol methyl ether-Skin	100	600	Formic acid	5	9	Mercury (organic compounds)-Skin	--	--	Methyl acetate	200	0.10
Di-sec, octyl phthalate (Di-2-ethylhexylphthalate)	-	5	Furfural-Skin	5	20	Methyl oxide	25	0.01	Methyl acrylate-Skin	10	35
Endrin-Skin	-	0.1	Furfuryl alcohol	50	200	Methanethiol, see Methyl mercaptan	--	--	Methylal (dimethoxymethane)	1,000	1.050
Epichlorohydrin-Skin	5	19	Gasoline	-	A3	Methoxychlor	--	--	Methyl alcohol (methanol)	200	260
EPN-Skin	-	0.5	Glycidol (2,3-Epoxy-1-propanol)	50	150	2-Methoxyethanol, see Methyl cellosolve	200	0.10	Methylamine	10	12
1,2-Epoxypropane, see Propylene oxide	-	-	Glycol monoethyl ether, see 2-Ethoxyethanol	-	-	Methyl cellosolve	200	0.10	Methyl amyl alcohol, see Methyl isobutyl carbinol	100	465
2,3-Epoxy-1-propanol, see Glycidol	-	-	Guthion, see Azinphosmethyl	-	-	Methyl acetylene-propadiene mixture (MAPP)	1,000	1.000	Methyl butyl ketone, see 2-Heptanone	20	80
Ethanolamine	3	746	Isatinium	-	-	Methyl acetate	10	35	Hexanone	25	40
2 Ethoxyethanol-Skin	200	100	Isopropyl alcohol	500	2,000	Methyl acrylate-Skin	10	35	Methyl cellosolve acetate-Skin	25	120
2 Ethoxyethylacetate (Cellosolve acetate)-Skin	100	540	Heptane (n-heptane)	500	2,000	Methylal (dimethoxymethane)	1,000	1.000	Methyl chloride (liq.)	350	1,900
Ethyl acetate	400	1,400	Hexachlorocyclopentadiene-Skin	1	10	Methyl alcohol (methanol)	200	260	Methyl cyclohexane	500	2,000
Ethyl acrylate-Skin	25	100	Hexane (n-hexane)	500	1,800	Methylamine	10	12	Methyl cyclohexanol	100	470
Ethyl alcohol (ethanol)	1,000	1,900	2-Hexanone	100	410	Methyl amyl alcohol, see Methyl isobutyl carbinol	100	465	o-Methylcyclohexanone-Skin	100	460
Ethylamine	10	18	Hexone	50	300	Methyl butyl ketone, see 2-Heptanone	20	80	Methyl ethyl ketone (MEK), see 2-Butanone	100	250
Ethyl sec-amyl ketone (5-methyl-3-heptanone)	25	130	sec-Hexyl acetate	100	410	Hexanone	25	40	Methyl formate	5	28
Ethyl benzene	100	435	Hydrogen bromide	3	10	Methyl cellosolve-Skin	25	120	Methyl iodide - Skin	25	100
Ethyl bromide	200	890	Hydrogen chloride-Skin	10	11	Methyl cellosolve acetate-Skin	25	120	Methyl isobutyl carbinol-Skin	100	460
Ethyl butyl ketone (3-Heptanone)	50	230	Hydrogen fluoride	3	2	C Methyl cellosolve acetate-Skin	100	460	Methyl isobutyl ketone, see Hexone	100	460
Ethyl chloride	1,000	2,800	Hydrogen peroxide, 90%	1	1.4	Methyl chloride (liq.)	350	1,900	Methyl mercaptan	10	20
Ethyl ether	400	1,300	Hydrogen selenide	0.05	0.2	Methyl cyclohexane	500	2,000	Methyl methacrylate	100	410
Ethyl formate	100	300	Hydrogen sulfide	10	15	Methyl cyclohexanol	100	470	Methyl propyl ketone, see 2-Pentanol	5	--
Ethyl formate	100	300	Hydroquinone	-	0.1	o-Methylcyclohexanone-Skin	100	460	tanone	100	410
Ethyl mercaptan	10	25	Indium and compounds, as in	-	-	Methyl ethyl ketone (MEK), see 2-Butanone	100	250	C α Methyl styrene	100	400
Ethyl silicate	100	850	C iodine	0.1	1	Methyl formate	5	28	C Methylene bisphenyl isocyanate (MDI)	0.02	0.2
Ethylene chlorohydrin-Skin	5	18	Iron oxide fume	-	10	Methyl iodide - Skin	25	100	Methylene chloride (dichloromethane)	500	1,740
Ethylene diamine	10	25	Iron salts, soluble, as Fe	-	-	Methyl isobutyl carbinol-Skin	100	460	Methylene chloride (dichloromethane)	500	1,740
Ethylene dibromide, see 1,2-Dibromethane	-	-	Isoamyl acetate	100	525	Methyl isobutyl ketone, see Hexone	100	460	Molybdenum (insoluble compounds)	-	5
Ethylene dichloride, see 1,2-Dichloroethane	-	-	Isoamyl alcohol	360	380	Methyl mercaptan	10	20	Monomethyl aniline-Skin	2	9
C Ethylene glycol dinitrate and/or Nitroglycerin-Skin	0.2d)	1	Isobutyl acetate	150	700	Methyl methacrylate	100	410	Monomethyl hydrazine-Skin	0.2	0.3
Ethylene glycol monomethyl ether acetate, see Methyl cellosolve acetate	-	-	Isobutyl alcohol	100	300	Methyl propyl ketone, see 2-Pentanol	5	--	Morpholine-Skin	20	70
Ethylene imine-Skin	0.5	1	Isophorone	25	140	tanone	100	410	Napthalene (coal tar)	100	400
Ethylene oxide	50	90	Isopropyl acetate	250	950	C Methyl silicate	100	400			
Ethylene chloride, see 1,1-Dichloroethane	-	-	Isopropyl alcohol	400	980						
N-Ethylmorpholine-Skin	20	94	Isopropylamine	5	12						
Ferbam	-	15	Isopropyl glycidyl ether (IGE)	50	240						
Ferrocenium dust	-	1	Ketene	0.5	0.9						
Fluoride (as F)	-	2.5	Lead	-	0.3						
Fluorine	-	0.1	Lead arsenate	-	0.15						
Fluorotrichloromethane	1,000	5,600	Lindane-Skin	-	0.5						
C Formaldehyde	5	6	Lithium hydride	1,000	1,800						

^{a)} An atmospheric concentration of not more than 0.05 ppm, or per-
sonal protection may be necessary to avoid headache.

^{b)} 1959 Addition
See Notice of Intended Changes

Threshold Limit Values of Airborne Contaminants

Adopted By ACGIH

For 1969

AND INTENDED CHANGES



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iv.

PREFACE

THRESHOLD LIMIT VALUES FOR 1969

Threshold limit values refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect. Because of wide variation in individual susceptibility, however, a small percentage of workers may experience discomfort from some substances at concentrations at or below the threshold limit, a smaller percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness.

Simple tests are now available (*J. Occup. Med.* 9, 537, 1967; *Ann. N.Y. Acad. Sci.* 151 Art. 2, p. 968, 1968) that may be used to detect those individuals hypersensitive to a variety of industrial chemicals (respiratory irritants, hemolytic chemicals, organic isocyanates, carbon disulfide). These tests may be used to screen out by appropriate job placement the hyperreactive worker and thus in effect improve this "coverage" of the TLVs.

Threshold limit values refer to time-weighted concentrations for a 7 or 8-hour workday and 40-hour workweek. They should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. (Exceptions are the substances listed in Appendices A and E and those substances designated with a "C" or Ceiling value, Appendix C.)

Time-weighted averages permit excursions above the limit provided they are compensated by equivalent excursions below the limit during the workday. In some instances it may be permissible to calculate the average concentration for a workweek rather than for a workday. The degree of permissible excursion is related to the magnitude of the threshold limit value of a particular substance as given in Appendix C. The relationship between threshold limit and permissible excursion is a rule of thumb and in certain cases may not apply. The amount by which threshold limits may be exceeded for short periods without injury to health depends upon a number of factors such as the nature of the contaminant, whether very high concentrations - even for short periods - produce acute poisoning, whether the effects are cumulative, the frequency with which high concentrations occur, and the duration of such periods. All factors must be taken into consideration in arriving at decision as to whether a hazardous condition exists.

Threshold limits are based on the best available information from industrial experience, from experimental human and animal studies, and, when possible, from a combination

of the three. The basis on which the values are established may differ from substance to substance; protection against impairment of health may be a guiding factor for some, whereas reasonable freedom from irritation, discomfort, nuisance or other forms of stress may form the basis for others.

The committee holds to the opinion that limits based on physical irritation should be considered no less binding than those based on physical impairment. There is increasing evidence that physical irritation may initiate, promote or accelerate physical impairment through interaction with other chemical or biologic agents.

In spite of the fact that serious injury is not believed likely as a result of exposure to the threshold limit concentrations, the best practice is to maintain concentrations of all atmospheric contaminants as low as is practical.

These limits are intended for use in the practice of industrial hygiene and should be interpreted and applied only by a person trained in this discipline. They are not intended for use, or for modification for use, (1) as a relative index of hazard or toxicity (2) in the evaluation or control of community air pollution or air pollution nuisances, (3) in estimating the toxic potential of continuous unintermittent exposures, (4) as proof or disproof of an existing disease or physical conditions, or (5) for adoption by countries whose working conditions differ from those in the United States of America and where substances and processes differ.

Ceiling vs Time-Weighted Average Limits. Although the time-weighted average concentration provides the most satisfactory, practical way of monitoring airborne agents for compliance with the limits, there are certain substances for which it is inappropriate. In the latter group are substances which are predominantly fast acting and whose threshold limit is more appropriately based on this pattern of response. Substances with this type of response are best controlled by a ceiling "C" limit that should not be exceeded. It is implicit in these definitions that the nature of sampling to determine compliance with the limits for each group must differ; a single brief sample, that is applicable to a "C" limit, is not appropriate to the time-weighted limit; here, a sufficient number of samples are needed to permit a time-weighted average concentration throughout a complete cycle of operations or throughout the work shift.

Whereas the ceiling limit places a definite boundary which concentrations should not be permitted to exceed, the time-weighted average limit requires an explicit limit to the excursions that are permissible above the listed values. The

magnitude of these excursions may be pegged to the magnitude of the threshold limit by an appropriate factor shown in Appendix C. It should be noted that the same factors are used by the Committee in making a judgment whether to include or exclude a substance for a "C" listing.

"Skin" Notation. Listed substances followed by the designation "skin" refer to the potential contribution to the over-all exposure by the cutaneous route including mucous membranes and eye, either by air-borne, or more particularly, by direct contact with the substance. Vehicles can alter skin absorption. This attention-calling designation is intended to suggest appropriate measures for the prevention of cutaneous absorption so that the threshold limit is not invalidated.

Mixtures. Special consideration should be given also to the application of the TLVs in assessing the health hazards which may be associated with exposure to mixtures of two or more substances. A brief discussion of basic considerations involved in developing threshold limit values for mixtures, and methods for their development, amplified by specific examples are given in Appendix B.

"Inert" or Nuisance Particulates. A number of dusts or particulates that occur in the working environment ordinarily produce no specific effects upon prolonged inhalation. Some insoluble substances are classed as inert (e.g., iron and steel dusts, cement, silicon carbide, titanium dioxide, cellulose); others may be soluble (starch, soluble oils, calcium carbonate) but are of such a low order of activity that in concentrations ordinarily encountered do not cause physiologic impairment; still others may be rapidly eliminated or destroyed by the body (vegetable oils, glycerine, sucrose). In the case of the insoluble substances, there may be some accumulation in the respiratory passages. In the case of the soluble substances, this accumulation will ordinarily be temporary but may interfere to some extent with respiratory processes. Hence, it is desirable to control the concentrations of such particulates in the air breathed by any individual, in keeping with good industrial hygiene practices.

A threshold limit of 15 mg/m^3 , or 50 mppcf, of total dust <10 μm , whichever is less, is recommended for substances in these categories and for which no specific threshold limits have been assigned. This limit, for a normal workday, does not apply to brief exposures at higher concentrations. Neither does it apply to those substances which may cause physiologic impairment at lower concentrations but for which a threshold limit has not yet been adopted. Some "inert" particulates are given in Appendix D.

Simple Asphyxiants - "Inert" Gases or Vapors. A number of gases and vapors, when present in high concentrations in air, act primarily as simple asphyxiants without other significant physiologic effects. A TLV may not be recommended for each simple asphyxiant because the limiting factor is the available oxygen. The minimal oxygen content should be 18 percent by volume under normal atmospheric pressure (equivalent to a partial pressure, p_{O_2} of 135 mm Hg). Atmospheres deficient in O_2 do not provide adequate warning and most simple asphyxiants are odorless. Several simple asphyxiants present an explosion hazard. Account should be taken of this factor in limiting the concentration of the asphyxiant. Specific examples are listed in Appendix E.

Physical Factors. It is recognized that such physical factors as heat, ultraviolet and ionizing radiation, humidity, abnormal pressure (altitude) and the like may place added stress on the body so that the effects from exposure at a threshold limit may be altered. Most of these stresses act adversely to increase the toxic response of a substance. Although most threshold limits have built-in safety factors to guard against adverse effects to moderate deviations from normal environments, the safety factors of most substances are not of such a magnitude as to take care of gross deviations. For example, continuous work at temperatures above 90°F or over-time extending the workweek more than 37½, might be considered gross deviations, in such instances judgment must be exercised in the proper adjustments of the threshold limit values.

"Notice of Intent" At the beginning of each year, proposed actions of the Committee for the forthcoming year are issued in the form of a "Notice of Intent." This Notice provides not only an opportunity for comment, but solicits suggestions of substances to be added to the list. The suggestions should be accompanied by substantiating evidence.

As Legislative Code. Although the Conference does not consider the TLVs appropriate matter for adoption into legislative codes and regulations, it recognizes that the values may be so used, if so used, the intent of the concepts contained in the Preface should be maintained and provisions should be made to keep the list current. These values are reviewed annually by the Committee on Threshold Limits for revision or additions, as further information becomes available.

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ADOPTED VALUES (in Alphabetical Order)

Substance	ppm ^a	mg m ⁻³ b)
*Alate	200	15
Acetaldehyde	10	360
Acetic acid	5	25
Acetic anhydride	1,000	20
Acetone	40	2,400
Acetonitrile	1	70
Acetylene dichloride, see 1, 2		
Dichloroethylene	0.1	14
Acetylene tetrafluoride	0.1	0.25
Acrylonitrile-Skin	20	0.3
Aldrin-Skin	2	45
Allyl alcohol-Skin	1	0.25
Allyl chloride	10	5
C Allyl glycidyl ether (AGE)	10	3
Allyl propyl disulfide	2	45
2-Aminoethanol, see Ethanolamine		12
2-Aminopyridine	0.5	2
*Anisole	50	35
Ammonium sulfamate (Ammonate)	100	15
n-Amyl acetate	125	325
sec-Amyl acetate	5	650
Aniline-Skin	0.5	19
Anilidine (o; p-isomers)-Skin	0.5	0.5
Antimony & compounds (as Sb)	0.5	0.5
ANTU (alpha naphthyl thiourea)	0.5	0.5
Arsenic & Compounds (as As)	0.05	0.3
Arsine	0.05	0.3
Asiaphos-methyl-Skin	0.05	0.2
Barium (soluble compounds)	25	0.5
Benzene (benzol)-Skin	1	60
Benzidine-Skin	1	1
p-Benzquinone, see Quinone		
Benzoyl peroxide	1	5
Beryllium	1	0.002
Biphenyl, see Diphenyl		
Boron oxide	1	15
*Boron trifluoride	1	1

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a) Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 mm. Hg pressure.

b) Approximate milligrams of particulate per cubic meter of air.

A Numbers, See Appendix A

* 1955 Addition

** See Notice of Intended Changes

871 Monosodium Glutamate (MSG).

Controversy continues over the effect of monosodium glutamate (MSG). Dr. A. G. Ebert, International Minerals and Chemical Corp. scientist, testified before Sen. McGovern's (D.-S.D.) nutrition committee that his studies with rats and rabbits showed no brain damage or offspring malformation attributable to MSG. Dr. John Olney earlier gave testimony that implied MSG might be deleterious to humans. In his experiments, he found evidence of brain damage in mice fed and injected with MSG. McGovern called on FDA to investigate the effects of MSG.

--Chem. Eng. News 47, 31 (Aug. 11, 1969)

872 Testing New Drugs.

Responsibility for testing new drugs would shift to the Food and Drug Administration, but industry would pick up the tab, under a bill introduced by Sen. Gaylord Nelson (D.-Wis.). S. 2729 would set up a National Drug Testing Center for some in-house testing as well as contracting out studies to "qualified" individuals and organizations. Sen. Nelson thinks those performing current tests aren't so qualified. "Abbreviated studies, ineptly designed protocols, and deficiencies in clinical investigations" are some of the reasons behind his bill, he says. The drug industry could still perform its own tests, of course.

--Chem. Eng. News 47, 25 (Aug. 11, 1969)

BOOKS, PAMPHLETS AND NOTICES

- 873 Profiles of Burn Management. N. H. Stone, editor. Available from: Industrial Medicine Publishing Co., Inc., Medical Book Division, 9703 S. Dixie Hwy., Box 546, Miami, Florida 33156. viii + 51 pp. (1969). Price: \$5.00.

A revised edition of six articles published originally in Industrial Medicine and Surgery from August through December, 1968, bringing together graphic summaries of therapeutic and technical aspects of burn management, heavily reliant on practice and personal experience. The compendium emphasizes the importance of The Burn Unit for serious cases and the need for knowledgeable initial treatment of burn patients for optimum relief, restoration and rehabilitation. Appropriately and adequately color-illustrated, the text touches on a variety of treatment practices for a variety of types and degrees of burns, including excision, grafting and post-operative care as well as a brief treatise of complications associated with burns. The book appears to be reasonably comprehensive in subject coverage but with limited depth on any particular phase of burn management.

--H. M. B.

- 874 Methods in Immunology and Immunochemistry. Volume II. Physical and Chemical Methods. C. A. Williams and M. W. Chase, editors. Available from: Academic Press, 111 Fifth Ave., New York, N. Y. 10003. xvii + 459 pp. (1968). Price: \$22.00.

This Volume II is from a series of four volumes treating the topic of immunology and immunochemistry, with Volume II emphasizing general chemical and physicochemical methods of significant utility for immunological research. It is, in fact, a collection of methods, contributed by some twenty-six authors, carefully organized in seven sections (or chapters): Electrophoresis; Ultracentrifugation; Dialysis and Ultrafiltration; Chromatographic Separations; Optical Analysis; Radioisotopes and Their Applications; and Chemical Analysis. In addition, three appendixes provide text on Spectral Properties of Proteins; Buffers; and Powder Block Electrophoresis. This book is a technical text in nature with liberal literature references throughout, making it a "methods reference handbook." It does not appear to be written for the reader with broad scientific curiosity because of its attention to methods and procedures detail. Rather it appears to be quite specifically for the advanced student and the practicing immunologists and immunochemists plus their technical laboratory staff. Author and subject indexes are provided.

--H. M. B.

- 875 Proceedings of the First Australian Pneumoconiosis Conference held within the University of Sydney, February 12, 13 and 14, 1968. Available from: The Executive Secretary, First Australian Pneumoconiosis Conference, c/o Joint Coal Board, Box 2242 G. P. O., Sydney, Australia 2001. x + 573 pp. (1968). Price: \$10.00 includes postage.

In 1950 the Sydney International Conference of Experts on Pneumoconiosis re-defined pneumoconiosis as "a diagnosable disease of the lungs produced by the inhalation of dust, the term must be understood to refer to particulate matter in the solid phase, but excluding living organisms". By defining it thus the Conference took two important steps (1) it omitted the word "fibrosis" which until then had been widely regarded as an essential component of pneumoconiosis—thus allowing the term to embrace certain more recently recognised forms such as those due to coal, beryllium, metallic dusts, organic dusts, and some very large molecules and (2) it used the term "diagnosable disease" to ensure that some objective manifestation of disease is present before the label is applied. In most cases this takes the form of an abnormal chest x-ray or, nowadays, respiratory function test. It is self evident that to cause pneumoconiosis a dust must be relatively insoluble in body fluids and this helps to explain why certain materials such as limestone and marble do not give rise to pneumoconiosis. Given sufficient exposure the inhalation of almost any insoluble dust can cause a pneumoconiosis, but coal and silica dusts are much more widely encountered than others. The two forms of pneumoconiosis caused by these dusts—silicosis and coal dust pneumoconiosis—are very much more common than other forms and indeed are still of widespread occurrence throughout the world.

Furthermore, certain dusts have been found by long experience to be more harmful than others, particularly insofar as the lungs are concerned, but also when injected. Amongst these silica, talc and asbestos stand out. These three dusts are distinguished from the so-called "inert" dusts such as coal and most silicates by their tendency to provoke excess fibrosis, or scarring, stiffening and thickening, whether in the lungs or in other tissues. This is related to their physico-chemical nature and to specific effects thus determined on the tissue reactions of the body. Such fibrosis is the main constituent of silicosis and asbestosis, being typically distributed in discrete nodules in silicosis and more diffuse through the lower parts of the lungs in asbestosis. Silica dust also seems to encourage the growth of the tubercle bacillus should it be present in the lungs. Such encouragement leads to the combined condition of silico-tuberculosis, from which in former years many silicotics died in early middle age.

Other types of dust, including many formerly classified as "inert", tend to cause different bodily reactions which fortunately, except for coal dust pneumoconiosis, are by and large of much rarer occurrence. Certain metallic dusts or fumes produce more emphysema (or destruction of the lungs) than fibrosis. Other metals cause no apparent reaction but are themselves opaque to x-rays. Iron, barium and tin oxides, for example, produce very little fibrotic reaction. Coal dust is intermediate in its action, tending to cause a limited fibrotic reaction of fine nodular distribution, with associated emphysema. A somewhat similar reaction may be evoked by certain silicates and by hard metal. Beryllium dust promotes a granulomatous (or fleshy) overgrowth of tissue which may return to normal or alternatively may leave in its wake a permanent lung fibrosis. Many organic fibre dusts, for example cotton, flax and also some dusts from cereal grains, tend to irritate the finer bronchial airways and alveoli, often causing recurrent illness resembling a type of allergic reaction. This may finally lead to a certain amount of diffuse fibrosis of the lung. Dusts from mouldy hay, from mushrooms and some bird excreta, and also possibly some forms of hairspray may cause a fine nodular pneumonitis (or lung inflammation) which usually clears but in some individuals progresses to a permanent diffuse fibrosis or honey-combing of the lungs. Certain types of living organisms such as mould spores and some bacteria may give rise to similar lung reactions, so that the borderline between pneumoconiosis and certain diseases caused by living organisms is not sharply defined.

Another aspect of industrial dust which determines both its ability to produce pneumoconiosis and the general nature of the disease is its fairly typical size distribution within the range 0.1 to 30 or 50 micron diameter, with a particle number peak size at or a little below 1 micron and a mass peak at from 3 to 10 micron diameter. The mean sizes retained in the lungs tend to be a little lower due to the filtering effect of the nose, trachea and bronchi. There are slight differences with fibrous material such as asbestos, cotton and flax dusts. Coarser particles such as roadway dust do not remain suspended for long except in strong winds, but in any case do not reach the lung tissue if inhaled. Nevertheless some such particles may be quite irritating to the nose and bronchi—for example, soot. Finer particles as in the smoke and fume range

(0.001 to 0.1 micron) are usually only deposited in small amounts in the lungs and bronchial airways. But they, together with gaseous irritants, tend to be implicated more and more as time goes by in the causation of the now very common diseases of chronic bronchitis, bronchiolitis, emphysema.

The Table of Contents includes: The Pneumoconioses; Dust Sampling—Instrumentation and Standards—A Review; Dust Sampling Instrument Comparison at Broken Hill, N.S.W.; Dust and Dust Sampling in South Africa; Discussion; Sampling and Control of Airborne Dust in Bituminous Coal Mining in the U.S.A.; Pneumoconiosis in N.S.W. Coal Miners; Dust Sampling and Control in Coal Mines in N.S.W. Part I; Dust Sampling and Control in Coal Mines in N.S.W. Part II; Discussion; Dust Sampling and Dust Control in Metalliferous Mines; Pneumoconiosis at Broken Hill; Dust Control Practices and Techniques in the Broken Hill Mines; Dust Sampling and Dust Control at Mount Isa; Discussion; Pneumoconiosis in New South Wales; The Control of Dust in Tunnelling and Excavation Work; Discussion; Pneumoconiosis in Queensland; Dust Control in Quarries; Discussion; The Prevalence of Respiratory Symptoms in Western Australian Gold Miners Compared with Coal Miners; Asthmatic Reactions to Occupational Inhalants; Rarer Forms of Pneumoconiosis; Asbestos Mining, Wittenoon, W.A.; Asbestos Dust Exposure; Dust Exposure and Control in Factories; Pneumoconiosis in Victoria; Dust and Dust Control in Foundries; Discussion; The Medical Control of Pneumoconiosis; A Review of Physical and Chemical Methods for the Determination of Quartz; Discussion.

--Cond. from text

- 876 Environmental Health Planning Guide. U. S. Department of Health, Education, and Welfare. Public Health Service. Consumer Protection and Environmental Health Service. 1968. Public Health Service Publication No. 823, 1968 Revision. iv + 100 pp. Available from: Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Price: \$1.00.

Designed to assist in the preparation of the environmental health plan as a part of the comprehensive health plan (physical, mental and environmental) prepared by each State and urban area, this publication has limited application, as an introductory or training document for lay and general health oriented groups. As originally published, the Guide was based upon experiences gained in working with diverse groups in ten different urban areas, large and small. The varied sponsors included health departments, planning departments, chambers of commerce, city and county governments, and a mixed committee of industrial, commercial and citizen representatives. The first revised edition incorporated experience gained through working with an additional twenty-five urban areas, including metropolitan areas. The revision reflected knowledge gained in various categorical fields and included a strengthened chapter on implementation. The second revision represented an attempt to make the document more responsive to 1966 Federal Partnership for Health Legislation, Public Law 89-749 and Model Neighborhoods in Demonstration Cities under the Demonstration Cities and Metropolitan Development Act of 1966, Public Law 89-754.

--Cond. from Preface

- 877 Home Care Programs in Arthritis. A Manual for Patients. (Pamphlet). The Arthritis Foundation. Available from: The Arthritis Foundation, 1212 Avenue of the Americas, New York, N. Y. 10036. 24 pp. (1969). Price: Not given.

This manual presents, for patients with rheumatoid arthritis and similar arthritic diseases, general instructions on their care at home. It is designed as an aid to the physician, a supplement to the specific treatment program and advice he gives his patients. Not everything in it applies to every patient. When the physician gives the manual to a patient, he should point out and discuss those exercises and other sections which apply in each case. The procedures described in this booklet will not cure arthritis. This statement is so important that it can't be repeated often enough. Arthritis sometimes goes away by itself, but there are no medical or other measures which can cure it or make it go away. There are, however, measures which can make it better or keep it from getting worse. The effects of the disease can become much worse if a proper treatment program is not followed. One of the chief dangers is keeping an arthritic joint immobilized. This can lead to deformity and crippling. The exercises and other procedures outlined here can prevent crippling. They are often essential in keeping a patient from becoming seriously disabled, and in improving the function of joints already seriously affected. This manual tells a patient what he can and should do about his arthritis at home, alone or with the help of others. But it is not a do-it-yourself substitute for being under the care of a physician. Used only if the patient's physician advises it, and in the way he prescribes for each patient, it should be a valuable aid in both prevention of disability and rehabilitation of individuals with this common chronic disease.

--Introduction modified

- 878 Nurses Can Give and Teach Rehabilitation. A Manual. Second Edition. Mildred J. Allgire. Available from: Springer Publishing Co., Inc., 200 Park Ave. South, New York, N. Y. 10003. 93 pp. (1968). Price: \$2.00.

The first edition of "Nurses Can Give and Teach Rehabilitation" was so favorably received—thousands of copies sold in English-speaking countries, and translation in three foreign languages—that the author was encouraged to prepare this second edition. According to Miss Allgire (page 7), new material is included on the growing needs and values of physical rehabilitation nursing, on understanding and meeting the patient's emotional needs, and on the importance of providing adequate fluids and nutrition, as well as a chapter on training for the bladder and bowel control. Other additions include techniques for making an assessment of the patient's nursing care needs, and for making nursing care plans that will provide for meeting the needs of the chronically ill person. The language is non-technical and many diagrams and pictures giving step-by-step procedures give graphic descriptions to nurses caring for patients of all age groups and many disabling conditions. It will be useful to nurses working in hospitals and convalescent nursing homes and to public health nurses working in the homes of patients. It certainly also will be a valuable tool for inservice education teachers who teach principles of physical rehabilitative care in the classroom. Although its principal purpose is to guide nurses who have no special rehabilitation facilities available, it also aims to serve nurses who work in fully equipped areas, and stresses the importance of early recognition and treatment of deformity and disability, since research has shown that early care is the key to helping the patient achieve a maximum participation in the normal processes of living. Miss Allgire's new manual is a concise but complete coverage of its subject that should be a boon to people concerned with rehabilitation in all its aspects.

--M. C. C.

- 879 The Biochemistry of the Nucleic Acids. Sixth edition. J. N. Davidson. Methuen and Co., Ltd., London. Available in U.S.A. from: Barnes and Noble, Inc., 105 Fifth Ave., New York, N. Y. 10003. xvi + 352 pp. (May, 1969). Price: \$8.00.

Since the fifth edition, published in 1965, the explosive increase in acquired knowledge of the nucleic acid field, particularly in relation to problems of conformation, of biosynthesis and of the genetic code, has made it mandatory to rewrite several of the chapters, extensively revise the remainder, eliminating much obsolete material. This book is intended to provide an elementary outline of the main features of the nucleic acids and nucleoproteins for the benefit of students of biochemistry, of chemists and of biologists. The author has tried to update the book to late 1968, but inevitably more recent developments can be found to have occurred while the book was being readied for publication. Each chapter is provided with rather extensive references both to reviews and to important original papers. The introduction, Chapter 1, provides a brief excursion into the past to put the text in proper time orientation and technological perspective. The very liberal use of references makes the total volume appear to be an annotated bibliography, but it is so much more. It is a current text and a reference library on the subject in one volume. The book reads smoothly and the subject matter appears quite logically presented. It should be a valuable addition to the library of those working in the field, for students hoping to learn more about the field, and for the inquiring mind who has an interest in the subject.

--H. M. B.

INDUSTRIAL MEDICAL PRACTICE

- 880 A New Health Professional—The Environtologist. I. R. Tabershaw. Arch. Environmental Health 18, 811-815 (May, 1969).

The word "environtologist" has been coined in response to the need to find a single, easily understandable term to designate a professional person whose functions in the field of health involve a dynamic concept of the interdependence of health and environment. The principal factors are a unifying concept or doctrine, a substantive body of scientific knowledge, a common ethic, and a sharply defined area of practice shared by its members, which is directed to a fundamental personal or social need of man. The unifying doctrine of the environtologist is unambiguous—to improve the environment in order to preserve the health of man and the quality of living. The area of activity is clearly delineated—the interface where man reacts with his environment. The scientific basis for practice is substantive—the environmental health sciences.

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Practicing environmentalists are employed mostly in government, many in educational institutions, and some in industry. Professional societies linked by this common interest already exist and their members strongly identify with each other. As professionals, their standard for performance is higher than what is legally required, and they feel constrained by the inadequacy of legislative support. Traditional public health filled a void which the medical profession was unwilling or unable to fill. Environmentalism, under the goad of urbanization, population growth, and advancing technology, and based on the environmental health sciences is now filling the void which traditional public health has not filled satisfactorily. "About the only factor left to make environmentalism an established rather than an emerging profession is recognition by the state of educational achievement and licensing to limit the entry of the unqualified and insufficiently trained," the author concludes. There are 6 references.

--Cond. from text.

- 881 The Case of Mary, Queen of Scots. Some Further Medical Notes. (Doctor Out of Zebulun).
E. P. Scarlett. Arch. Internal Med. 123, 591-593 (May, 1969).

An article which Macalpine and Hunter published in the British Medical Journal in 1966,¹ dealt with King George III of Great Britain. As the result of their studies, they concluded that the malady from which George had suffered, rather than being what traditionally had been regarded as manic-depressive psychosis, was in fact due to porphyria. They then continued their investigation to conclusively establish the diagnosis of porphyria, and proceeded to survey the hereditary background in several generations of the three royal houses of Stuart, Hanover, and Prussia.² Gunther, in his early study,³ provided the first knowledge of the disease. He described the triad of abdominal pain, constipation (or diarrhea), and vomiting associated with the disorder. Waldenstrom, in a classic monograph,⁴ described acute intermittent porphyria as a familial disorder running a chronic course with exacerbations of Gunther's triad, with neurological involvement, varying mental symptoms, and usually a grossly increased urinary porphobilinogen level during attacks. In 1959, Dean and Barnes⁵ described a type of porphyria in South Africa which they named "variegate porphyria," characterized by the symptoms noted by Gunther and Waldenstrom and, in addition, traumatization of the skin and intolerance of sunlight. Other features were frequent occurrence of symptom-free members in the family line, the great liability of barbiturates to provoke acute attacks, increased urinary porphobilinogen levels during attacks, in the quiescent stage (noted by later observers) large amounts of porphyrin-peptide conjugates (designated X-porphyrin), this latter feature being of diagnostic significance. Other features are spasms in the chest with respiratory embarrassment; pain in the limbs; muscular weakness; transient paralysis affecting preferably the extensor groups; mental symptoms ranging from depression or excitement to delirium, convulsions, and coma; insomnia; loss of voice; transient visual impairment; headache; vasomotor disturbances; and skin lesions. Convalescence is usually marked by great debility. The disease may run a fulminating course or recur at varying intervals. The age at onset is usually early, but rarely before puberty. During attacks the urine is colored from deep amber to a port wine hue (a feature of historical pathographic importance).

The disorder, porphyria, can clearly be traced back to Mary, Queen of Scots. Then it appears in her son, James VI of Scotland and I of England, and his son, Henry, Prince of Wales, who died in an attack at the age of 18. Through James I's daughter, Elizabeth, Queen of Bohemia, it passed to her daughter Sophia, wife of Ernst August, Elector of Hanover, the foundress of the British House of Hanover, and thence to her son George I of England, and to George III and his descendants. In George III's family, four of his sons and his granddaughter, Princess Charlotte, were affected. Through Sophia, also, it passed to her daughter, Sophia Charlotte, wife of Frederick I, King of Prussia, and in the Brandenburg-Prussian line to Frederick the Great, German cousin to George III. Of prime importance in such revelations is the light that is now thrown on the personal histories of a succession of rulers, notably Mary, Queen of Scots, George III, and George IV.

A professional historian, John Brooke, Ph.D., senior editor, Historical Manuscripts Commission, London, discusses these disclosures in some detail.⁶ He states that they may have the greatest consequence in historical circles, particularly in the case of George III, in which connection this new diagnosis is of the utmost importance. He also examines the history of George IV in the light of this new evidence. The importance of such renewed examination is evident when one remembers that the reigns of these two sovereigns spanned crucial years in British history—the secession of the American Colonies, the French Revolution, the Napoleonic wars, and the

beginning of the Industrial Revolution. The editor of the British Medical Journal, commenting on these studies of Dr. Macalpine and her associates, ⁷ echoes the opinion of Dr. Brooke in his assessment of their historical value. To underline further the importance of this work, a monograph has been prepared dealing with the whole subject, entitled Porphyria: A Royal Malady. It comprises 76 pages, is published by the British Medical Journal, and a copy may be had by writing to B.M.A. House, Tavistock Square, London, W.C. 1, England. The booklet contains the 1966 article by Drs. Macalpine and Hunter on George III's illness, the paper by Macalpine, et al (1968) on porphyria in three royal houses, Dr. John Brooke's article on the historical implications of porphyria, and an account of the porphyrias by Prof. Abe Goldberg.

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Editor's Note: This "occupational malady" illustrates the importance of (1) host (genetotropic) factors in chronic disease etiology, (2) retrospective epidemiological studies where there is a well-defined pathological entity such as porphyria, and (3) proper job placement.

--R. T. P. deT.

1. Macalpine, I., and Hunter, R.: The "Insanity" of George III: A Classic Case of Porphyria. Brit. Med. J. 1:65-71 (Jan. 8, 1966).
2. Macalpine, I.; Hunter, R.; and Rimington, C.: Porphyria in the Royal Houses of Stuart, Hanover and Prussia: A Follow-up Study of George III's Illness. Brit. Med. J. 1:7-18 (Jan. 6, 1968).
3. Gunther, H.: Ergebn. Allg. Path. Path. Anat. 20 (pt 1):608, 1922.
4. Waldenstrom, J.: Studien uher die Porphyrie. Acta Med. Scand., suppl. 82, p. 73, 1937.
5. Dean, G., and Barnes, H. D.: Porphyria. S. Afr. Med. J. 33:246, 1959.
6. Brooke, J.: Historical Implications of Porphyria. Brit. Med. J. 1:109-111 (Jan. 13, 1968).
7. Revision of History, editorial. Brit. Med. J. 1:74 (Jan. 13, 1968).

882 Physiologist's Response to "On a View of Undiagnosed Distress." (Editorial). A. B. Craig, Jr. Arch. Internal Med. 123, 594-595 (May, 1969).

For most physiological functions we do not know the variability within the population. In part, the physiologists must take blame. Most studies of human physiology involve five to ten subjects. Although such a sample size is usually adequate to define and to fathom many physiological problems, it does not provide a reasonable basis for understanding people. In general, our present teaching of physiological concepts neglects the idea of individuality in sensitivity, tolerance, or responsiveness. For a number of years, the writer and a co-worker argued almost daily about the temperature in the laboratory. He maintained that the temperature was too high, and she closed the windows as fast as he could open them. He became convinced that she was slightly "crocky" on the subject, and she felt that he was inconsiderate and "pig-headed." In talking about the problem further, it was discovered that her hands were cold most of the morning or after any minor cold stimulation during the day. This lead was followed up. A common physiological test for cold intolerance is to immerse the hand in ice water. This often produces blanching of the skin which in Raynaud's phenomenon persists and is accompanied by pain. It was not possible to show any difference in the reaction of my co-worker from others except for the verbiage during immersion. We then tried a milder stimulus, 20 C water. Most subject's finger temperature decreases rapidly and within two to four minutes equals the water temperature (unpublished data). This was her response also, but after immersion the finger temperature showed little recovery in two hours. Usually, subjects will rewarm the finger in 10 to 20 minutes. Furthermore, if a person is in a warm environment (40 C) the finger will remain 4 to 5 C above the water temperature, but her finger temperature decreased to that of the water even in a hot room. We have identified one other such person out of about 20 tested. She also had had considerable interpersonal conflict at home and at work. As a "follow-up," it is worth mentioning that the laboratory is still much too warm, but that the author's office is now separate and pleasantly cool. In the above example, the subject's response to a mild and local cold exposure could not really be considered "abnormal." Her response probably falls at the extreme range of normal responses. Being in that region of the normal distribution curve implies that usual indoor temperature environment is inadequate, for the temperature setting is decided by a population described by plus and minus a certain deviation from the mean. She is not within this latter group in regard to local temperature regulation in the extremities.

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Editor's Note: Mr. Douglas Soutar, Vice President Industrial Relations and Personnel, American Smelting and Refining Co., will speak on "How Industrial Hygiene Engineering Contributes to Good Personnel Administration" at Industrial Hygiene Foundation's 34th Annual Meeting Technical Conference, October 15, 1969, at Chatham Center, Pittsburgh, Pa. The above example illustrates a human relations problem, common among industrial personnel, in which the industrial hygienist may be helpful.

--R. T. P. deT.

- 883 Residency Training in Community Medicine. A New Concept Utilizing Proven Principles. R. L. Kane and H. S. Fulmer. Arch. Environmental Health 18, 844-847 (May, 1969).

The three-year residency program in Community Medicine is multiphasic involving the following: (1) an elective phase that allows a year of concentration within a clinical specialty of choice; (2) tutorial sessions in epidemiology, biostatistics, and medical care; (3) practice teaching in the sophomore and senior medical school courses in community medicine; and (4) an original research project. The early and continued involvement in the department's teaching program provides reinforcement of the acquisition of principles of epidemiology and preventive medicine. The department and the resident are based within the medical school, and encourage effective interaction between community medicine and other clinical services. There are 5 references.

--Authors' summary

- 884 Sleep and Wakefulness in a Group of Shift Workers. G. S. Tune. Brit. J. Ind. Med. 26, 54-58 (Jan., 1969).

Fifty-two shift workers recorded their hours of sleep and wakefulness for a period of 10 weeks. Compared with matched non-shift-working control subjects it was found that they took a higher average duration of sleep per 24 hours and more and longer naps outside the major sleep period. A comparison of the on and off duty records from the shift workers showed that a sleep debt was incurred during the former which was largely paid off by taking long naps in the latter. It is suggested that the longer sleep taken by shift workers may be necessary in order to pay off specific kinds of sleep debt.

--Author's abst.

- 885 Experimental Scurvy in Man. R. E. Hodges, et al. Am. J. Clin. Nutr. 22, 535-548 (May, 1969).

Six apparently healthy men volunteered for metabolic studies of human scurvy. Four developed the clinical signs of follicular hyperkeratosis of the thighs, buttocks, calves, and posterior aspects of the arms, swollen bleeding gums, perifollicular hemorrhages and congested follicles, and conjunctival hemorrhages. Biochemically there was virtually complete disappearance of ascorbic acid from the blood and urine. Blood counts, numerous biochemical measurements, the rate of wound healing, and physiological tests including electrocardiograms, electroencephalograms, basal metabolism rates, and blood coagulation studies showed no abnormalities as a result of induced scurvy. The present studies do not provide sufficient evidence to estimate the optimal daily allowance of ascorbic acid.

--J. Am. Med. Assn. References & Reviews

- 886 Ocular Lesions in Scurvy. J. Hood and R. E. Hodges. Am. J. Clin. Nutr. 22, 559-567 (May, 1969).

Despite the recorded rarity of ocular vascular lesions in human scurvy, conjunctival lesions appeared during deprivation of ascorbic acid in five of nine volunteers who participated in two studies of experimental scurvy in man (three of four men in the first study and two of five in the second). The ocular lesions often appeared early in the development of clinical scurvy and were first noted after deprivation of ascorbic acid for 74 to 95 days. These lesions varied from minute bulbar conjunctival hemorrhages and varicosities to a large subconjunctival hemorrhage accompanied by palpebral petechial hemorrhages, and conjunctival congestion.

--J. Am. Med. Assn. References & Reviews

- 887 Tennis Leg. A. I. Froimson. J. Am. Med. Assn. 209, 415-416 (July 21, 1969).

Tennis leg is a painful condition of partial tearing of the medial belly of the gastrocnemius, caused by overstretching the muscle by concomitant ankle dorsiflexion and full knee extension. Contributory factors are muscle fatigue and degenerative changes. Simple conservative treatment is effective and permanent disability does not result. Prodromic calf aching has been discussed and permits preventive measures to be taken. A diagnosis of plantaris tendon rupture is erroneous. There are 5 references.

--Author's abst.

- 888 Clinical Aspects and Pathogenesis of Chronic Bronchitis. (In Japanese). K. Ito, et al. Jap. J. Chest. Dis. 27, 829-842 (Dec., 1968).

Stricter criteria for chronic bronchitis than that of Fletcher's, including a certain amount of sputum and bronchographic findings, were applied in the analysis of patients with chronic bronchitis, and 243 cases were selected for this study. A mass outbreak of chronic bronchitis in the Yokkaichi area where air contamination was heavy was also investigated. The writers noted the following factors as responsible for the development of chronic bronchitis: (1) exocrine function, allergic diathesis, respiratory disposition, sex, and race as background factors in the development of bronchitis in the adult, (2) pneumonia, allergic diseases, sinusitis, cardiac diseases, pulmonary tuberculosis, and repeated infections of the respiratory tract as important contributing factors in the preadolescent stage, (3) air pollution, aging, smoking habits, the amount and type of smoking, excessive intake of alcoholic beverages, poor economic condition, harmful occupation, and infection as important contributing factors in adults. It is concluded that chronic bronchitis develops as a summation of these factors.

--Am. Rev. Resp. Dis. Absts.

- 889 Mites and House-Dust Allergy in Bronchial Asthma. K. Naunsell, D. G. Wraith, and A. M. Cunningham. Lancet 1, 1267-1270 (June 15, 1968).

The mites in a large number of dust samples from houses of patients with bronchial asthma were identified and counted. The most common species was Dermatophagoides pteronyssinus, and it was particularly abundant in mattress dust. A total of 94 per cent of the house dust-sensitive patients gave skin reactions to D. pteronyssinus extracts and, to a lesser extent, to extracts of other species. Asthma patients who did not react to house dust also did not react to D. pteronyssinus. Threshold dilutions giving reactions in 200 patients sensitive to D. pteronyssinus were about 10^{-6} . In 22 patients dust from mattresses and living rooms was tested by counting the numbers of D. pteronyssinus and by measuring the skin reactions to one per cent extracts of the dusts; the mite count was much higher in mattress dust, and skin reactions to mattress dust extracts tended to be greater.

--Am. Rev. Resp. Dis. Absts.

- 890 Mites and House-Dust Allergy. J. Pepys, M. Chan, and F. E. Hargreave. Lancet 1, 1270-1272 (June 15, 1968).

For more than 40 years, house dust has been recognized as probably the most important cause of allergic rhinitis and bronchial asthma. Samples of house dust from many countries contain common or related antigens. This study demonstrated that in patients with bronchial asthma, there was a good correlation between a history of house dust allergy and prick-test and inhalation-test reactions to an extract of a culture of the acarine mite Dermatophagoides culinae, the antigenic capacity of which is comparable to an extract of D. pteronyssinus, the "house dust mite." It appears likely that the house dust mite is at least closely associated with the ability of house dust to act as an allergen, and it is also likely that it is a major source of house dust allergy.

--Am. Rev. Resp. Dis. Absts.

- 891 Clinical Significance of Skin Reactions to Mite Extracts and Other Allergens in Children with Asthma. J. M. Smith, et al. Brit. Med. J. 2, 723-726 (June 21, 1969).

Prick tests, using mite extracts, in 300 asthmatic children gave positive reactions more frequently than any other group of allergens. The most active extract was that of Dermatophagoides pteronyssinus, but D. farinae gave reactions of only slightly less frequency and size and was considered a satisfactory substitute. A control group of 60 children without asthma or allergic disease were also tested, and in only one were positive reactions to mite extracts obtained. Whealing reactions 5 mm or more in mean diameter to mite extracts occurred in 77% of clinically dust-sensitive asthmatic children. Such reactions to pollen extracts occurred in similar percentage of clinically pollen-sensitive children and to relevant food extracts of clinically food-sensitive children. House dust mites, particularly D. pteronyssinus are probably of considerable importance in childhood asthma.

--J. Am. Med. Assn. References & Reviews

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- 892 Evaluation of Lung Function. UCLA Conference. D. H. Simmons, Moderator. Ann. Internal Med. 71, 155-176 (July, 1969).

Evaluation of lung function requires evaluation of the function of the entire respiratory apparatus of which the lung is ordinarily the most critical part. It is of diagnostic value in determining the presence, type, and extent of disease. It is of therapeutic value in following the course of disease and its response to management. And, finally, it is of value in making relatively objective determinations of the degree of disability due to respiratory disease. Ideally, lung function tests should independently evaluate the function of the airways, lung circulation, and lung parenchyma where gas exchange occurs. In addition, interactions between these three parts of the system are often very important. Usually, the functions are evaluated by techniques that give only indirect evidence concerning their status and their contribution to disability. Techniques discussed include spirometry, measurement of blood gases, and lung scans. There are 23 references.

--Authors' summary

- 893 Epidemiological Study of Atherosclerosis in the Vicinity of Provence. A. Jouve, P. Rochu, and P. Avril. Union Med. Canada 98, 761-766 (May, 1969).

Ten different factors were examined in 1,229 subjects with coronary disease, 669 with obliterative arteriopathy of lower limbs, and 743 controls. The most important predisposing factors leading to coronary disease in men were familial tendency, android biotype (often associated with excessive body weight), compulsive neurosis, arterial hypertension, elevated blood levels of lipids, glucose, and uric acid, excessive food intake—especially fat, and heavy smoking habits. In the women with coronary disease, the presence of masculine traits and arterial hypertension are most prevalent. In patients with chronic arteriopathy of lower limbs, the same factors seem to be at play, except for obesity, heredity, and abnormal personality traits.

--J. Am. Med. Assn. References & Reviews

- 894 Peptic Ulcer in Massachusetts Physicians. R. R. Mason and B. MacMahon. New Engl. J. Med. 281, 11-15 (July 3, 1969).

Frequency of peptic ulcer among physicians was estimated by a mail questionnaire. Ninety-two percent (8,056) of 8,716 eligible physicians responded to the questionnaire; 11% of male physicians above the age of 45 reported having had a duodenal ulcer. The estimated annual incidence rate of duodenal ulcer in males was between 2.5 and 4/1,000 in all age groups above the age of 25. There is an indication that this rate has decreased over the past 10 to 20 years among physicians born after 1921. About 1.5% of male physicians over 45 reported having had a gastric ulcer. The estimated annual incidence rate of gastric ulcer increased with age to a peak of 1 to 1.5/1,000 above the age of 65. There is no indication that peptic ulcer is unduly frequent among male physicians; the rate for female physicians may be higher than for the general female population. No association of risk of ulcer with professional specialty or place of residence could be demonstrated.

--J. Am. Med. Assn. References & Reviews

- 895 Influence of Age and Sex on Dietary-Induced Cirrhosis. An Experimental Study in the Rat. M. D. Reuber. Arch. Environmental Health 18, 792-797 (May, 1969).

Inbred Buffalo strain 4-, 8-, 12-, 24-, and 52-week-old male and female rats were given a choline-deficient diet for 22 weeks. Cirrhosis of the liver varied from mild to severe. The incidence and severity of the cirrhosis was comparable for males and females 4 weeks of age at the start of the experiment. The incidence in males and females 8, 12, and 24 weeks of age was similar, but the severity of the cirrhosis was greater in the males. Both the incidence and the degree of cirrhosis in the 52-week-old females were remarkably less than in males of the same age or in younger females. Survival time in male and female rats 4 weeks of age, male rats 8 weeks of age, and males and females 52 weeks of age at the beginning of the choline-deficient diet was less than in animals of other ages. There are 25 references.

--Author's abstr.

- 896 Human Louse Infestation. H. F. Sussman, S. B. Cooke, and V. Bloch. Arch. Dermatol. 100, 82-83 (July, 1969).

Carbacide is a fine, slightly scented white powder, the active ingredient of which is 1-naphthyl N-methylcarbamate, an insecticide-pesticide with a long history in the agriculture field. It is relatively safe and nontoxic, manifesting no sting, burn, or other discomfort to the patient. It appears to be highly effective in the treatment of human louse infestation. There is also a strong possibility that Carbacide will be highly efficacious in the treatment of human Sarcoptes scabiei infestation.

--J. Am. Med. Assn. References & Reviews

- 897 Cigaret Nicotine, Tar Rating. Federal Trade Commission. Pittsburgh Press, Aug. 10, 1969, Sect. 1, p. 29.

The Federal Trade Commission (FTC) has released its new rankings on cigarettes according to tar and nicotine contents. In the FTC figures, the No. 1 rank in tar means the brand which delivers the least tar. Here are the figures:

<u>Sales Rank</u>	<u>Brand</u>	<u>Tar Rank</u>	<u>Nicotine Rank</u>
1	Winston	69	54
2	Pall Mall	28	46
3	Salem	63	76
4	Camel	74	70
5	Marlboro	59	94
6	Kool	42	99
7	Kent	8	15
8	Lucky Strike	35	44
9	Tareyton	24	32
10	Viceroy	41	91

Brands with the least tar and their relative ranking in nicotine content and sales:

<u>Sales Rank</u>	<u>Brand</u>	<u>Tar Rank</u>	<u>Nicotine Rank</u>
32	Marvels rf	1	1
26	Carlton kf	2	7
31	Sano rf	3	2
*32	Marvels kf	4	3
*31	Sano kf	5	5
28	Montclair kf	6	18
**	Duke of Durham kf	7	8
7	Kent rf	8	15
37	Life kf	9	17
**	Tryon kf	10	22

* Sales list groups all varieties of brand together.

** Not among top 50 sellers.

rf—Regular size, filter.

kf—King size, filter.

- 898 The Epidemiology of Cancer Therapy. IV. The Extraction of Data from Medical Records. A. R. Feinstein, Joyce A. Pritchett, and Carol R. Schimpff. Arch. Internal Med. 123, 571-590 (May, 1969). (See also Absts. Nos. 680 and 681 in Industrial Hygiene Digest, p. 14, July, 1969).

If the clinical course of cancer is to be studied from medical records, arrangements must be made to obtain the records for all suitable patients, and to perform an appropriate extraction of data for each case. To obtain records for a complete collection of patients, the investigator must learn about the system of diagnostic coding numbers used for soliciting material from the

medical record library; he must also search for cases noted only by such additional sources as the tumor registry, necropsy pathology department, and other sections of the medical center. Establishment of a system of "external book-keeping" will help maintain a smooth traffic in the movement of records during processing. Before the extraction begins, each obtained record should be briefly reviewed to verify its inclusion in the series; to select appropriate "datemarks" for allocating the data to be extracted; to learn about missing or displaced information; and to develop a general orientation for the clinical course of that particular patient. The extracted information is entered on a form specifically designed for each cancer. The form should contain space for certain administrative remarks, for the patient's medical itinerary during the present illness, and for selected demographic data. The retrospective opportunity to review an entire clinical course enables the discernment of various errors in the judgments made by different physicians who have participated in the patient's care. The reviewer can also note unusually interesting events that may not be adequately emphasized in the formal arrangement of extracted data. A background of clinical experience may be required to perceive many of these distinctions, but many others can be noted by alert extractors who have no special clinical training. With data available, the patient can be effectively compared with others during scientific analyses of the epidemiology of cancer therapy. There are 8 references.

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Editor's Note: This article refers to biostatistical studies in a medical center, using the ICDA.¹ The following remarks are given by the authors regarding comparative usefulness of the ICDA and SNDO² in such studies. For industrial populations the ICDA is preferable,³ although it has been necessary to modify the ICDA for use in industry. Companies which have modified the ICDA for their own use are urged to send Industrial Hygiene Foundation a copy of such revision to guide its efforts to incorporate industry's needs into the next revision of the ICDA, due in the next year or so.

--R. T. P. deT.

1. International Classification of Diseases: Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, Geneva: World Health Organization, 1957, vol. 1 and 2.
2. Thompson, E. T., and Hayden, A. C. (eds.): Standard Nomenclature of Diseases and Operations, ed 5, New York: McGraw-Hill Book Co., Inc., 1961.
3. Industrial Hygiene Foundation's Medical Series Bulletin No. 15-69, "Current Concepts of Biostatistical Services for Industry. Proceedings of IHF Biostatistical Workshop, July 29-30, 1968."

- 899 The Characteristics of Bronchial Clearance in Humans and the Effects of Cigarette Smoking. R. E. Albert, M. Lippmann, and W. Briscoe. Arch. Environmental Health 18, 738-755 (May, 1969).

The clearance of radioactive monodisperse ferric oxide aerosols ranging in diameter from 0.8 μ to 7.9 μ was studied in a total of 117 experiments on 36 subjects. In most normal subjects there were two discrete periods of bronchial clearance, with the first usually completed within one to two hours, and the second within four to ten hours after inhalation. The fraction cleared in each phase was strongly dependent on the size of the inhaled particles, with more first phase clearance for larger particles. The rates of bronchial clearance were expressed in terms of the time required for completion of 50% to 90% bronchial clearance. On the basis of the limited data thus far accumulated, bronchial clearance was impaired in eight out of fourteen cigarette smokers, three out of three former uranium miners, and two out of two emphysema cases. There are 14 references.

--Authors' abst.

- 900 Chronic Chest Disease, Personality, and Success in Stopping Cigarette Smoking. B. H. Burns. Brit. J. Prev. Soc. Med. 23, 23-27 (Feb., 1969).

The ability to give up smoking was found to bear no relationship to age or to the initial quantity of cigarettes smoked. Personality factors, as derived from the scores on the Maudsley Personality Inventory, were found to be related to success in giving up smoking. Those who stopped smoking showed significantly lower neuroticism scores and higher (not significant) extroversion scores than those who did not. The female patients were significantly less successful in stopping smoking than the males. Significantly higher neuroticism scores were found in the female smokers than in the male smokers as well as in the females who continued to smoke as compared with the males who continued to smoke. Personality factors are of importance in predicting the occurrence of withdrawal symptoms and success in stopping smoking.

--Am. Rev. Resp. Dis. Absts.

- 901 Operative Mortality and 5-Year Survival Rates in Men with Bronchogenic Carcinoma. W. Weiss, D. A. Cooper, and Katharine R. Boucot. *Ann. Internal Med.* 71, 59-65 (July, 1969).

Twelve teaching hospitals in Philadelphia reported histologically proved cases of bronchogenic carcinoma to the County Medical Society Subcommittee on Lung Cancer from 1956 to 1965. A study was made of the first 421 men who were operated on and had 5-year follow-up. Of these, 156 had thoracotomy-only, and 265 had resections. Age, tissue type, and surgical procedure were examined in relation to operative risk and 5-year survival. Patients explored whose cancers were not resected were included because such patients have a significant operative mortality rate but no benefit. The overall operative mortality rate was 11%, and 5-year survival rate was 13%. Operative risk increased with age but was essentially the same for the three tissue types and the type of surgery although it tended to be higher in patients with right pneumonectomy. Five-year survival was unrelated to age but was poor in men with undifferentiated carcinoma and better for those treated by lobectomy than for those who had pneumonectomy. Operative risk exceeded 5-year survival rate in men aged 70 and over, men with undifferentiated carcinoma, those explored but not resected, and in older men requiring right pneumonectomy. In these categories the therapeutic approach should be conservative. There are 13 references.

--Authors' summary

- 902 Pulmonary Function Studies in Bird Breeder's Lung. P. Dinda, S. S. Chatterjee, and W. D. Riding. *Thorax (London)* 24, 353-358 (May, 1969).

Pulmonary function studies, performed in ten patients with bird breeder's lung at the time of diagnosis, were repeated after a varying interval in nine following removal from exposure. In initial tests, diffusing capacity was impaired in eight patients and the arterial oxygen tension at rest was below 80 mm Hg in seven. Five patients had low vital capacity, and three evidence of air obstruction. One patient continued to breed pigeons, against medical advice, and his pulmonary function after nine months showed further deterioration. The others with abnormal pulmonary functions showed significant improvement.

--J. Am. Med. Assn. References & Reviews

- 903 Pharmacology of the Antimalarials. L. G. Hunsicker. *Arch. Internal Med.* 123, 645-649 (June, 1969).

Review of antimalarial pharmacology and examination of results in recent studies of malaria in Vietnam revealed that quinoline derivatives have multiple actions which include interference with nucleic acid replication and glucose metabolism; sulfonamides and sulfones competitively antagonize aminobenzoic acid, and folic acid reductase inhibitors interfere with the conversion of folic acid to folinic acid. No single agent produced satisfactory cure rates in recent trials with malaria in Vietnam. A combination of quinine and pyrimethamine appeared to give additive results. A combination of pyrimethamine and a sulfonamide gave superior results, consistent with their proved synergism. A combination therapy of a long-acting sulfonamide with pyrimethamine, possibly with the addition of quinine, is recommended.

--J. Am. Med. Assn. References & Reviews

- 904 Trichinosis in Southwest Ireland. J. P. Corridan and J. J. Gray. *Brit. Med. J.* 2, 727-729 (June 21, 1969).

The last outbreak of trichinosis reported in Britain was in Liverpool in 1953. Since then there have been three outbreaks in Ireland; two occurred recently in Cork and Kerry where 76 cases were confirmed. The Kerry outbreak of 50 cases is described. The latex trichina slide agglutination test was valuable diagnostically and epidemiologically. Claims regarding the efficacy of thiabendazole for treatment appear unproved. The mode of transmission of the disease and problems raised by these outbreaks are discussed.

--J. Am. Med. Assn. References & Reviews

01 132 4401

- 905 Epidemiologic Study of a Fatal Case of Inhalation Anthrax. F. M. LaForce, et al. Arch. Environmental Health 18, 798-805 (May, 1969).

An isolated case of inhalation anthrax occurred in a 46-year-old white man who worked adjacent to a goat hair processing plant. The illness was characterized by three days of malaise and fatigue and the sudden development of coma followed by death on the fourth day. Autopsy revealed massive hemorrhagic mediastinal lymphadenitis and hemorrhagic leptomeningitis. Anthrax bacilli were demonstrated in tissue and recovered bacteriologically. Bacillus anthracis was cultured from machinery, from imported goat hair, and from aerosols in the goat hair mill. Bacillus anthracis was also recovered in the metal fabricator shop where the patient had worked, supporting the hypothesis that the exposure was via contaminated aerosols. There are 18 references. --Authors' summary

- 906 Powdered Tantalum as a Medium for Bronchoscopy in Humans. J. Austin, et al. Clin. Res. 17, 164 (Jan., 1969).

Bronchograms were obtained in 11 patients with serious lung disease by insufflating tantalum via a catheter. Approximately 0.2 ml of tantalum powder was required to outline airways of a lobe with excellent mucosal detail. Coughing and deep breathing had no effect on the bronchogram and patients did not display any fever. Roentgenographic clearing of tantalum occurred within 48 hours, except for very peripheral airways. Microscopic sections of resected lobes previously used for bronchograms showed no inflammation or other deleterious response. The excellence of powdered tantalum is related to its inertness, radiopacity, and firm adherence to airway mucosa. --Am. Rev. Resp. Dis. Absts.

- 907 Heterozygous and Homozygous Alpha₁-Antitrypsin Deficiency in Patients with Pulmonary Emphysema. J. Lieberman. New Engl. J. Med. 281, 279-284 (Aug. 7, 1969).

Homozygous deficiency of alpha₁-antitrypsin is known to predispose to pulmonary emphysema. Measurement of the trypsin inhibitory capacity (TIC) of serum specimens from 28 relatives of a homozygous proband suggested that both heterozygotes and homozygotes may have an increased predisposition to lung disease, and possibly to peptic ulcer. Four of 19 heterozygotes and two homozygotes in this family had definite histories of pulmonary disease. After this family study, the TIC of serum was measured in 66 patients hospitalized for pulmonary emphysema at a Veterans Administration hospital. Of these, 25.8 per cent were found to be deficient; seven were homozygotes, and 10 heterozygotes. Of 23 patients with emphysema under 50 years of age, 48 per cent were deficient. A history of peptic-ulcer disease was obtained from 35.3 per cent of the antitrypsin-deficient, as compared to 28.6 per cent of the nondeficient patients with emphysema, a difference statistically not significant. There are 22 references. --Author's abst.

- 908 Plasma Hydrocortisone Response to Ethanol in Chronic Alcoholics. J. Merry and V. Marks. Lancet 1, 921-922 (May 3, 1969).

In male, loss-of-control, chronic alcoholics, 10 fluid ounces (284 ml) of 70°-proof whisky (112 ml ethanol) produced no increase in plasma cortisol (hydrocortisone). In contrast, male non-alcoholic controls responded to the same stimulus with a brisk rise in plasma cortisol. This difference in plasma cortisol response to a large dose of ethanol facilitated the identification of two previously unrecognized alcoholics in the volunteer control group.

--J. Am. Med. Assn. References & Reviews

- 909 Evaluation of Hand Antisepsis. R. E. Berman and R. A. Knight. Arch. Environmental Health 18, 781-783 (May, 1969).

Klebsiella-Aerobacter was isolated from a 3% hexachlorophene surgical soap. The effectiveness of two surgical scrub products: hexachlorophene (Dermasurgical and pHisoHex), and povidone-iodine (Betadine) was tested in a surgical scrub procedure and compared with an anti-crosscontaminant foam (Intersept). Bacterial count reductions were as follows: Dermasurgical, 23.8% reduction; Betadine, 43.8% reduction; pHisoHex, 66.8% reduction; and Intersept, 94.8% reduction. Intersept applied following a surgical scrub procedure further reduced the bacterial counts approximately 100%. There are 7 references. --Authors' abst.

- 910 Identification of Bacteria by Rapid Spectrophotofluorometric Methods. C. J. Rogers and T. C. Purcell. *Environ. Sci. Technol.* 3, 764-766 (Aug., 1969).

There is a genuine need for additional characteristics, based on either biochemical properties or cellular composition, of microorganisms to establish their taxonomic relationships. The present study represents an attempt to provide additional characteristics applicable to the identification of certain species of bacteria. The methods described are rapid, sensitive, and when applied in the analysis of carbohydrates (C), esterases (E), and E/C ratios of 11 strains of bacteria, give information to aid in identification of species. The characteristics are reported in tabular form for two separate incubation periods and, when taken into consideration with other identifiable properties of the organisms, can be used to further the classification and taxonomy of clinically significant bacteria present in polluted waters or waste processing operations.

--Authors' abet.

SKIN DISEASES AND BURNS

- 911 Warts and Ultrasound. H. Kent. *Arch. Dermatol.* 100, 79-81 (July, 1969).

A preliminary report on the treatment of plantar warts with ultrasound was made in 1958. The present study offers confirmation of this initial study by quoting a series of 1,000 patients. A revised technique and dosage are given for improving wart treatment.

--J. Am. Med. Assn. References & Reviews

CHEMICAL HAZARDS

- 912 Cyanide Poisoning Following Ingestion of Apricot (*Prunus armeniaca*) Kernels. A. E. Gunders, et al. *Harefuah* 76, 536-538 (June 15, 1969).

A 3 1/2-year-old girl ingested an unspecified number of apricot kernels some ten weeks after the apricot season had ended. The fruit stones had been kept dry and were cracked open at the time the kernels were ingested. The child rapidly developed signs of acute poisoning, manifested by marked pallor, tachycardia, tachypnea, mydriasis, disorientation and confusion, vertigo, and restlessness. Her breath smelled strongly of bitter almonds. Examination of apricot kernels for cyanide content showed that kernels from the same lot that caused the intoxication contained 0.33% of CN⁻, an average of 2.15 mg/kernel.

--J. Am. Med. Assn. References & Reviews

- 913 Cyanide Intoxication in Childhood After Ingesting Apricot Kernels. S. Yatziv and A. Simcha. *Harefuah* 76, 535-536 (June 15, 1969).

A 2-year-old girl developed acute cyanide intoxication after eating a large number of apricot kernels. Clinical signs appeared within minutes of ingestion and she was unconscious for 45 minutes until a large part of the ingested material was evacuated by gastric lavage. This averted severe complications and recovery was complete.

--J. Am. Med. Assn. References & Reviews

- 914 Bilateral Thrombosis of Popliteal Vein with Diffuse Muscle Necrosis after Carbon Monoxide Poisoning. H. Heidrich and H. Klems. *Deut. med. Wochschr.* 94, 1367-1370 (June 27, 1969).

In a 32-year-old man, severe carbon monoxide poisoning resulting from a suicide attempt led to thrombosis of both popliteal veins with diffuse necrosis of the leg muscles, probably caused by marked pressure on the veins due to extreme flexion of the knees with severe compression of artery and vein. Complete recanalization of the affected vessels was achieved with fibrinolytic treatment.

--J. Am. Med. Assn. References & Reviews

01 132 4403

- 915 Development of Bronchiectasis by Inhalation of a Large Amount of Ammonia. (In Japanese). K. Sugiyama, M. Yoshida, and M. Koyamada. *Jap. J. Chest Dis.* 27, 797-803 (Nov., 1968).

The writers report an unusual case of acquired bronchiectasis in a 24-year-old man in whom the disease developed after accidental inhalation of a large amount of ammonia. This observation appeared to have opened the way for the hitherto unsuccessful production of saccular bronchiectasis in experimental animals. The patient was exposed to the gas for 15 minutes in a fishing boat because of mechanical malfunction of a bomb containing the coolant ammonia. He recovered consciousness after eight hours of oxygen inhalation. He had severe inflammation of the oropharyngeal mucus membrane and later had cough, sputum, and chest pain. The radiogram showed patchy areas of infiltration in both lung fields, which disappeared three months later, but episodes of pneumonia in the right lower lung field developed twice thereafter, and annular shadows became more and more pronounced in the following year. Bronchography revealed stablike or saccular bronchiectasis in both lung fields. This lesion might have developed by the direct tissue-lytic action of the ammonia plus additional bacterial infection.

--Am. Rev. Resp. Dis. Absts.

- 916 Cer-pneumoconiosis. F. Heuck and R. Hoschek. *Am. J. Roentgenol.* 104, 777-783 (Dec., 1968).

Exposure to the smoke of carbon arc lamps over a period of several years may cause changes in the lungs that can be detected on roentgenograms as small round or linear infiltrates. In order to increase their brightness, the rods of arc lamps are equipped with cored carbon. The essential components of these rods are fluorides of the rare-earth elements. Cerium (atomic No. 58) is quantitatively the most important component of rare-earth minerals and their products. The roentgenologic and biophysical findings of the previously unknown cerium pneumoconiosis are reported. As a result of inhalation of the smoke of carbon arc lamps, which produce a high quantity of dust, roentgenologically detectable morphologic changes of the lungs may occur which, in their early stage, are shown as fine infiltrates that are well circumscribed and have a great density. They are disseminated throughout both lungs and may be accompanied by fibrosis. The characteristic clinical and roentgenologic findings and differential diagnosis in 3 of a group of 67 exposed persons (60 of them working in graphic arts) are reported.

--Am. Rev. Resp. Dis. Absts.

- 917 The Uptake of Mercury in the Brains of Animals Exposed to Mercury Vapor and to Mercuric Salts. M. Berlin, J. Fazackerley, and G. Nordberg. *Arch. Environmental Health* 18, 719-729 (May, 1969).

Rats, rabbits, and monkeys were exposed to mercury vapor (1 mg/cu m) for four hours, and uptake and distribution of mercury in the brain was compared with that of animals injected intravenously with the same dose of mercury as mercuric salts. Vapor-exposed animals showed a brain content about ten times higher than the injected animals. The results indicate that the higher uptake in brain following vapor exposure is a general phenomenon in mammals. There are 8 references.

--Authors' abst.

- 918 Fatality Following Metallic Mercury Aspiration During Removal of a Long Intestinal Tube. J. E. Zimmerman. *J. Am. Med. Assn.* 208, 2158-2160 (June 16, 1969).

A 48-year-old man died following aspiration of metallic mercury during removal of a Miller-Abbott tube. Death resulted from massive endobronchial hemorrhage and was preceded by symptoms and signs of mercury poisoning. Metallic mercury may cause serious local and systemic effects when introduced parenterally. Prompt therapy with dimercaprol (BAL) combined with surgical excision where practical are recommended when these effects are detected. There are 13 references.

--Author's abst.

- 919 Serum delta-Aminolevulinic Acid in Plumbism. F. Feldman, et al. J. Pediat. 74, 917-923 (June, 1969).

Blood lead and serum delta-aminolevulinic acid levels were determined in children with increased lead absorption, lead intoxication, and lead encephalopathy. Blood lead values tended to be higher in children with intoxication, and tended to overlap those of patients with increased absorption but no intoxication. Serum delta-aminolevulinic acid was consistently higher in patients with overt toxicity, with almost no overlapping of values. Patients with encephalopathy had markedly elevated blood lead and serum delta-aminolevulinic acid levels. Lead and delta-aminolevulinic acid values did not correlate well. Cerebrospinal fluid delta-aminolevulinic acid values were consistently lower than serum values. Serum delta-aminolevulinic determinations are valuable in selecting infants who are intoxicated from those exposed to increased amounts of lead.

--J. Am. Med. Assn. References & Reviews

- 920 Potassium Chloride Treatment in Thallotoxicosis. J. P. Papp, et al. Ann. Internal Med. 71, 119-123 (July, 1969).

A 64-year-old man was treated for thallotoxicosis with oral potassium chloride while on a known normal salt and potassium diet. An increase in restlessness, agitation, and confusion was noted to occur concomitantly with a two- to threefold increase in thalliuresis. Marked clinical improvement occurred after 1 week of treatment. The various modes of treatment are reviewed. It is postulated that potassium chloride used in conjunction with dithiocarb. or dithizon, or both, may be the treatment of choice for thallotoxicosis. There are 19 references.

--Authors' summary

- 921 Camphor Exposures in a Packaging Plant. P. A. Gronka, et al. Am. Ind. Hyg. Assn. J. 30, 276-279 (May-June, 1969).

Poor housekeeping resulted in excessive exposure of employees to camphor vapor. Analysis of results dictated the need for enclosure and local exhaust ventilation. Ethyl alcohol is a good collecting liquid for sampling camphor from air. Evaporation of alcohol did not seem to affect results or impose great sampling problems. Carryover of camphor into the second bubbler in the sampling train was more pronounced at higher sampling rates and during longer sampling times. A sampling rate of approximately 1.0 liter of air per minute for 20 minutes minimized carryover. One-hour samples at 1.0 liter of air per minute are recommended. In view of the magnitude of the exposures and the lack of reported symptoms other than minimal eye irritation, an increase in the threshold limit value from 2 mg/m³ camphor to 2 parts per million parts of air (approximately 12.4 mg/m³) is recommended. There are 3 references.

--Authors' summary

- 922 Chronic Nitrofurantoin Pulmonary Reaction: Report of Five Cases. E. C. Rosenow, R. A. DeRemee, and D. E. Dines. New Engl. J. Med. 279, 1258-1262 (Dec. 5, 1968).

In 5 patients, diffuse interstitial pneumonitis or fibrosis, or both (as proved by lung biopsy), was seen after long-term therapy with nitrofurantoin (Furadantin®). The acute form of nitrofurantoin pneumonitis is characterized by the sudden onset of cough, dyspnea, and fever and the rapid disappearance of the symptoms and findings when the use of the drug is discontinued. The chronic form is insidious in onset, is not associated with a febrile reaction, produces a nonspecific histologic and radiologic picture of diffuse interstitial pneumonitis or fibrosis, or both, and may be at least partially reversible when drug therapy is discontinued and steroids are used. The five cases presented suggest that nitrofurantoin can be taken for a prolonged time (six months to six years) before pulmonary side effects occur and that pulmonary symptoms may be chronic (seven weeks to six years) rather than acute, which has been the most commonly recognized manifestation of nitrofurantoin pulmonary reaction. In all patients the roentgenogram of the chest gave evidence of a nonspecific, diffuse, bilateral interstitial pulmonary infiltrate that frequently was most severe at the bases. Roentgenographically, the lung bases have also been most frequently involved in the cases of acute onset. Pleural effusion was not seen in any of these patients.

--Am. Rev. Resp. Dis. Absts.

- 923 Acute Tetrabromoethane (Acetylene Tetrabromide) Intoxication in Man. A. B. Van Haaften. *Am. Ind. Hyg. Assn. J.* 30, 251-256 (May-June, 1969).

A chemist working with tetrabromoethane (TBE) for 7 1/2 hours without benefit of local exhaust ventilation was hospitalized with near fatal liver injury for a 9-week period. His estimated exposure for most of the day was to 1 to 2 ppm TBE, and for a single 10-minute period he was exposed to about 16 ppm. Previous investigations of the toxicity of TBE were done with laboratory animals, and it appears obvious that man does not react to TBE exposure as do rodents. TBE should be labeled as a highly toxic substance. It should be used only with adequate local exhaust ventilation, and skin contact should be prevented until more is known about skin absorption of TBE in man. There are 7 references.

--Author's abst.

- 924 Stridor Developing After Intubation with Phenol-Contaminated Tracheal Tubes. J. Bay. *Nord. Med.* 81, 631-632 (May 15, 1969).

Four cases of severe stridor occurred in children after intubation, probably caused by the use of endotracheal tubes inadvertently disinfected in phenol-containing fluid. Disinfectants on phenolic bases present a danger, as they accumulate in rubber and plastic materials. Cleaning with soap and water, followed by autoclaving, and increased use of disposable materials are recommended. The material and the treatment of it should be continuously checked.

--J. Am. Med. Assn. References & Reviews

- 925 Isocyanate Hazard from Wire Insulation: An Old Hazard in a New Guise. D. P. G. Paisley. *Brit. J. Ind. Med.* 26, 79-81 (Jan., 1969).

This finding appears to be important in a number of respects. There is the immediate hazard in relation to the work of coil winding using polyurethane-covered wire. There are also remote hazards, indicated by this finding, related to the ever widening use of these polyurethane materials. When buildings in which are incorporated large quantities of polyurethane foams, surface applications, etc. are set alight, there might be a serious hazard to firemen and others engaged in combating the fire. The position appears to be even more serious in the case of fire at sea when refrigerated compartments in ships become involved or in engine rooms where polyurethane cladding of engines has been used for noise suppression, because in these circumstances those engaged in putting out the fires would probably be working in confined spaces and might be exposed to high concentrations of isocyanate vapours.

--Author's conclusions

- 926 A Method for Determining the Dermal Toxicity of Pesticides. Diana N. Noakes and D. M. Sanderson. *Brit. J. Ind. Med.* 26, 59-64 (Jan., 1969).

A method is described for the measurement of the percutaneous LD₅₀ of a pesticide, using the laboratory rat as a test animal. The results obtained by this method on a selection of pesticide chemicals are tabulated and discussed. The reproducibility of the method was validated by a collaborative study with five other laboratories.

--Authors' abst.

- 927 The Epidemiology of Pesticides in a Rural Area. K. R. Long, et al. *Am. Ind. Hyg. Assn. J.* 30, 298-304 (May-June, 1969).

A random sample of 155 farmers was studied with respect to use of pesticides and to farming habits and products. Significant differences were found between the "high" and "low" pesticide use groups with respect to hematocrit, hemoglobin, and prothrombin time values. Significant correlations were obtained between the use of aldrin and blood uric acid values; atrazine and bilirubin, 1-minute and 30-minute values; benzene hexachloride and total blood chlorinated hydrocarbon residues; benzene hexachloride and urinary creatinine values; and 2, 4-dichlorophenoxy acetic acid herbicides and serum albumin values for the high pesticide use group. Significant correlations were found between the total pesticides employed by the high-use group and the blood uric acid and bilirubin 1-minute values. A significant negative correlation existed with respect to erythrocyte sedimentation rates. No significant correlations were obtained for the low-use group. The blood concentrations of pesticide residue were not proportionate to the levels of exposure. There are 3 references.

--Authors' abst.

- 928 Decontamination of Empty Antilouse Cotton Sacks. A. R. El-Rufai and M. El-Essawi. Arch. Environmental Health 18, 777-780 (May, 1969).

An experiment was conducted to determine the value of different cleaning solutions for decontaminating cotton sacks that had contained antilouse powders. All three insecticides (DDT, BHC, and malathion) tested were found to be more persistent to washing with tap water alone. When regular soap, washing soda, and caustic soda were used for washing, malathion loss was more significant than the loss of DDT and BHC. The use of detergents for decontamination of empty sacks is effective and the cost involved in time and material makes the procedure practical. Use of nonoxynol (Berol detergent) at 1%, 2%, or 5% concentration can be relied upon to be 91.85%, 93.89%, and 99.09% efficient in removing the highly contaminating DDT residues from sacks. Since minute amounts of insecticides were found after washing, advantage could be taken of the toxic effect of the remaining residue for pestproofing purposes. There are 9 references. --Authors' abst.

- 929 Paraquat Poisoning—Lung Transplantation. H. Matthew, et al. Brit. Med. J. 2, No. 5621, 759-763 (Sept. 28, 1968). (See also Industrial Hygiene Digest, Abst. No. 68, January, 1969).

A 15-year-old boy ingested a mouthful of paraquat and severe respiratory distress ensued. Treatment included the transplantation of one lung, but subsequently changes developed in the graft, which are thought to have been caused by paraquat, and the patient died two weeks after the operation. The dangers of keeping poisonous substances in incorrectly labeled bottles have once again been demonstrated, and the pattern of paraquat poisoning, especially the development of proliferative alveolitis and terminal bronchiolitis, is confirmed. Immediate forced diuresis followed by hemodialysis is necessary to remove paraquat, thereby perhaps avoiding initiation of the changes in the lungs. The technical feasibility of human lung transplantation has again been demonstrated. It has also been shown that infection does not necessarily pose an insuperable problem, at any rate, if, as in the case described, there was no preoperative pulmonary infection in either recipient or donor. --Am. Rev. Resp. Dis. Absts.

INDUSTRIAL DUSTS

- 930 The Effect of Particle Size on the Regional Deposition of Inhaled Aerosols in the Human Respiratory Tract. M. Lippmann and R. E. Albert. Am. Ind. Hyg. Assn. J. 30, 257-275 (May-June, 1969).

The effect of particle size on the regional deposition of aerosols inhaled through the mouth was determined in 93 studies on 34 subjects. The test aerosols were spherical monodisperse insoluble iron oxide particles (specific gravity 2.5) containing radioactive tags, ranging in median unit density diameter from 2.1 to 12.5-microns ($\sigma \cong 1.08$). Particles deposited on the bronchial tree were translocated to the stomach by mucociliary clearance which was essentially complete within the first day. The proportion of the initial lung burden of radioactive particles removed during the first 24 hours provided a functional measure of tracheo-bronchial deposition. A portion of the inhaled aerosol was deposited in the head by impaction. As an impactor, the tracheobronchial tree is more efficient. For each individual subject, head and tracheobronchial deposition increased with increasing particle size. Alveolar depositions decreased with size for particles larger than 4-microns. There are 17 references. --Authors' abst.

- 931 A Modification of the Bausch and Lomb Aerosol Dust Counting System to Automatically Measure Aerosol Size Distributions. P. M. Brown. Environ. Sci. Technol. 3, 768-769 (Aug., 1969).

Circuitry has been added to a Bausch and Lomb Dust Counting System to allow unattended, automatic measurements from which size distributions of airborne particles can be determined. The system has been tested and operated up to altitudes of 20,000 feet MSL. --Author's abst.

01 132 4407

- 932 Evaluation of Air Filters with Submicron Viral Aerosols and Bacterial Aerosols. J. B. Harstad and M. E. Filler. *Am. Ind. Hyg. Assn. J.* 30, 280-290 (May-June, 1969).

Velocity, aerosol particle size, aerosol charge, and exposure to high humidity were found to affect the performance of air filters. Filter papers and the DOP scan-tested filter units (HEPA filters) fabricated from these papers were evaluated with submicron T1 bacteriophage aerosols having a number median diameter (NMD) of 0.12 micron and with *Bacillus subtilis* var *niger* spore aerosols with a NMD of 1 micron. Penetration of submicron phage aerosols through filter papers increased markedly with an increase in velocity. Neutralizing phage aerosol with bipolar air ions resulted in 2- to 5-fold increases in penetration. Penetration of bacterial spore aerosols through the filter papers was essentially zero. Phage aerosol penetration through HEPA filters averaged 0.00095%. Spore aerosol penetration was 0.00005%. Exposure to high humidity (>95%) resulted in roughly a 3-fold increase in HEPA penetration. HEPA filters can be expected to provide excellent protection against submicron viral aerosols as well as against bacterial aerosols, but the installations must be commensurate with the high performance of this type of filter for full efficiency. There are 10 references.

--Authors' abst.

- 933 Tumors of Nose and Sinuses in Relation to Woodworkers. E. Hadfield. *J. Laryngol. Otol.* 33, 417-422 (May, 1969).

This survey, which includes an independent review of histological material, reinforces previous conclusions about the vulnerability of woodworkers in the furniture industry to adenocarcinoma of the sinuses. The disease seems to arise primarily in the ethmoid.

--J. Am. Med. Assn. References & Reviews

- 934 Serum Iron and Iron Kinetics in Coalworkers with Complicated Pneumoconiosis. B. W. B. Chan. *Brit. J. Ind. Med.* 26, 65-70 (Jan., 1969).

Twenty-three patients with complicated pneumoconiosis were studied, and compared with 16 patients of similar age with chronic non-specific lung disease. In seropositive cases (Rose Waaler titre higher than 1:32) the serum iron, total iron binding capacity (T.I.B.C.), and the serum iron/T.I.B.C. % were all significantly decreased. In seronegative cases only the T.I.B.C. was significantly decreased. Low serum iron levels were found to be associated with a high iron clearance rate, so that the total iron transport rate was normal or slightly increased. The proportion of circulating plasma iron utilized for effective red cell production was found to be normal. These findings are, in general, similar to those in rheumatoid arthritis and suggest that iron mobilization or transport may be defective but that erythropoiesis is not depressed.

--Author's abst.

- 935 Experimental Pulmonary Carcinogenesis with Asbestos. M. F. Stanton, R. Blackwell, and Eliza Miller. *Am. Ind. Hyg. Assn. J.* 30, 236-244 (May-June, 1969).

Three methods have been used to test the carcinogenic response of the lung and pleura of the rat to asbestos. No carcinogenic response of pulmonary epithelium or pleura was noted to either healing infarcts or implanted wax pellets that contained asbestos. Sarcomas of the pleura and pericardium developed in 74% of rats in which the pleura was covered with an asbestos-impregnated fibrous glass coat. The fibrous glass alone caused only slight reaction, with complete healing. The last method may serve as an accurate and convenient means of quantitating the neoplastic response of the pleura to asbestos. There are 21 references.

--Authors' abst.

- 936 The Significance of Cavernostomy in Far-Advanced Silicotuberculosis.(In Japanese). S. Sadakata. *Jap. J. Chest Dis.* 27, 881-888 (Dec., 1968).

The treatment of severe silicotuberculosis is difficult both medically and surgically because widespread and advanced tuberculous lesions are usually present in both lung fields simultaneously with silicotic lesions. Impairment of pulmonary function is also significant. Therefore, it is a worthwhile achievement if only slight improvement of the condition is obtained. The

writer reports 3 cases of severe silicotuberculosis in which a major cavitory lesion was in the apex of one lung and the daughter lesions were in the other lung. He performed cavernostomy on these patients, and the improvement of the main lesion was accompanied by improvement in the contralateral lung. The writer emphasizes the value of cavernostomy in carefully selected advanced cases of silicotuberculosis.

--Am. Rev. Resp. Dis. Abstr.

PHYSICAL ASPECTS OF THE ENVIRONMENT

- 937 Noise Masking of a Change in Residue Pitch. R. D. Patterson. J. Acoust. Soc. Am. 45, 1520-1524 (June, 1969).

A comparison was made of the effectiveness of noise in masking (1) a change in the frequency of a sinusoid, and (2) a change in the repetition rate of a pulse train that had no low-frequency energy. The sinusoid and the pulse train had the same pitch. It was found that, whereas the change in the pitch of the sinusoid was better masked by low-frequency noise, the change in the residue pitch produced by the filtered pulse train was more easily masked by high-frequency noise. These results replicate the findings of Small and Campbell (1961). The author concludes as they did that the basis for the residue pitch of the pulse train is its high-frequency components. In a second experiment, a pair of sinusoids was used to produce the residue pitch. The same masking technique was employed, and again the results indicate that the residue pitch is not based on a nonlinear distortion component, but rather is based on information being transmitted through high-frequency components (2100 Hz).

--Author's abst.

- 938 Environmental Noise, Hearing Acuity, and Acceptance Criteria. E. R. Hermann. Arch. Environmental Health 18, 784-791 (May, 1969).

Information regarding puretone hearing acuity of certain occupational groups is presented using Speech Average Loss and Early Loss Index grading techniques. A biophysical law describing the manner in which hearing loss progresses at 4,000 hertz is reiterated, and determinations of absolute thresholds of human hearing are cited. Using the foregoing advances in knowledge of noise and hearing, discussion is developed relative to audiometer reference levels and classifications of hearing impairment. A rational basis is provided for establishing puretone audiometric-zero reference levels some 35 db below the 1951 American Standards Association, (ASA) or 24 db below the 1964 International Organization for Standardization (ISO) reference levels. Evolutionary changes in hearing impairment classifications are mentioned and a revised scheme is suggested which is based upon audiometric measurements more closely referenced to true zero, but at the same time compatible with existing scales. The possible need for more stringent acceptance criteria to conserve hearing acuity is broached. There are 9 references.

--Author's abst.

Editor's Note: A paper, "Noise—How Much Is Too Much?", will be given by Dr. Joseph Sataloff in the Management Conference session on "Understanding Industrial Hygiene Legislation—1969" at the 34th Annual Meeting of Industrial Hygiene Foundation, October 14-15, 1969, at Chatham Center, Pittsburgh, Pa.

RADIOACTIVITY AND X-RADIATION

- 939 Tritium in Environment From Nuclear Powerplants. C. L. Weaver, E. C. Harward, and H. T. Peterson, Jr. Public Health Repts. 84, 363-371 (April, 1969).

The results obtained from a sampling network indicated, with one exception, that waters downstream from nuclear facilities did not show any significantly higher tritium concentrations than streams which did not have operating nuclear reactors on them. The one exception was a plant-site with several operating heavy-water moderated reactors on it. Tritium concentrations, however, amounted to less than 1% of the Atomic Energy Commission's discharge limit of $3 \times 10^{-3} \mu\text{Ci/ml}$.

--J. Am. Med. Assn. References & Reviews

ENVIRONMENTAL MEASUREMENTS

- 940 Air Pollution from Animal Wastes: Determination of Malodors by Gas Chromatographic and Organoleptic Techniques. W. E. Burnett. Environ. Sci. Technol. 3, 744-749 (Aug., 1969).

A combination of gas chromatographic and organoleptic techniques was used to determine the chemical compounds responsible for the offensive odor of accumulated liquid poultry manure. The volatile odorous substances were trapped and concentrated in short sections of gas chromatographic columns held at $-78^{\circ}\text{C}.$, separated by gas chromatography and identified by the correspondence between relative retention time and the odors of the peaks for the unknowns and authentic compounds. Mercaptans, sulfides, and diketones were identified. Volatile organic acids and the nitrogen heterocycles, indole and skatole, were also identified, using direct injections of liquid manure supernatant and standard gas chromatographic techniques. The sulfur compounds, organic acids, and skatole were implicated as important malodorous components involved in air pollution. The prevention of the formation of the malodorous substances was suggested as the best means of control of air pollution from animal wastes. --Author's abst.

- 941 An Improved Gas Sampler for Air Pollutant Analysis. A. F. Wartburg, J. B. Pate, and J. P. Lodge, Jr. Environ. Sci. Technol. 3, 767-768 (Aug., 1969).

A gas sampling bubbler, consisting of easily assembled and replaceable glass and Teflon components, has been designed to replace prior designs, which are both expensive and fragile. The new bubbler has proved to be rugged, and easy to handle in the field. It is far less subject to damage than all-glass designs, but equally efficient in pollutant collection. Instructions for its use in the field are presented. --Authors' abst.

- 942 Determination of Atmospheric Concentrations of Sulfuric Acid Aerosol by Spectrophotometry, Coulometry, and Flame Photometry. F. P. Scaringelli and K. A. Rehme. Anal. Chem. 41, 707-713 (May, 1969).

Heretofore, nonspecific and insensitive methods were used to measure sulfuric acid aerosols in the atmosphere. We have developed a precise, sensitive, and highly selective method for determination of these toxic pollutants. The aerosols are collected by impaction or filtration, which separates the sulfuric acid from sulfur dioxide. The sulfuric acid is decomposed at controlled temperatures under a stream of nitrogen to separate the acid from other sulfates. The liberated sulfur trioxide in nitrogen is converted to sulfur dioxide by reaction with hot copper. The sulfur dioxide produced is analyzed either spectrophotometrically, coulometrically, or flame photometrically. The method can measure sulfuric acid in the presence of 10 to 100 times as much sulfur dioxide and other sulfates. Ammonium sulfate interferes quantitatively with the determination of sulfur acid. We do not, however, consider this a serious interference, because this compound forms in the atmosphere from sulfuric acid and gaseous ammonia. The relative standard deviation with standard samples is 5% or less. The sensitivities of the method for colorimetric, coulometric, and flame photometric analysis are 0.3, 0.03, and 0.003 μg of H_2SO_4 per sample. There are 34 references. --Authors' abst.

- 943 Lead Aerosols in Marine Atmosphere. T. J. Chow, J. L. Earl, and Carrie F. Bennett. Environ. Sci. Technol. 3, 737-740 (Aug., 1969).

Procedures for the shipboard sampling of marine air and the analysis of its lead content by the isotope dilution method are discussed. Marine air collected over the north and central Pacific Ocean between California, Midway Island, and American Samoa showed a lead concentration range from 0.0003 to 0.0015 μg . per cu. meter. This lead concentration range shows that marine air is the least polluted of north temperate atmospheres. --Authors' abst.

- 944 Gas Chromatographic Separation of Chlorosilanes, Methylchlorosilanes, and Associated Siloxanes. K. R. Burson and C. T. Kenner. Anal. Chem. 41, 870-872 (May, 1969).

Several methods have been reported for gas chromatographic separation of chlorosilicon compounds. In many samples of these compounds, siloxanes produced by hydrolysis are also present but are not eluted in a reasonable length of time under isothermal conditions. Temperature programming is necessary for elution of the siloxanes, but none of the stationary phases studied in the previous investigations can be used with temperature programming because of their high volatility at elevated temperature. The purpose of this study was to evaluate the stationary phases that could be used with temperature programming for the separation of mixtures of chlorosilanes, methylchlorosilanes, and their associated siloxanes, and to develop a quantitative method for the analysis of such mixtures. There are 10 references.

--Cond. from text

- 945 A Test for Susceptibility to Noise-Induced Hearing Loss. P. E. Smith, Jr. Am. Ind. Hyg. Assn. J. 30, 245-250 (May-June, 1969).

A study of temporary threshold shift (TTS) was undertaken with the following objectives: (1) to develop a simple, reliable, and easily administered test procedure which could be widely used in field testing; (2) to express the data obtained in a manner useful in predicting susceptibility to noise-induced permanent threshold shift (NIPTS); and (3) to develop a field test protocol useful in studying the presumed relation between NIPTS and TTS. The test developed uses the Rudmose ARJ-4 Automatic Audiometer as both the noise source and the audiometric test instrument. The findings are in good agreement with those of previous investigators. They show a high dependence of TTS on initial threshold, with a standard deviation from regression of 6.2 dB. This dependence permits the establishment of criteria for high-risk individuals. As part of a hearing conservation program, a plan is proposed to study the relation between TTS and NIPTS of individuals who may be susceptible without risk to the subjects exposed to noise conditions. There are 11 references.

--Author's abstr.

PREVENTIVE ENGINEERING

- 946 Laser Damage Thresholds for Ocular Tissues. N. A. Peppers and Ann H. Hammond. Am. Ind. Hyg. Assn. J. 30, 218-225 (May-June, 1969).

Safe laser exposure levels have enormous commercial and military ramifications and must be set neither too high nor too low. Linear thermal models indicate ranges over which thresholds increase with increasing exposure time and decreasing spot size. Reported thresholds depend on the damage criterion used. There are significant experimental uncertainties in determining energy distribution on the retina at both small and large spot sizes. Human threshold values extrapolated from animal data may be questionable, but human data are being gathered. Graphs comparing theoretical models, experimental threshold values, and recommended safe levels are shown; references to original data are given. There are 27 references. --Authors' abstr.

- 947 The Plasma Jet: Industrial Hygiene Aspects and Survey of Current United States Practices for Employee Protection. N. L. Fannick and M. Corn. Am. Ind. Hyg. Assn. J. 30, 226-235 (May-June, 1969).

The plasma torch, because it concentrates large amounts of thermal energy in a small volume, has become increasingly popular in industry. During the past fifteen years, the plasma torch has developed into an important industrial tool, and it has been used for metal cutting and welding fabricating operations that would not be possible otherwise. However, along with technological advances, the plasma torch has presented new problems to the industrial hygiene field. It is the purpose of this paper to discuss these problems and the extent of industrial hygienist's awareness of them. A brief outline of the theory of the plasma torch and the history and scope of its industrial usage is also presented. There are 24 references. --Authors' abstr.

01 132 4411

- 948 Conditions for Use of Airline Respirators in Atmospheres Immediately Hazardous to Life or Health. American Industrial Hygiene Association—American Conference of Governmental Industrial Hygienists Joint Respirator Committee. Am. Ind. Hyg. Assn. J. 30, 305-307 (May-June, 1969).

The use of the airline respirator is increasing because of its comfort and high degree of protection it offers. Since airline respirators offer no protection if the air supply fails, the U.S. Bureau of Mines approves airline respirators only for use in atmospheres from which the wearer can escape without respiratory protection. However, it is recognized that the conditions of routine processes or operational designs may dictate the occasional use of airline respirators in atmospheres immediately dangerous to life or health. The various types of airline respirators are listed in order with regard to the protection they afford the wearer. The required precautions which must be taken for the safe use of airline respirators in hazardous atmospheres are described in detail.

--Authors' abst.

COMMUNITY AIR HYGIENE

- 949 The Spectre of Today's Environmental Pollution—USA Brand: New Perspectives from an Old Scout. Cummings Memorial Lecture. H. E. Stokinger. Am. Ind. Hyg. Assn. J. 30, 195-217 (May-June, 1969).

A comprehensive toxicologic evaluation of the potential human health hazards from man-made and natural environmental pollutants (except radiation) from air, water and food has been made to highlight the areas of greatest concern for health agencies in the U.S.A. The judgments are predicated on pollutant levels existing now or in the foreseeable future, and on the hereditary milieu of the population of the continental United States. There are 128 references.

--Author's abst.

- 950 Respiratory Symptoms and Air Pollution in an Urban Population of Northeastern United States. W. Winkelstein, Jr., and S. Kantor. Arch. Environmental Health 18, 760-767 (May, 1969).

A study of the relationship of respiratory symptoms to air pollution from both suspended particulates and oxides of sulfur was undertaken in a random sample of white women in Buffalo during the period 1961 to 1963. Smokers had higher rates of cough with phlegm than did non-smokers. A positive association ($0.25 > P > 0.10$) between cough with phlegm and suspended particulate air pollution was revealed among nonsmokers 45 years of age and older. An interaction among smokers between residential mobility and respiratory symptomatology was indicated. Among smokers with stable residential histories, cough with phlegm was positively associated with air pollution at place of current residence; while among those smokers who had moved within the previous five years, it was inverse ($P < 0.01$). There was no positive association between respiratory symptoms and oxides of sulfur air pollution. The analysis indicated that the association was not attributable to differences in social class between the air pollution levels. There are 11 references.

--Authors' abst.

- 951 Chicago Air Pollution Study. SO₂ Levels and Acute Illness in Patients with Chronic Bronchopulmonary Disease. B. W. Carnow, et al. Arch. Environmental Health 18, 768-776 (May, 1969).

A study was done to determine whether a dose-effect relationship exists between levels of pollution as measured by SO₂ and acute morbidity from respiratory disease in patients with chronic bronchopulmonary disease. For this purpose a Registry of 561 patients with chronic bronchopulmonary disease was established. A graded pulmonary disease classification was developed, based on severity of symptoms; a daily personal pollution index was estimated for each patient, based on SO₂ levels in his square mile of employment and residence; and a daily calendar was maintained to record acute respiratory illness. In patients age 55 and over with grade 3 and 4 bronchitis, an increase in the acute morbidity rate was found in association with increased levels of SO₂. This increase in illness rate was recorded for the day of exposure and more consistently for the day following exposure. There are 3 references.

--Authors' abst.

- 952 Air Pollution Control. Preventive Medicine. J. T. Middleton. Arch. Environmental Health 18, 834-838 (May, 1969).

The practice of medicine is becoming more and more imbued with the concept of treating the whole man, not merely his symptoms. This same concept is urgently needed in dealing with problems of environmental health. We must be oriented to the total man in his total environment, to the cumulative effects of a growing number of environmental hazards on a receptor—man—who can respond to them in an incredibly complex manner. It is not sufficient to narrow our interest to the effects of air pollution on the lungs, the effect of noise on the ear, or the effect of crowding on the psyche. We must identify the interrelationships of these and all other forms of environmental insult on man's physical and mental health, productivity, and ability to enjoy the fruits of our culture. The sincere and responsible cooperation of all citizens in the time ahead will make it possible to move toward making the environment man's ally, not his enemy. We have no time to lose. There are 4 references.

--Cond. from text

- 953 Synergistic Action of Ozone-Sulfur Dioxide on Peanuts. H. G. Applegate and L. C. Durrant. Environ. Sci. Technol. 3, 759-760 (Aug., 1969).

Peanut plants were fumigated with ozone and sulfur dioxide singly and together. Both gases, when applied separately, induced characteristic damage to the plants. A synergistic action not characteristic of individual gases was found when the two gases were administered simultaneously.

--Authors' abstr.

- 954 Incineration of Organic Materials by Direct Gas Flame for Air Pollution Control. D. E. Waid. Am. Ind. Hyg. Assn. J. 30, 291-297 (May-June, 1969).

This paper gives a summary of industries where direct gas flame incineration is applicable for air pollution control and traces the nationwide development and recent applications of this device in Los Angeles County, San Francisco Bay area, and Chicago. Test data are given which include information on heat recovery methods, performance, and design criteria. An approach to solving a typical air pollution control problem by the use of gas flame incineration is presented.

--Author's abstr.

MANAGEMENT ASPECTS

- 955 Absence from Work and Physical Fitness. V. Lindén. Brit. J. Ind. Med. 26, 47-53 (Jan., 1969).

The distribution of sickness absence in a given population is not one of chance but is governed by the nature of the individuals making up the group. Earlier studies strongly suggested that an individual factor was operating. The present paper is concerned with the possible influence of a physical factor. Are those who repeatedly absent themselves from work less physically fit than those who do not, and are the former, in carrying out their work, overtaxing their respiratory and circulatory systems? Pilot studies were carried out on 203 employees from different occupations. Physical fitness was determined by measurement of the maximal oxygen uptake during performance of dynamic work. A bicycle ergometer of the mechanical braking type was used.

--Author's abstr. cond.

- 956 University-Sponsored Executive Development Programs. D. R. Sheriff and J. P. West. Conference Board Record 6, 48-50 (Aug., 1969).

The emergence of business administration as a major area of concentration in higher education, both undergraduate and graduate, is one of the most notable developments in American education during the past half-century. Comparatively little attention has been given to a later, but at least equally vigorous off-shoot of the same branch—the university-sponsored executive development program. Most of the growth in this area has taken place since 1950. Of the major courses currently offered by U.S. universities today, only three were in existence prior to 1950: M.I.T.'s, starting in 1931, Harvard University's in 1943, and the University of Pittsburgh's in 1949. By 1954 there were 17 courses operating in 15 different universities, and three years

later, 30 programs. The present analysis covers 45 programs in 42 schools. It would appear that university-sponsored courses are becoming a permanent feature of many collegiate schools of business administration. And it is safe to assume that other schools have such programs in the planning stage. In a program evaluation survey of 35 major corporate-users, most replies indicated that the firms believe that participants receive these benefits, and in substantial measure: (1) A broader perspective of themselves and the company. (2) A noticeable increase in knowledge. (3) New approaches to problem-solving and decision-making. (4) A general improvement in performance. A more detailed report of the results of the latest National Industrial Conference Board (NICB) study of university-sponsored executive development programs will shortly appear in an NICB Study in Personnel Policy. --Cond. from text

- 957 Low Unemployment Rates Abroad. The Impact of Manpower Programs and Self-Employment. D. Bauer. Conference Board Record 6, 51-56 (Aug., 1969).

The rate of unemployment in the United States has declined almost consistently each year since 1961, and the 3.3% reached early this year represented the lowest level since shortly after the end of the Korean War. The current low level of joblessness largely reflects eight years of uninterrupted economic expansion, plus, —since 1965—the manpower requirements, both military and civilian, of the Vietnam conflict. In addition, Federal manpower programs have emerged as a major means of providing a "basis for overcoming the obstacles to gainful employment of disadvantaged workers, and for averting manpower shortages which could interrupt economic progress."¹ Between 1965 and 1968 alone, roughly one million persons were enrolled in programs designed to teach skills and to correct educational deficiencies that stand in the way of gainful employment. Yet, despite the continuing demand for labor and the improvement of job skills among marginal workers, the unemployment rate in the United States has remained well above the rates recorded in most other industrialized countries. Unemployment among non-agricultural workers in the U.S. is relatively high because of the predominance of wage and salary employment. Only about 10% of this country's nonagricultural work force is self-employed or works in family-owned enterprises; the vast majority work in establishments owned by others and are thus prone to layoffs or dismissals if business slackens. Only the nonfarm labor force in the U.K. (94% wage and salary) and Germany (89%) is comparable to the U.S. in this respect. Wage and salary personnel in France account for approximately 86% of all nonagricultural workers, and in Italy and Japan the ratio drops to about 75%. According to one estimate, unemployment in the United States in the early 1960's would have been about one-third lower if the self-employed (including unpaid family workers) had constituted as large a portion of this country's labor force as they do in Japan. While self-employment may afford workers a certain measure of "job security," such a guarantee may be illusory if it does no more than prevent a worker from swelling the unemployment statistics. Moreover, job security attained in this guise may come at the expense of gains in productivity and hence in overall output. Italy, for instance, has large pockets of underemployed, working on small undercapitalized farms and commercial establishments. Many of these workers probably would be reluctant to work for others. But from an aggregate point of view, the country's total manpower resources would be more productive if such persons were to be shifted to other jobs, particularly in industries where the ratio of capital per worker is high. The importance of similar shifts in fostering the growth of the economies of Western Europe during the 1950's has been amply documented in recent years. --Cond. from text

1. Manpower Report of the President, Government Printing Office, January 1969, p. 22.

- 958 Human Values and Business Leadership. G. E. Morse. Personnel 46, 8-14 (July-Aug., 1969).

In a pluralistic society, great power is safely and constructively used only when properly checked and balanced. We live in an era of growing bigness everywhere—big business, big labor, big government, big institutions of all kinds. For example, the spotlight is now on the military-industrial complex. It would be tragic if our very best young minds, our most sensitive, idealistic, creative youngsters withheld themselves from careers in either part of that complex. In the face of great power, nonparticipation doesn't work; the only sure route to reform is from within. Because of the very power of the large organizations in every aspect of our society, it is important that the most capable, the most self-disciplined, the most right-minded, and the highest-principled individuals in each generation prepare themselves for and devote their lives

to sound, constructive application of such power. If they do not, if they let power drift into the hands of the less capable, the unprincipled, those who shout down any dissenting voice or thwart legitimate activity of ideological adversaries, they create the opportunity for another despot.

--Cond. from text

ACCIDENTS AND PREVENTION

- 959 The Occupation of Trawl Fishing and the Medical Aid Available to the Grimsby Deep Sea Fisherman. S. R. W. Moore. Brit. J. Ind. Med. 26, 1-24 (Jan., 1969).

The mortality of fishermen is twice that of coalminers. Because of the method of fishing the mortality of the trawlerman is probably higher. Outside the industry little is known about the occupation of trawl fishing. Its size, the number of men employed, and the number and distribution of trawlers are therefore described, with particular reference to the port of Grimsby. As near, middle, and deep water trawlers sail from Grimsby, its industry gives a good representation of conditions in the industry as a whole. The port and the fishing grounds are described. The composition of the trawler crew, their conditions of work, accommodation, and remuneration are explained. A description is given of the trawl apparatus, fishing operations, and the hazards involved; and extracts from the writer's diary of a fishing voyage are appended. The United Kingdom has ratified the Accommodation of Crews (Fishermen) Convention 1966 of the International Labour Organisation, and an informal survey of a modern trawler fleet showed that it fell short of the requirements of this Convention. Accommodation is confined and the crew live and work in close proximity and in conditions of physical discomfort. Trawlermen work for long hours under conditions which would not be tolerated by the shore worker. The method of payment is such that trawlermen may take unnecessary risks. Earnings depend on team work so that illness and injury are often not reported with consequent deterioration of the condition.

--Author's abst. cond.

- 960 The Mortality and Morbidity of Deep Sea Fishermen Sailing from Grimsby in One Year. S. R. W. Moore. Brit. J. Ind. Med. 26, 25-46 (Jan., 1969).

The injuries, illnesses, and deaths of Grimsby deep sea fishermen in the year 1963 have been studied using the trawler log-book as the basic source of information. Additional information has been obtained from other sources. The numbers of man-days sailed by Grimsby deep sea fishermen, by age and rating in 1963, have been ascertained. From these, incapacity rates for the measurement of morbidity due to injury and illness, and the mortality rate, have been calculated. There were 14 deaths, six due to accidental causes and eight to natural causes, giving a mortality rate of 5.7 per 1,000 for Grimsby deep sea fishermen in 1963. In a year when there was no foundering or loss of Grimsby trawlers, the fatal accident rate of Grimsby trawlermen was more than twice that of fishermen of the United Kingdom, four times the rate for miners, and 40 times that for the manufacturing industries. The most common injuries were, in order of incidence, contusions of varying degrees of severity, infected lesions, sprains and strains, lacerations, and fractures. More than half (56.3%) of the trawlermen were incapacitated by their injuries. The highest rates of incapacity were caused by fractures, contusions, and infected lesions. The upper limb, especially the hands and fingers, was most often affected, resulting most commonly in infected lesions. Third hands, mates, deck hands, deck trimmers, and deck learners had the highest incapacity rates due to injury. Third hands are especially at risk to injury. Most injuries and two deaths caused by casualties to boats occurred in fires aboard trawlers.

--Author's abst. cond.

- 961 Effects of Safety Communication Campaigns: A Review of the Research Evidence. J. B. Haskins. J. Safety Research 1, 58-66 (June, 1969).

An intensive search of published literature was conducted to determine what is known about the effects of mass communication on drinking/driving in particular and safety in general. Results of that search indicate that there has been relatively little research of any kind on the effects of the numerous campaigns that have been conducted and, due to inadequate research design, one cannot be confident of the results obtained in most published studies. The principal flaw in campaign evaluation studies has been the reliance on before and after research designs with no control group and an unfounded faith in the power of post hoc statistical analysis. In message pre-testing, the principal flaw has been unrealistic laboratory environments and the use of verbal measures of effect.

--Author's abst.

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