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The physical properties, synthesis, industrial uses, and the extent of occupational exposure to tetrahydrofuran (109999) (THF) are reviewed. Domestic producers and distributors of THF are identified, and the production processes involving furfural (98011), acetylene (74862), and formaldehyde (50000) are described. Various commercial uses of THF and consumption patterns are described, and production statistics are presented. Industries that use THF are discussed and the extent of THF exposure potentials represented is examined. A list of trade associates, professional societies, unions and other organizations that may be involved with using THF in some manner is provided.

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TETRAHYDROFURAN

Preliminary Report of Plants and Processes

Prepared for
The National Institute for Occupational
Safety and Health

Contract No. 210-79-0090

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

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NIOSH Project Officer: Jack E. McCracken, Ph.D.

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CHAPTER 1. INTRODUCTION

This report describes the physical properties, synthesis, industrial uses and extent of occupational exposure to tetrahydrofuran. The information presented is intended to aid in the selection of sites for plant visits and to assist in refining the scope for the criteria document of recommended standards for tetrahydrofuran in the workplace.

Information on production, distribution and uses for tetrahydrofuran was obtained from the literature retrieved by JRB. Telephone communication with distributors and industrial representatives confirmed information on current commercial uses for tetrahydrofuran.

JRB has confirmed the use of tetrahydrofuran as a plastics resin solvent used in adhesives and for surface coating. It also occurs as a chemical intermediate in the production of polytetramethylene ether glycol, used for the manufacture of polyurethane elastomers.

The National Occupational Hazard Survey estimates that approximately 83,000 workers are potentially exposed to tetrahydrofuran. A more precise estimate of exposure would be difficult to obtain, given that tetrahydrofuran is used by a large number of diverse industries in which plastics processing can occur.

CHAPTER 2. PROCESSES INVOLVING TETRAHYDROFURAN

TETRAHYDROFURAN PRODUCTION AND SUPPLY

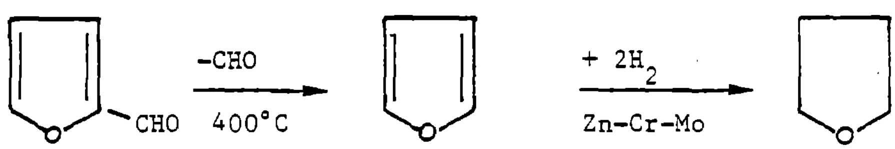
Producers of Tetrahydrofuran

There are currently three producers of tetrahydrofuran (THF) in the United States [1]. The largest producer, du Pont, has a plant in La Porte, Texas, with a capacity for producing 160 million pounds of THF per year. GAF and Quaker Oats operate plants with capacities of 10 million lbs/yr and 5 million lbs/yr, respectively.

BASF Wyandotte Corporation will become the fourth U.S. producer when their 12 million lbs/yr THF plant at Geismar, Louisiana is completed in mid-1980 [2,3].

Production of Tetrahydrofuran from Furfural

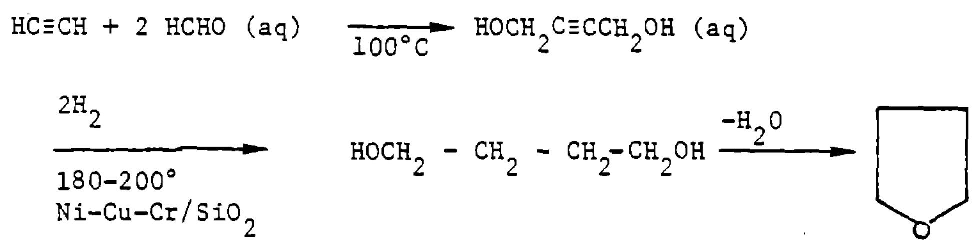
Tetrahydrofuran can be produced from the catalytic hydrogenation of furan, which in turn is prepared from the decarbonylation of furfural (4,5).



The assumed yield from this process is 75% [4]. Furfural is obtained from a variety of raw materials that occur as waste products from food processing, including oat hulls. Quaker Oats operates the only furfural based THF plant, which is located in Memphis, Tennessee.

Production of Tetrahydrofuran from Acetylene and Formaldehyde (Reppe Process)

GAF and du Pont produce THF from acetylene feedstock in 10-30% aqueous formaldehyde solution, with the commercially important 1,4-butanediol occurring as an intermediate [4,6].



The final step proceeds at 110-120°C in the presence of phosphoric and sulfuric acid. An alternate method is to carry out the dehydration of 1,4-butanediol in a high pressure reactor (300°C, 100 bar) in the presence of acid. The selectivity to THF in this process is greater than 95% [6].

Domestic Supply of Tetrahydrofuran

Current U.S. production data for THF was not available in either the Chemical Economics Handbook [4] or Synthetic Organic Chemicals [7]. The construction of the BASF THF plant, as well as the rapid growth of the plastics industry where THF is used, might imply that all three producers are currently operating at or near their combined capacity of 175 million lbs/yr.

Du Pont is the only major distributor of THF to other industries. GAF, in 1977, began exporting most of their THF to Germany [8]. It is believed that Quaker Oats captively uses their THF in the production of polytetramethylene ether glycol [4], although they do advertise THF for distribution [9].

Distributors of THF were identified [9,10] and all have been contacted by telephone for current information on THF distribution. All confirmed current distributors of THF are listed in Table 2-1. There are three major

TABLE 2-1

TETRAHYDROFURAN PRODUCERS AND DISTRIBUTORS

Supplier	Comments
Alpha International Chemical, Inc. New York, New York	exports THF in small quantity
Ashland Chemical Company Columbus, Ohio	major distributor for du Pont
Chem Central Atlanta, Georgia	distributes commercial quantities from du Pont
E.I. du Pont de Nemours & Co., Inc. Wilmington, Delaware	major U.S. producer 160 million lbs/yr capacity
GAF Corporation New York, New York	producer, exporter 10 million lbs/yr capacity
Howe and French Salem, Massachusetts	distributes commercial quantities from du Pont
MC&B Manufacturing Chemists, Inc. Norwood, Ohio	small quantities of chromatographic grade
Pioneer Salt and Chemical Company Philadelphia, Pennsylvania	distributes commercial quantities source unknown
Quaker Oats Company Chicago, Illinois	producer 5 million lbs/yr capacity
Southdam, Inc. Durham, North Carolina	distributes truckload quantities sporadically

distributors for du Pont. The remaining distributors sell THF sporadically or in small quantity. No distributors for THF from either GAF or Quaker Oats were found.

THF has been imported from foreign sources in small quantity, with 1974 and 1975 imports totalling 420,000 pounds and 82,000 pounds, respectively.

Future Changes in the Tetrahydrofuran Market

Demand for tetrahydrofuran has increased rapidly since the early 1970's due to the growth of the plastics industry, where THF is used as a specialty solvent. In 1972 and 1973, production of 1,4-butanediol, an intermediate in THF production, increased by 35% per year [11]. In 1976, du Pont increased capacity for 1,4-butanediol at its La Porte, Texas plant by 80%, all of which has been used in the production of THF [12]. U.S. capacity for THF production will increase upon completion of the BASF plant in Geismar, Louisiana. In a joint venture, GAF and Huels-Chemie have built a THF plant in West Germany that was scheduled for completion at the end of 1979 [13]. Total U.S. production of THF is expected to increase by 7% per year over the next few years [4].

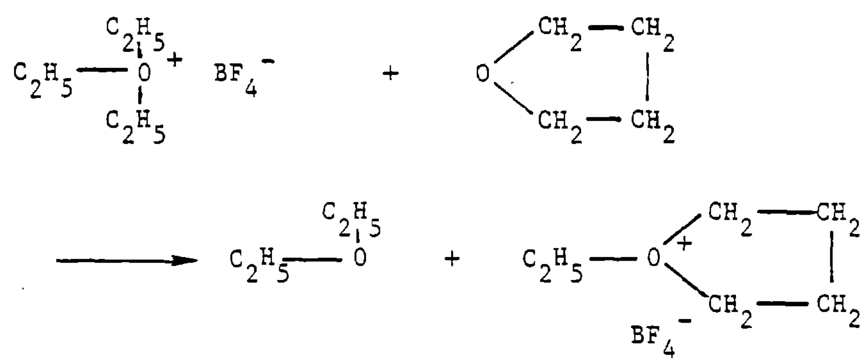
Although acetylene has been displaced as a feedstock for vinyl chloride and acrylates, total U.S. demand for acetylene is expected to remain steady [14,15]. The increasing use of acetylene for 1,4-butanediol and THF has compensated for the declining use of acetylene for other processes [14]. It has been estimated that THF production will consume 8% of the total acetylene feedstock in 1980 [15].

COMMERCIAL USES FOR TETRAHYDROFURAN

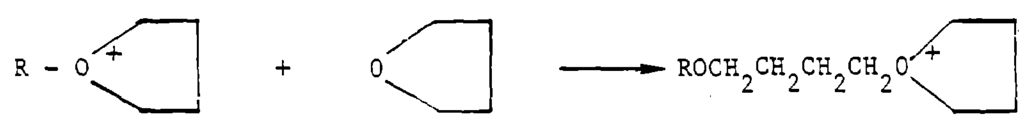
Synthesis of Polytetramethylene Ether Glycol

In the presence of a Lewis acid catalyst such as flurosulfonic acid or trialkyloxonium ion salts, tetrahydrofuran will form a polymer ranging from 600 to 3,000 in molecular weight. THF polymers, or polytetramethylene ether glycol (PTMEG), was first prepared during the 1930's, but not generally known of until the 1950's or 1960's [16].

Polymerization of THF is initiated by generation of an oxonium ion via reaction with an appropriate Lewis acid. For instance, in the reaction of THF with triethyloxonium tetrafluroborate, an alkyl group of the salt is transferred to the THF monomer.



Propagation proceeds by nucleophilic attack by the monomer on the oxonium ion formed by the catalyst.



The nature of R will be determined by the choice of catalyst. Termination is effected by adding water, alcohols, amines, or other compounds that will introduce the desired end group.

Quaker Oats and du Pont are the only producers of PTMEG in the U.S. Teracol, produced by du Pont, is used in-house and not distributed [4]. Quaker Oats has a ten million pound capacity plant in which they produce Polymeg, which is available on the open market.

PTMEG is extensively used in the production of thermoplastic elastomers based on polyurethanes [17]. These elastomers consist of alternating segments of polyurethane and an elastomer block. The polyurethane block is typically formed by reaction of butanediol with a mixture of 2,4 and 2,6 toluene diisocyanate. This block is then chain extended or cross-linked by further reaction with the elastomer block, such as PTMEG. Because of their good resistance to fuels, oils, and water, thermoplastic polyurethanes containing PTMEG are used in automobile applications. Highly elastic fibers, such as Spandex, are prepared in a similar manner from PTMEG, aromatic diisocyanates and diamines.

Resin Solvent Applications of Tetrahydrofuran

Tetrahydrofuran is a powerful solvent for a variety of resins, plastics, and elastomers (Table 2-2). For this reason, THF is useful in primary plastics processing and fabrication. This is particularly evident in the processing of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), and vinylidine chloride copolymers [4,5,17,18].

Representatives from Chem Central, Ashland, and du Pont agreed that the most common use of THF as a resin solvent is in adhesive applications (verbal communication, February 1980). This is especially true in the construction industry where THF based adhesive is used in cementing PVC pipe or CPVC hot water piping [18]. In these adhesives THF is often combined with a less volatile solvent, such as cyclohexanone, to control "set" time. PVC or CPVC resin is included in the adhesive formulation to provide viscosity. THF is also used as a solvent adhesive for assembly of plastic parts in fabrication houses, but this use is of a lesser extent [19].

TABLE 2-2

RESINS, PLASTICS, AND ELASTOMERS THAT ARE SOLUBLE IN TETRAHYDROFURAN

<u>Acrylic Resins</u>

Methyl methacrylate polymers
Ethyl, butyl and other methacrylate polymers
Acrylic polymers and copolymers

<u>Alkyd and Amino Resins</u>

Alkyd resins
Urea formaldehyde resins (uncured)
Phenol formaldehyde resins (uncured)

<u>Cellulosics</u>

Cellulose acetate
Cellulose acetate butyrate
Cellulose acetate stearate
Ethyl cellulose
Nitrocellulose

<u>Elastomers</u>

Butadiene-acrylonitrile copolymers
Chlorinated rubbers
Chlorosulfonated polyethylenes
Polysulfides
Polyurethanes (uncured)
Rubber (natural, unvulcanized)
Chloroprene elastomers

<u>Vinyl Resins</u>

Polyvinyl acetate
Polyvinyl butyrate
Polyvinyl butyrals
Polyvinyl chloride
Vinyl chloride copolymers
Vinylidine chloride copolymers
Vinyl acetate/ethylene

<u>Natural Resins</u>

Congo ester
Coumarone-indene
Raw dammar
Ester gum
Manila copal
Pentaerythriol ester gum
Rosin
Shellac

<u>Miscellaneous Resins</u>

ABS copolymers
Styrene-acrylonitrile copolymers
Chlorinated polyethylene
Polycarbonates
Polysulfones
Epoxy (uncured)
Silicones (uncured)
Polyesters (low molecular weight)
Polyamides (low molecular weight)
Polystyrene
Styrene-butadiene copolymers

PVC film and sheet can be produced using THF in a solution casting process [17]. The resin solution is made up in heated, inert gas-blanketed mixing tanks to minimize the possibility of igniting the solvent. The solution is then cast on a suitable substrate after which it is dried in ovens. The resulting PVC film is then removed from the substrate and rolled. A solvent recovery system is often employed to collect solvent vapors from the ovens. This is a completely automated process.

THF-resin solutions may also be used to coat a variety of surfaces. For instance, THF is used for the coating of magnetic tape with polyurethane, polyester, or polyvinylidine [18]. Plastic sheet, such as cellophane, is coated by a dip process in which the sheet is passed through a resin-solvent bath then dried in ovens [20].

The top coating of vinyl fabric or sheet is carried out by a process known as transfer coating [17]. This process is similar to the solution casting operation previously discussed. A resin solution in THF is fed into a hopper where it coats a textured release paper passing underneath. A knife edge spreads the solution to the desired thickness. This is followed by an application of a PVC foam which is layered on top of the solution. The fabric or sheet to be coated is layered on top of the foam. Ovens are used to bond the three layers together. The product is stripped from the release paper, which may be reused. Polyurethane or acrylic solutions are also suitable for this operation.

A variety of resin-solvent systems may be used in dip coating or transfer coating to produce a variety of products. A representative from Ashland, however, indicated that tetrahydrofuran is generally used in these processes to produce specialty coatings for industrial use.

The solvent properties of THF make it useful for the cleaning of machine parts for a variety of THF-soluble resins [5,18]. THF may also be used as a component of paint and varnish removers, lacquers, and printing inks [4,5], but this use has not been confirmed by telephone communication of industrial representatives.

Tetrahydrofuran as a Reaction Solvent

The molecular structure of tetrahydrofuran favors the formation of coordinated complexes. THF is more basic towards Lewis acids than diethyl ether and is a comparatively unreactive compound. As such, THF is an important solvent for reactions involving the solvation of cations [4,5,18].

THF is able to solvate the Grignard reagent, RMgX, by acting as a base towards the acidic magnesium. The number of alkyl halides that can form Grignard reagents is greater in THF than in diethyl ether. A variety of other reactions in which THF can be used as a solvent include the preparation of carbonyl compounds, reactions involving metal aluminum hydrides and borohydrides, hydrogenation reactions, and oxidations of high molecular weight amines and steroids [18].

Verbal communication with industrial representatives has not yet confirmed the commercial application of THF as a reaction solvent, although it has been estimated that 20% of the THF consumed in the U.S. is used for this purpose [4]. JRB's search for THF literature has revealed a number of instances where THF is used in research and development as a reaction solvent and as a solvent for biologic material or chromatography.

Consumption Pattern of Tetrahydrofuran

The Chemical Economics Handbook [4] estimates that, of the total THF consumed in the U.S., 40% is used as a resin solvent, 40% as a chemical intermediate, and 20% as a Grignard reaction solvent.

The Dyes and Pigments Division of du Pont has been contacted by letter requesting additional information. Specifically, we have requested consumption data approxmating the proportion of THF consumed that is used in PTMEG production, PVC adhesive applications, surface coating or PVC sheet production and cleaning operations. We have also requested information that will confirm if THF is used in the commercial production of succinic acid, butyrolacetone, pyrrolidine or tetrahydrothiophene, which is a natural gas oderant [5,18].

THF, in resin solvent applications, is most widely used for PVC resin and products [4,5,18]. Table 2-3 lists the PVC distribution, by sales, to various industries [21]. PVC consumption data for 1978 is shown in Table 2-4 [21]. It can be seen that most PVC consumed is used for pipe and tubing. This would imply an extensive use of THF in adhesive bonding of PVC pipe. As was previously mentioned, the use of THF in calandering, casting, or coating processes is generally restricted to products for industrial use.

Production Statistics for Other Ethers and Isocyanates

Table 2-5 lists 1976 production data for a variety of alcohol ethers, cellulose ethers and isocyanic derivatives. This information is included for consideration of any future refinements of the scope of the tetrahydrofuran criteria document.

TABLE 2-3

POLYVINYL CHLORIDE RESIN DISTRIBUTION BY SALES

Industry	Percent Total Sales
Building/Construction	54%
Electrical	11%
Packaging	7%
Consumer	7%
Export	4%
Transportation	5%
Furniture	5%

TABLE 2-4

CONSUMPTION OF POLYVINYL CHLORIDE BY PROCESS

Process and Use	Millions of Pounds Consumed
Calandering	667
Coating	532
Flooring	181
Textile and Paper	141
Protective	123
Adhesive and Other	87
Extrusion	3,254
Wire and Cable	400
Film and Sheet	255
Rigid Pipe and Tubing	2,099
Other	500
Molding	535
Paste Processes Except Coating	169
Other	321
Total	5,567

TABLE 2-5

PRODUCTION STATISTICS FOR

OTHER ETHERS AND DIISOCYANATES

Compound	1976 U.S. Production in Thousands of Pounds
Polyhydric Alcohol Ethers	
Total	940,294
2-Butoxyethanol	100,128
Diethylene glycol monobutyl ether	31,318
2-Ethoxyethanol	198,169
Diethylene glycol monoethyl ether	34,790
Triethylene glycol monoethyl ether	16,031
2-Methoxyethanol	87,611
Diethylene glycol monomethyl ether	10,110
Triethylene glycol monomethyl ether	20,538
All others	441,605
Higher Alcohol Alkoxylates	
Mixed linear alcohols (C_{12}-C_{22}) (including all ethylene and propylene oxide condensates)	235-240 (U.S. consumption)
Alkyl glyceryl ether sulfonates (C_{12} and higher)	20-23 (U.S. consumption)
Sulfated Ethers	
Total	233,800 (1974 production)
Cellulose Ethers	
Total	148,000
Sodium carboxymethyl cellulose Sodium carboxymethyl hydroxyethyl cellulose	76,000
Hydroxyethyl cellulose Hydroxypropyl cellulose	36,000
Methyl cellulose and derivatives	25,160
Ethyl cellulose and derivatives	10,360

TABLE 2-5 (CONTINUED)

Compound	1976 U.S. Production in Thousands of Pounds
Isocyanic Derivatives	
Total	948,277
Mixed 2,4 and 2,6 toluene diisocyanates	563,752
Polyisocyanates	312,548
p,p'-methylene diphenyl diisocyanate	9,000
Others	72,000

CHAPTER 3. EXTENT OF EXPOSURE

Table 3-1 gives the physical properties of tetrahydrofuran. It is a liquid that boils at 60°C and has a vapor pressure of 19.1 kPa at 20°C. It is extremely volatile so inhalation of vapors becomes a factor at room temperature.

Significant exposure to THF will most likely result during its use as a resin solvent. Inhalation of THF vapors during the use of THF based PVC cement in the construction industry is likely in that respirators are seldom used and the ventilation may at times be poor. Vapor inhalation may also result during resin-solvent coating operations where open tanks of solution are present. This will occur on a sporadic basis, however, such as during the mixing of resin and THF or the opening of solvent tanks to rethread sheets of material to be dip coated [20]. The likelihood of skin exposure to THF during these operations would be minimized with the use of polyvinyl alcohol gloves [18]. Published reports are available which provide evidence that exposure to THF occurs in the construction and plastics processing industries. Four articles have been retrieved to date which describe human health effects (headache, dizziness, skin irritation, loss of smell) resulting from occupational exposure to THF.

Exposure to THF during its production, unloading or transfer is expected to be slight as these are all closed processes [18]. These operations are strictly controlled to prevent ignition of the extremely flammable THF. The use of THF as a chemical intermediate is also expected to be a closed process.

The National Occupational Hazard Survey [22] estimates that approximately 83,000 people are potentially exposed to THF. The majority of these

TABLE 3-1

PHYSICAL PROPERTIES OF TETRAHYDROFURAN

Physical appearance	Liquid at room temperature
Molecular weight	72.108
Boiling point (°C)	66 (at 760 mm Hg)
Freezing point (°C)	-108.5
Vapor pressure (kPa)	19.1 (at 20°C)
Density (g/cc)	0.888 (at 20°C)
Autoignition temperature (°C)	321
Flammability	Extremely flammable
Miscibility	Miscible in water, esters, keytones, alcohols, diethyl ether; aliphatic, aromatic and chlorinated hydrocarbons

(~34,000) are special trade contractors [SIC 17]. The remaining 49,000 workers are employed in a large number of different industries. It would be expected that there are a significant number of people exposed who are working in industries classified under SIC 3079 (Miscellaneous Plastics Products). These are establishments engaged in the manufacture of fabricated plastics products or plastic films, sheets, or rods [23]. There are currently 3,748 plants in this industrial classification [21]. Not included are those plastics processors that manufacture intermediate products for other industries and are classified within these industries. These plants produce a variety of products including transportation equipment, metal working machinery, electronic components, furniture and paper products. Since THF is generally used for specialty coatings, only a few percent of the total workforce in these industries are potentially exposed. This is reflected in the Hazard Survey [22] which lists 21 industrial classes by two-digit SIC code, each of which contain less than 3,500 workers who are potentially exposed to THF.

CHAPTER 4. TETRAHYDROFURAN INDUSTRIES

Industries that may use THF are listed by SIC code in Table 4-1.

Table 2-1 lists the three U.S. producers and all current distributors of THF. Two companies, du Pont and Quaker Oats, have been identified as the only producers of polytetramethylene ether glycol, of which THF occurs as an intermediate.

Companies that produce PVC cast film and sheet, calandered PVC or polyurethane elastomer sheet, or that use resins in dip coating or solution coating operations are listed in Table 4-2. These industries were identified in the Modern Plastics Encyclopedia [17].

A copy of the contact letter to be sent to all industries listed follows Table 4-2.

TABLE 4-1

TETRAHYDROFURAN INDUSTRIES BY SIC CODE

SIC	Description
15	Building Construction
171	Special Trade Contractors--plumbing, heating, air conditioning
2262	Textile Finishing Plants, synthetics
2295	Coated Fabrics, Not Rubberized
2821	Plastics Materials, Synthetic Resins and Nonvulcanizable Elastomers
2865	Chemicals and Allied Products--Cyclic crudes and intermediates
2891	Miscellaneous Chemical Products--Adhesives and sealants
3079	Miscellaneous Plastics Products
3479	Metal Coating and Allied Services
367	Electronic Components and Accessories
3714	Motor Vehicle Parts and Accessories
394	Miscellaneous Manufacturing Industries--Toys and Amusement, Sporting, and Athletic Goods
807	Medical and Dental Laboratories

TABLE 4-2

PRODUCERS OF PLASTICS PRODUCTS THAT

MAY USE TETRAHYDROFURAN

Cast PVC Film and Sheets

Continental Industries, Inc.
Seattle, Washington

Continental Plastic Company
Chicago, Illinois

Engineered Plastics, Inc.
Gibsonville, North Carolina

Reynolds Metals Company
Richmond, Virginia

VCF Packaging Films, Inc.
Howell, Michigan

Calandered PVC, Polyvinylidine Chloride or Polyurethane Elastomer

Ain Plastics Company
Mount Vernon, New York

Alusuisse Metals, Inc.
Fort Lee, New Jersey

American Hoechst Corporation
Delaware City, Delaware

American Renolit Corporation
Whippany, New Jersey

Blank, Arthur and Company
Boston, Massachusetts

Cadillac Plastic and Chemical Company
Detroit, Michigan

Carroll, J.W. and Sons
Wilmington, California

Continental Plastic Company
Chicago, Illinois

Dayton Plastics, Inc.
Dayton, Ohio

Delmar Products, Inc.
Berlin, Connecticutt

Dynamit Nobel of America, Inc.
Northvale, New Jersey

Engineered Plastics, Inc.
Gibsonville, North Carolina

General Binding Corp.
Northbrook, Illinois

General Tire and Rubber Company
Newcomerston, Ohio

Goss Plastic Film Corporation
Los Angeles, California

Kaufman Glass Company
Wilmington, Delaware

Lustro Corporation of California
Valencia, California

Maclin Company
Industry, California

Polytherm Kassel Corporation
Ramsey, New Jersey

Saunders Corporation
Los Angeles, California

TABLE 4-2 (CONTINUED)

PRODUCERS OF PLASTICS PRODUCTS THAT
MAY USE TETRAHYDROFURAN

Vernon Plastics Company
Haverhill, Maryland

Specialized services--Dip or Solution Coating

Acro Chemical Products Corporation
Long Valley, New Jersey

Allied Chemical Corporation
Morristown, New Jersey

American Combining Corporation
Arverne, New York

Appleton Papers
Appleton, Wisconsin

Arex Graphics
Mount Vernon, New York

Arlon Products, Inc.
Santa Ana, California

Arvey Corporation
Chicago, Illinois

Athol Manufacturing Corporation
Butner, North Carolina

Columbia Mills, Inc.
Minetto, New York

Duracote Corporation
Ravenna, Ohio

Ferro Corporation
Norwalk, Connecticutt

Flexcon Company
Spencer, Massachusetts

General Research, Inc.
Sparta, Michigan

Gowar Manufacturing Company
Lindin, New Jersey

Gowen, Inc.
Portland, Maine

Joanna Western Mills Company
Chicago, Illinois

Lamart Corporation
Clifton, New Jersey

Ludlow Corporation
Needham Heights, Massachusetts

Mead Paper-Specialty
South Lee, Massachusetts

National Coating Corporation
Rockland, Massachusetts

National Metallizing Division
Cransbury, New Jersey

Pallflex Products Corporation
Putnam, Connecticutt

Pandel-Bradford, Inc.
Lowell, Massachusetts

Reeves Brothers, Inc.
New York, New York

TABLE 4-2 (CONTINUED)

PRODUCERS OF PLASTICS PRODUCTS THAT

MAY USE TETRAHYDROFURAN

Rexham Corporation Mathews, North Carolina
Richards, Parents and Murray, Inc. Mount Vernon, New York
Scharr Industries, Inc. Bloomfield, Connecticutt
Stik-II Products Easthampton, Massachusetts
U.S. Polymeric Santa Ana, California
Vitek Research Corporation Stamford, Connecticutt

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PUBLIC HEALTH SERVICE
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December 1979

NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
5600 FISHERS LANE
ROCKVILLE, MARYLAND 20857

[name]
[address]

[salutation]:

The Occupational Safety and Health Act of 1970 authorizes the Department of Health, Education, and Welfare through the National Institute for Occupational Safety and Health (NIOSH) to develop recommended standards to protect workers occupationally exposed to chemical or physical hazards. After reviewing all available data and consulting with health professionals from industry, organized labor, and academia, NIOSH makes recommendations in the form of criteria documents. These criteria documents are sent to the Occupational Safety and Health Administration in the Department of Labor for review and consideration as Federal standards.

NIOSH is currently preparing a criteria document on tetrahydrofuran. On April 11, 1978, NIOSH published notices in the Federal Register (vol 43, pages 15197-15198) that outlined the areas to be included in the criteria document and requested additional pertinent information. Enclosed is a copy of this notice.

Please review the notice, particularly items 1, 3, 7, and 9, and send any information or comments that may help us to prepare a more thorough and accurate document on tetrahydrofuran. This information may be in the form of published or unpublished studies, personal communications from workers or others concerning the occupational hazard in question, and personal observations that you would like us to consider while developing the document.

JRB Associates, Inc. (JRB), is assisting NIOSH in the development of this criteria document. JRB will be visiting several plants to gather information on innovative control procedures and safe work practices. If you would be willing to allow a visit to your plant, please make this known in your reply, and JRB will contact you.

Plant visits are conducted in accordance with NIOSH regulations as specified in the Code of Federal Regulations (42 CFR, Part 85A, October 14, 1976). If NIOSH and JRB were to visit your plant, we would prepare a report and send it to you so you may review it for technical accuracy and ensure that it does not disclose any proprietary information. After you review, information contained in the report may then be included in the criteria document.

Please send your comments relative to the enclosed request for information to NIOSH and identify your response with the term "tetrahydrofuran" so that we can process it rapidly. The 60-day deadline for submitting information listed in the enclosed Federal Register notice does not apply to your response to this letter.

Let me thank you in advance for your cooperation in this important activity.

Sincerely yours,

Irwin P. Baumel, Ph.D.
Acting Director
Division of Criteria Documentation
and Standards Development

Enclosures

CHAPTER 5. ORGANIZATIONS

Table 5-1 lists trade associations, professional societies, unions, and other organizations that may be involved with the use of THF. The contact letter requesting information from these societies is included following Table 5-1.

TABLE 5-1

TRADE ASSOCIATIONS, PROFESSIONAL SOCIETIES AND UNIONS FOR TETRAHYDROFURAN

American Chemical Society
1155 16th Street, N.W
Washington, D.C. 20036
Executive Director:
Dr. Robert W. Cairns
(202) 872-4600

American Conference of Governmental Industrial Hygienists
Post Office Box 1937
Cincinnati, Ohio 45201
Secretary Treasurer:
William D. Kelley
(513) 584-2535

American Federation of Labor and Congress of Industrial Organizations
Department of Occupational Safety and Health
815 16th Street, N.W.
Washington, D.C. 20006
(202) 637-5000

American Industrial Hygiene Association
475 Wolf Ledges Parkway
Akron, Ohio 44311
Managing Director:
William E. McCormick
(216) 762-7294

American Institute of Chemical Engineers
345 East 47th Street
New York, New York 10017
Secretary: R.J. Van Antwerpen
(212) 644-8025

The Chemical Marketing Research Association
139 Chestnut Avenue
Staten Island, New York 10305
Secretary:
John S.C.A. Lippincott
(212) 727-0550

Chemical Specialties Manufacturers Association, Inc.
1001 Connecticut Avenue, N.W.
Washington, D.C. 20036
Executive Director:
Ralph Engel
(202) 872-8110

International Chemical Workers Union
1655 West Market Street
Akron, Ohio 44313
President:
Frank D. Martino
(216) 867-2444

Manufacturing Chemists Association
1825 Connecticut Avenue, N.W.
Washington, D.C. 20009
President:
William J. Driver
(202) 328-4200

National Association of Plastics Fabricators, Inc.
4720 Montgomery Lane
Washington, D.C. 20014
Executive Director:
Jill M. Wettrich
(301) 656-8874

TABLE 5-1 (CONTINUED)

TRADE ASSOCIATIONS, PROFESSIONAL SOCIETIES AND UNIONS FOR TETRAHYDROFURAN

The Organization of Plastics Processors
31 Wallacks Lane
Stamford, Connecticut 06902
Executive Vice President:
Lee R. Noe
(203) 535-3869

Plastic and Metal Products Manufacturers Association
225 West 34th Street
New York, New York 10001
Executive Director:
Sheldon M. Edelman
(212) 564-2500

Society of Plastics Engineers, Inc.
656 West Putnam Avenue
Greenwich, Connecticut 06830
Executive Secretary:
Robert D. Forger
(203) 661-4770

The Society of the Plastics Industry, Inc.
1101 17th Street, N.W.
Washington, D.C. 20001
President:
Ralph L. Harding, Jr.
(202) 331-0340

Synthetic Organic Chemical Manufacturers Association
1075 Central Park Avenue
Scarsdale, New York 10583
Executive Secretary:
Ronald A. Lang
(914) 725-1492

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

O.M.B. No. 68-R1504
Expiration Date -
December 1979

NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
5600 FISHERS LANE
ROCKVILLE, MARYLAND 20857

[name]
[address]

[salutation]:

On April 11, 1978, the National Institute for Occupational Safety and Health (NIOSH) published in the Federal Register (vol 43, pages 15197-15198) a notice which requested information concerning the development of a criteria document and a recommended occupational health standard for tetrahydrofuran. Enclosed is a copy of the notice as it appeared in the Federal Register.

The Federal Register notice outlines the areas of information to be included in the criteria document. I would appreciate your consideration of all the listed areas, and in particular items numbered 1, 3, and 7, and your forwarding any information you have which will allow us to prepare a thorough document. This information can be in the form of published or unpublished studies conducted by your organization, or communications received from your workers or other organizations, or simply personal observations which you would like considered during the document development.

JRB Associates, Inc., is assuming a major role in assisting us in the development of these criteria documents. As part of its project, JRB is also required to conduct several plant visits to ascertain what constitutes good work practices. These plant visits are conducted in accordance with the regulations identified in 42 CFR Part 85a. Information gathered during such visits will be compiled in a report which will be sent to you for review of technical accuracy and to prevent inadvertent release of proprietary information. Information from the report may then be included in the criteria document. If your firm would be receptive to such an information-gathering visit, please make this known in your reply. The person at JRB who has been given project responsibility for the tetrahydrofuran criteria document is William Perry. I would appreciate, as part of our common interests in occupational safety and health, your cooperation with JRB in the fulfillment of its tasks.

Please submit your comments relative to the enclosed request for information to NIOSH. Identifying your response with the term "tetrahydrofuran" will accelerate its processing. Please note that the 60-day submission deadline listed in the Federal Register notice does not apply to your response.

Sincerely yours,

Irwin P. Baumel, Ph.D.
Acting Director
Division of Criteria Documentation
and Standards Development

Enclosure

REFERENCES

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