Figure 4. Occupational contact dermatitis.

DERMATOSES

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Any abnormality of the skin induced or aggravated by the work environment is termed an "occupational dermatosis." A dermatosis, therefore, can represent one or more alterations in the skin ranging from the mildest erythema and scaling to a complicated eczematous, acneform, pigmentary, neoplastic, granulomatous, or ulcerative disorder. Commonly used terms as "industrial dermatitis" or "occupational contact dermatitis" actually designate an inflammatory process of eczematous nature; whereas descriptive titles as "cutting oil acne," "tar melanosis," "pitch cancer," "silica granuloma," "chrome ulcer," among others, are used to identify cause and effect.

Occupational diseases of the skin are common for at least two reasons: first, the skin has a large surface area available for contact exposure; and, second, the work environment contains innumerable natural and artificial materials capable of exerting chemical, mechanical, physical, biological, or photoreactive insults to the skin. Causal agents, therefore, are diverse; but chemicals are by far the most frequent offenders.

Organic and inorganic chemicals are everywhere in modern industry, on the farm, and even in the household. In acting as primary irritants or allergic sensitizers or as photosensitizers, the usual clinical effect is contact eczematous dermatitis. This type of cutaneous response characterizes about 75 to 80 per cent of the occupational dermatoses observed and about four-fifths of these are due to contact with primary irritant chemicals. See Figure 4.

NATURAL PROTECTION

Anyone who works is a potential candidate for developing an occupational dermatosis; however, many workers are not affected with these disorders. Several intrinsic factors influence the behavior of the worker's skin, the most important of these is its own natural defense. Anatomically, the skin acts as a body envelope whose connective tissue, including the elastic fibers, provides flexibility which buffers moderate blunt mechanical trauma. The outermost layer of the skin, thickest on the palms and soles, is a complex protein called "keratin." Though composed of dead cells, the keratin layer is a most important line of cutaneous defense. It protects against the rapid entrance of water and water-soluble chemicals and, similarly, prevents mass loss of water from the body. In a limited way, it offers resistance to mild acids and water; but its chemical nature does not furnish satisfactory defense against alkalis, strong acids, solvents, or prolonged immersion. These agents disrupt the chemical nature and the cohesiveness of the keratin cells, thereby, weakening their barrier effect. Protection also results from the increased thickening of the keratin layer which follows repetitive trauma or the action of ultraviolet rays.

Keratin cells are covered by a film of sweat and sebaceous gland material (sebum) mixed with the by-products of the keratinizing epidermis. All of these materials make up the acid surface film, sometimes called the "acid mantle." This film may provide some impedance to the rapid entrance of water and water-soluble chemicals; but its ready removal by water, soap, detergents, and solvents obviously limits its effectiveness in defense.

Residing below the keratin layer are the living epidermal cells which stem from the basal cells located in the lowermost area of the epidermal layer. Basal cells or germinative cells supply the epidermal cells, which in turn, become keratin cells. Located among the basal cells are the pigment-forming elements, the "melanocytes," which manufacture melanin. This material, the product of an enzyme reaction, is picked up by the epidermal cells and migrates upward with them, at the same time furnishing protection against sunlight and ultraviolet rays.

Blood vessels, nerves, sweat glands, and sebaceous glands are located within the dermis. The major defense against heat is furnished by the interaction of blood vessels, nerves, and sweat glands. Located within the upper dermis are numerous nerve receptors and effectors which delineate sensory perception and, thereby, afford protection against certain external stimuli. An antimicrobial capacity appears to be present in the skin and probably is influenced by the skin's secretions and excretions, products arising from the cellular turnover of the epidermal cells, and the inherent dryness which the skin possesses.

PRIMARY IRRITANTS

Most occupational dermatitis is caused by primary irritant chemicals. These agents will cause dermatitis by direct action on the normal skin at the site of contact if they are permitted to act in sufficient intensity or quantity for a sufficient length of time. Thus, any normal skin will almost always react to a primary irritant if the above requirements are met. Strong or absolute irritants as sulfuric acid, sodium hydroxide, or methyl bromide produce an observable effect within a few minutes, depending upon their concentration. Conversely, weak or marginal irritants as acetone, soap and water, and mineral oil may require several days before a clinically recognizable change occurs.

The precise mechanism of how primary irritants disturb the skin is far from understood, but clinical effect generally varies with the degree of injury. Strong acids react vigorously with skin to form acid albuminates. Clinically, an acid burn resembles a thermal burn. Strong alkalis combine with fats and also dissolve protein, including the cytoplasm of keratin cells. Marginal alkaline irritants produce less destruction of tissue, but subtly cause dehydration of the keratin by inducing loss of cell cohesion, cracking, and loss of continuity.

Lipid solvents remove the surface film, disturb the water-holding quality of the keratin cells, and injure the membranous structure of epidermal cells. Metallic salts of arsenic, mercury, zinc, and chromium

precipitate skin protein and if the concentration of these materials is sufficient, ulceration of the skin occurs. Otherwise, contact dermatitis results. Oxidizing and reducing agents also injure keratin and epidermal cells. The events which occur in the various layers following exposure to most of the irritant chemicals are not well understood.

ALLERGIC SENSITIZERS

It is generally estimated that 20 per cent of occupational contact dermatitis is caused by allergenic materials. Naturally, this will vary in any industrial plant, depending upon the materials being handled. Practically any chemical can act as a sensitizer, but certain ones are more conspicuous because of this capacity. Some examples are: poison ivy, poison oak, epoxy monomers and their amine hardeners, potassium dichromate, nickel, formaldehyde, tetramethylthiuram disulfide, and mercaptobenzothiozole.

Cutaneous sensitizers differ from primary irritants in their mode of action and in the effects they create within the skin. Most sensitizers do not produce demonstrable cutaneous changes on first contact or perhaps for many days or weeks. However, the sensitizer induces certain specific cellular changes in the skin so that after a period of incubation (five to seven days or more) further contact with the same or a closely related agent on the same or other parts of the body results in an acute dermatitic reaction.

The essential differences between primary irritation and allergenic sensitization, therefore, are time and a different mechanism of action. Another difference which may be noted is that an irritant usually affects a number of workers whereas a sensitizer generally affects a few. This, of course, does not apply to potent sensitizers as poison ivy or epoxy resin systems. In spite of these differences, it can be extremely difficult to distinguish between a marginal irritant and a cutaneous sensitizer because the marginal irritant also requires prolonged or repeated contact before a dermatitis appears.

PHOTOSENSITIZERS

Photosensitivity is the capacity of an organ or organism or certain chemicals and plants to be stimulated to activity by light or to react to light. Photosensitizers are divided into "phototoxic" and "photoallergic" materials. Several derivatives of coal tar, e.g., anthracene, phenanthrene, and pitch, possess this activity.

Photobiologic effects as melanosis or photodermatitis are associated with specific chlorinated hydrocarbons, particularly the chlorobenzols, the diphenyls, and the triphenyls; dyes as acridine, eosin, and rose bengal; certain essential oils as bergamot; and a number of plants as limes, wild parsnip, fennel, and "pink-rot" celery.

Phototoxicity, like primary irritation, can affect anyone; however, heavily pigmented skin is more resistant. Similarly, photoallergens, like allergic sensitizers, affect far fewer people.

DIAGNOSIS

Recognizing and diagnosing an occupational dermatosis, like any cutaneous disease, depends upon satisfying several basic criteria. These fundamental tenets deal with the morphology or appearance of the eruption, its location, the history and course of the disease, and laboratory data.

The eruption should look like a contact dermatitis or one of the other clinical types classified as an occupational dermatosis. Lesions should be located on sites of greatest exposure, notably the backs of the hands, the volar surfaces of the wrists, the forearms, and the cubital areas—particularly when dusts and liquids are the contactants. Involvement of the face, eyelids, ears, and "V" of the neck usually indicates exposure to fumes, vapors, or mists. Excessively dusty exposures can affect large areas of the skin by direct contact or by manual transmission.

When the disease is suspected of being occupational, the history should reveal that the rash occurred after beginning work and that periods of remission and recurrence correlate with work exposure. A thorough history reveals the substances being handled at work and at home, including medications applied or ingested; the manner in which contact has been made; cleansing habits with soaps or solvents; and the use of protective equipment, including barrier creams, gloves, etc.

Most workers with an active occupational dermatosis relate that the eruption diminishes, but rarely disappears completely, over the weekend. Additionally, the eruption almost always worsens upon return to work after the weekend. When the eruption fails to clear after six to eight weeks of sick leave or after complete withdrawal from the suspected contact agent through a job change, other reasons for the dermatitis should be explored.

Actually, the prolonged or recurrent eruption may represent an underlying disorder as atopic dermatitis, psoriasis, nonoccupational contact dermatitis, nummular eczema, among other nonoccupational diseases. Certain laboratory procedures may be indicated and may further define the disease process. These may include skin scrapings and culture for detecting the presence of a superficial fungus, anaerobic or aerobic cultures for bacteria, histopathologic diagnosis following skin biopsy, diagnostic patch tests or photopatch tests to detect an allergen. Additional analytical tests for porphyrins in urine and for metals in urine or blood, skin or hair may also be indicated.

CLINICAL CLASSIFICATION

Occupational dermatoses have considerable morphologic variety. Their appearance and pattern rarely indicate the provoking substance, but may provide a clue as to a class of materials being encountered. Diagnosis depends upon appearance and location, but mostly upon history. Supervening infections or undesirable therapeutic effects make the diagnosis more difficult.

Despite the numerous clinical reactions the skin can display, the

following groupings comprise the majority of the occupational dermatoses:

(1) Acute contact eczematous dermatitis characterized by erythema, edema, papules, vesicles or bullae, crust, scale, and finally, desquamation. These are the signs of an inflammatory eczematous dermatitis caused by contact with a primary irritant or a sensitizer or a photosensitizer.

(2) Chronic eczematous dermatitis characterized by erythema, lichenification, scaling, dryness, and fissuring resulting from contact with substances which dehydrate the skin as alkali, liquids and dusts, solvents, soaps and detergents.

(3) Folliculitis and acneform dermatoses including chloracne characterized by plugged sebaceous follicles and nodular and suppurative lesions. Chloracne also shows multiple cystic lesions which contain straw-colored material. These dermatoses are caused by contact with insoluble oils, greases, tars, waxes, and certain chlorinated hydrocarbons as the chloronapthalenes.

(4) Neoplastic (benign and malignant) types as keratoses, papillomata, epitheliomas, and carcinomas of the exposed areas. These usually are caused by certain petroleum products, coal tar and certain derivatives, sunlight, and ionizing radiation.

(5) Pigmentary disturbances characterized by an increase or decrease of pigment in the epidermis. Increased pigmentation can result from contact with coal tar compounds, certain petroleum oils, vegetables, fruits, sunlight, and trauma. Decreased or absent pigmentation may result from burns; forceful trauma; chronic dermatitis; monobenzyl ether of hydroquinone; and certain phenolics as tertiary butyl catechol, tertiary amyl phenol, and tertiary butyl phenol.

(6) Granulomatous dermatoses characterized by chronic indolent focal inflammations which tend to heal with scar. These lesions can result from bacterial, viral, fungal or inanimate agents as asbestos, beryllium, and silica.

(7) Ulcerative lesions characterized by a loss of tissue on a cutaneous or mucous membrane surface leading to necrosis. Ulcerations can be caused by arsenic trioxide, calcium compounds, cement and concrete, chromic acid, burns and trauma. They may also result from purposeful or unconscious manipulation.

(8) Miscellaneous lesions. Some occupational dermatoses, because of their unusual nature, do not fit into the above classifications. Among such miscellaneous lesions are:

(a) alopecia induced by chloroprene;

(b) acro-osteolysis, with or without Raynaud's;

(c) sclerodermoid changes believed due to vinyl chloride polymerization;

(d) discolorations of the hair, skin, and nails due to various chemicals;

(e) porphyria cutanea tarda caused by a certain chlorinated hydrocarbon intermediate.

OCCUPATIONS AND AGENTS

The following is a list of occupations each accompanied by certain agents frequently associated with that occupation and capable of producing a dermatosis. Additional agents for the occupations listed as well as additional occupations will be found in other sections, principally the one on chemical hazards.

Abrasive Wheel Makers
- carborundum
- emery
- resin glues

Agricultural Workers
- See Farmers

Aircraft Workers
- adhesives (resins)
- alkalis
- bichromates
- chromates
- chromic acid
- cutting fluids
- cyanides
- epoxy resins
- flame retardants
- glass fibers
- hydraulic fluids
- hydrofluoric acid
- lubricants
- nitric acid
- oils
- paints
- plastics
- rubber
- solvents
- thinners
- ultraviolet light
- vibrating tools
- X-rays

Animal Handlers
- antibiotics
- bacteria
- cleaners & detergents
- deodorants
- feeds
- fungi
- germicides
- insecticides
- medicaments
- parasites
- pesticides
- viruses

Artists (Painters)
- acrylics
- epoxies
- paint removers
- pigments
- plasticizers
- solvents

Artists (Sculptors)
- dusts
- plaster of Paris
- pneumatic tools
- polishes

Athletes
- adhesives
- antibiotics
- bacteria
- lime
- medications
- protective gear
- soaps

Automobile Workers (Assembly)
- adhesives
- asbestos
- antifreeze
- brake fluids
- brake linings
- flame retardants
- gasoline
- hydraulic fluids
- oils
- rubber
- solvents

Automobile Workers (Body)
- abrasives
- adhesives
- alkalis
- lead
- paints
- rubber compounds
- solder
- solvents

Automobile Workers (Mechanic)
- acids
- adhesives
- alkalis
- antifreeze
- brake fluids
- brake linings
- cleansers
- epoxy resins
- gasoline
- hydraulic fluids
- lubricants
- rubber
- solvents
- thinners

Bakers
- benzoyl peroxide
- cinnamon
- dough
- dusts
- flavors (oils)
- flour
- fungi
- heat
- moisture
- spices
- sugar

Barbers
- ammonium thioglycolate
- antiseptics
- bacteria
- cosmetics
- depilatories
- detergents
- dyes
- fungi
- hair conditioners
- hair sprays
- hair straighteners
- hair tonics
- perfumes
- shampoos
- shaving creams
- ultraviolet
- vibrating machines
- wave solutions

Bartenders
- citrus fruits
- detergents
- disinfectants
- flavors
- moisture
- soaps

Bath Attendants
- deodorants
- fungi
- liniments
- lotions
- oils
- soaps
- ultraviolet

Battery Makers
- alkali
- cobalt
- epoxy sealer
- fiber glass plates
- mercury
- moisture
- nickel
- pitch
- plastics
- solvents
- sulfuric acid
- zinc chloride

Bleachers
- borax
- chlorine compounds
- hydrochloric acid
- hydrogen peroxide
- oxalic acid

Bleachers (cont'd)
- per-salts
- potassium hydroxide
- sodium hydroxide
- solvents

Bookbinders
- formalin
- glues (natural)
- glues (resin)
- inks
- shellac
- solvents

Brick Masons
- cement
- chromates
- cold
- epoxy resins
- lime
- moisture
- sunlight

Briquette Makers
- coal tar pitch

Bronzers
- acetone
- ammonia
- ammonium sulfide
- amyl acetate
- antimony sulfide
- arsenic
- arsine
- benzine
- benzol
- cyanides
- heat
- hydrochloric acid
- lacquers
- mercury
- methyl alcohol
- petroleum hydrocarbons
- phosphorus
- resins
- sodium hydroxide
- sulfur dioxide
- turpentine
- varnishes

Broom Makers
- bacteria
- bleaches
- dust, vegetable
- dyes
- fungi
- glues - natural & resin
- parasites
- pitch
- plastics
- rubber
- shellac
- solvents
- tar
- varnish
- woods

Brush Makers
- See Broom Makers

Butchers
- antibiotics
- bacteria
- brine
- cold
- detergents
- enzymes
- fungi
- moisture
- parasites

Button Makers
- bacteria
- dusts - animal, vegetable, mineral
- dyes
- hydrogen peroxide
- plastics

Cabinet Makers
- bleaches
- glues - resin & casein
- insulation agents
- oils
- polishes
- rosin
- shellac
- solvents

Cabinet Makers (cont'd)
- stains
- woods

Cable Splicers
- chlorinated diphenyls
- chlorinated naphthalenes
- dyes
- epoxy resins
- solvents

Cable Workers
- See Cable Splicers

Candle Makers
- ammonium salts
- borax
- boric acid
- chlorine
- chromates
- hydrochloric acid
- potassium nitrate
- sodium hydroxide
- stearic acid
- waxes

Candy Makers
- chocolate
- citric acid
- dyes - food
- essential oils (flavors)
- fruits
- pineapple juice
- spices
- sugar
- tartaric acid

Canners
- bacteria
- citrus oil
- dyes
- enzymes
- fruit acids & sugars
- fungi
- moisture
- parasites
- resins
- salt
- vegetable juices

Carpenters
- See Cabinet Makers

Carpet Makers
- alizarine dye
- aniline dyes
- anthrax bacillus
- bleaches
- chlorine
- fungicides
- glues
- insecticides
- jute
- loom oils
- solvents

Carroters - Felt Hat
- acids
- anthrax bacillus
- quinones

Case Hardeners
- heat
- oils (quench)
- sodium carbonate
- sodium cyanide
- sodium dichromate
- sodium nitrite

Cellulose Workers
- acids
- alkalis
- bleaches
- carbon disulfide
- finishing oils

Cement Workers
- cement
- chromates
- cobalt
- epoxy resins
- lime
- moisture
- pitch
- resins

Chemical Workers
- See Section VII

Chrome Platers
- chromium compounds
- degreasers (solvents)
- metal cleaners (alkali)
- sulfuric acid

Clerks
- adhesives
- carbon paper
- copy paper
- duplicating fluids
- duplicating materials
- indelible pencils
- ink removers
- inks
- rubber
- solvents
- type cleaner
- typewriter ribbons

Cloth Preparers
- acids
- alkalis
- amino resins
- detergents, synthetic
- dyes
- flame retardants
- formaldehyde
- fungicides
- moisture
- potassium salts
- soaps
- sodium metasilicate
- sodium salts
- sodium silicate

Coal Tar Workers
- anthracene oil
- benzol
- coal tar
- creosote
- cresol
- naphtha
- pitch
- solvents
- sunlight

Compositors
- alkalis
- inks
- solvents

Construction Workers
- adhesives, resin
- cement
- concrete
- cold
- creosote
- gasoline
- glass fiber
- oils
- paints
- pitch
- poisonous plants
- sealers
- solvents
- sunlight
- ultraviolet light
- wood preservatives
- woods

Cooks
- fruit acids
- heat
- moisture
- monilia
- spices
- sugars
- vegetable juices

Cotton Sizers
- acids
- aluminum salts
- arsenic salts
- calcium salts
- dicyandiamide formaldehyde
- fungicides
- magnesium salts
- melamine formaldehyde
- sodium hydroxide
- starch
- urea formaldehyde
- zinc chloride

Dairy Workers
- antibiotics
- bacteria

Dairy Workers (cont'd)
- deodorants
- detergents
- fungi
- mites
- viruses

Degreasers
- alkalis
- chlorinated hydrocarbon solvents
- petroleum solvents
- ultrasonic devices

Dentists
- anesthetics, local
- antibiotics
- bacteria
- disinfectants
- eugenol
- ionizing radiation
- mercury & metallic amalgams
- oil of clove
- resins
- soaps
- waxes

Dishwashers
- bacteria
- detergents, synthetic
- grease
- moisture
- monilia
- soaps
- water softeners

Disinfectant Makers
- carbolic acid
- chloride of lime
- chlorinated phenols
- chlorine
- cresol
- formaldehyde
- iodine
- mercurials
- quarternary ammonium compounds
- surfactants
- zinc chloride

Dock Workers
- bacteria
- castor bean pomace
- chemicals
- cold
- fumigants
- fungi
- grains
- heat
- insecticides
- insects
- irritating cargoes
- mites
- moisture
- petroleum
- sunlight
- tar

Druggists
- acids
- alkalis
- antibiotics
- bleaching powder
- detergents, synthetic
- drugs
- iodoform
- soaps
- sugar

Dry Cleaners
- acetic acid
- ammonia
- amyl acetate
- benzine
- carbon tetrachloride
- dusts
- methanol
- nitrobenzene
- perchloroethylene
- sizing chemicals
- Stoddard solvent
- trichloroethylene
- turpentine
- waterproofing chemicals

Dye Makers
- acids
- alkalis

Dye Makers (cont'd)
- antimony compounds
- benzine
- calcium salts
- coal tar products
- cresol
- dextrins
- dye intermediates
- ferrocyanides
- formaldehyde
- gums
- hydroquinone
- lead salts
- potassium chlorate

Dyers
- acids
- alkalis
- bleaches
- detergents, synthetic
- dyes
- mercurial salts
- moisture
- solvents
- zinc chloride

Electric Apparatus Makers
- acids
- asbestos
- chlorinated diphenyls
- chlorinated naphthalenes
- enamels
- epoxy resins
- ionizing radiation
- phenolic resins
- pitch
- rubber
- solder fluxes
- solvents
- synthetic waxes
- varnishes

Electricians
- chlorinated diphenyls
- chlorinated naphthalenes
- electricity
- epoxy resins
- solder fluxes
- solvents
- waxes, synthetic

Electroplaters
- acids
- alkalis
- benzine
- chromic acid
- heat
- lime
- moisture
- nickel
- potassium cyanide
- soaps
- waxes, chlorinated
- zinc chloride
- zinc cyanide

Embalmers
- bacteria
- formaldehyde
- fungi
- ionizing radiation
- mercury
- oil of cinnamon
- oil of clove
- phenol
- thymol
- zinc chloride

Enamelers
- acids
- alkalis
- antimony
- arsenic
- chromium
- cobalt
- nickel

Engravers
- acids
- alkalis
- chromic acid
- ferric chloride
- potassium cyanide
- solvents
- tropical woods

Etchers
- acids
- alkalis

Explosive Workers
- ammonium salts
- mercury compounds
- nitroglycerin
- PETN
- picric acid
- tetryl
- TNT

Farmers
- antibiotics
- bacteria
- cold
- detergents, synthetic
- disinfectants
- feeds
- fertilizers
- fruits
- fungi
- fungicides
- heat
- lubricants
- oils
- paints
- parasites
- pesticides
- poison ivy, oak, sumac
- ragweed
- solvents
- sunlight
- tar
- vegetables
- wood preservatives

Felt Hat Makers
- acids
- bacteria
- dyes
- Glauber's salt
- hydrogen peroxide
- mercuric nitrate (if used)
- sodium carbonate

Fertilizer Makers
- acids
- ammonium compounds
- calcium cyanamide
- castor bean pomace
- fluorides
- lime
- manure
- nitrates
- pesticides
- phosphates
- potassium salts

Fish Dressers
- bacteria
- brine
- cold
- moisture
- redfeed
- sunlight
- trauma

Florists
- bacteria
- bulbs
- fertilizers
- fungi
- herbicides
- parasites
- poisonous plants

Flour Mill Workers
- chemical bleaches
- dusts
- parasites
- pesticides

Food Preservers
- bleaches
- brine
- ionizing radiation
- moisture
- monilia
- resins
- spices
- sugar
- vinegar
- waxes

Foundry Workers
- acids
- heat
- lime
- resin binder systems
- solvents
- ultraviolet light

Fur Processors
- acids
- alkalis
- alum
- bacteria
- bleaches
- chromates
- dyes
- formaldehyde
- fungi
- lime
- oils
- salt

Furnace Workers
- heat
- ultraviolet light

Furniture Polishers
- acids
- alkalis
- benzine
- essential oils in polish
- methyl alcohol
- naphtha
- pyridine
- rosin
- soaps
- solvents
- stains
- turpentine
- waxes

Galvanizers
- acids
- alkalis
- zinc chloride

Garage Workers
- air guns (grease)
- antifreeze
- detergents, synthetic
- epoxy resins
- gasoline
- gasoline additives
- glass fiber
- greases
- moisture
- oils
- paint removers
- paints
- solvents

Gardeners
- bacteria
- fertilizers
- fungi
- fungicides
- herbicides
- insecticides
- insects
- plants
- poison ivy
- poison oak
- sunlight

Glass Workers
- arsenic
- borax
- boric acid
- glass fiber
- glass wool
- heat
- hyrdofluoric acid
- lead compounds
- lime
- metallic oxides
- petroleum oils
- resins
- soda ash
- ultraviolet light

Hairdressers
- See Barbers

Highway Workers
- See Road Workers

Histology Technicians
- alcohol
- aniline
- benzol
- epoxy resins
- formaldehyde
- mercury bichloride
- osmium tetroxide
- potassium dichromate
- stains
- toluene
- waxes
- xylene

Ink Makers
- anti-skinning agents (antioxidants)
- chrome pigments
- cobalt compounds (driers)
- detergents, synthetic
- dyes
- mercurial pigments
- resins
- soaps
- solvents
- turpentine
- varnishes

Insecticide Makers
- aldrin
- allethrin
- arsenic trioxide
- calcium arsenate
- chlordane
- DDT
- dieldrin
- lindane
- malathion
- methoxychlor
- parathion
- piperonyl compounds
- pyrethrin
- strobane
- See also Pesticides section

Janitors
- bacteria
- detergents, synthetic
- disinfectants
- house plants
- polishes (essential oils)
- soaps
- solvents
- waxes

Jewelers
- acids
- adhesives, resin
- chromium
- cyanides
- mercury
- mercury solvents
- nickel
- rouge
- solder flux

Laboratory Workers, Chemical
- acids
- alkalis
- chromates
- detergents, synthetic
- moisture
- organic chemicals
- soaps
- solvents

Laundry Workers
- alkalis
- bactericides
- bleaches
- chemical dusts
- detergents, synthetic
- enzymes
- fiber glass
- fungicides
- heat
- moisture
- optical brighteners
- soaps

Linoleum Makers
- asphalt
- dyes
- oils
- pigments
- resins
- solvents

Longshoremen
See Dock Workers

Machinists
antioxidants
aqueous cutting fluids, synthetic
chlorinated cutting oils
chromates
germicides
greases
insoluble cutting oils
lubricants
rust inhibitors
soluble cutting fluids
solvents

Masons
See Brick Masons

Match Factory Workers
ammonium phosphate
chromates
dextrins
dyes
formaldehyde
glues
gums
phosphorus sesquisulfide
potassium chlorate
red phosphorus
waxes

Meat Packers
See Butchers

Mechanics
See Aircraft Workers, Automobile Workers, & Garage Workers

Mercerizers
acids
alkalis
heat
moisture

Metal Polishers
abrasives
acids
alkalis
ammonia
naphtha
pine oil
potassium cyanide
soaps
soluble oils
solvents
triethanolamine
waxes
wood (pine)

Mirror Makers
acids
ammonia
cyanides
formaldehyde
lacquers
silver nitrate
solvents
tartaric acid
varnishes

Mordanters
acids
alkalis
aluminum salts
antimony compounds
arsenates
chromates
copper salts
iron salts
lead salts
phosphates
silicates
tin salts
zinc chloride

Nickel Platers
acids
alkalis
degreasers
detergents, synthetic
heat
moisture
nickel sulfate
zinc chloride

Nitroglycerin Makers
- ethylene glycol dinitrate
- nitric acid
- nitroglycerin
- sodium carbonate
- sulfuric acid

Nurses
- anesthetics, local
- antibiotics
- antiseptics
- bacteria
- detergents, synthetic
- disinfectants
- drugs
- ethylene oxide
- fungi
- ionizing radiation
- moisture
- rubber gloves
- soaps
- tranquilizers
- viruses

Oil Field Workers
- acids
- alkalis
- brine
- crude petroleum
- explosives
- ionizing radiation
- lubricating oils
- sunlight

Optical Workers
- alkalis
- grinding fluids
- oils
- turpentine

Packinghouse Workers
- antibiotics
- bacteria
- bone fragments
- brine
- cold
- detergents, synthetic
- enzymes
- fungi
- parasites
- spices

Paint Makers
- anti-mildew agents
- chromates
- coal tar distillates
- driers
- fish oils
- latex
- oil, vegetable
- petroleum solvents
- pigments
- plasticizers
- resins
- thinners
- turpentine
- zinc chloride

Painters
- acetone
- acids
- alkalis
- benzine
- chlorinated hydrocarbons
- chromates
- driers
- paint strippers
- paints, oil base
- paints, resin
- pigments
- solvents
- thinners
- turpentine

Paper Box Makers
- anti-flame agents
- dyes
- glues, natural & resin
- mildew proofers
- waxes

Paraffin Workers
- paraffin
- paraffin distillates
- solvents

Pencil Makers
- aniline dyes
- chromium pigments
- glues
- gums
- lacquer
- lacquer thinners
- methyl violet
- pyridine
- red cedar wood
- resins
- solvents
- waxes

Petroleum Refinery Workers
- acids
- alkalis
- aluminum chloride
- gas oil
- gasoline
- hydrofluoric acid
- kerosene
- paraffin
- paraffin distillates
- petroleum
- petroleum solvents
- tar
- waxes

Photoengravers
- ammonium bichromate
- etching acids
- inks
- photo developers
- solvents
- ultraviolet light

Photographers
- acids
- alkalis
- chromates
- hydroquinone
- methyl para-aminophenol sulfate
- para-aminophenol
- paraformaldehyde
- paraphenylenediamines
- pyrogallic acid
- sodium hypochlorite
- sodium sulfide
- turpentine

Physicians
- adhesives
- anesthetics, local
- antibiotics
- antiseptics
- bacteria
- detergents, synthetic
- drugs
- fungi
- ionizing radiation
- soaps
- tranquilizers
- viruses

Pipeline Layers
- burns
- fluxes, welding
- ionizing radiation
- parasites
- poisonous plants
- solvents
- sunlight
- tar
- ultraviolet, welding

Pitch Workers
- heat
- pitch
- solvents
- sunlight
- tar

Plasterers
- lime
- moisture

Plastics and Resin Makers
- See Section VII

Plumbers
- adhesives
- caulking compound
- cold

Plumbers (cont'd)
- fluxes, solder
- hydrochloric acid
- parasites
- solvents
- tar
- zinc chloride

Printers
- alkalis
- aniline
- chromates
- glues
- gums
- inks
- roller wash
- solvents

Railroad Shop Workers
- alkalis
- antiseptics
- chlorinated hydrocarbons
- chromate (antioxidants)
- cutting fluids
- detergents, synthetic
- diesel fuel oil
- greases
- insecticides
- lacquers
- lubes
- Magnaflux (fluorescein)
- paint
- paint strippers
- paint thinners
- solvents
- ultraviolet light

Railroad Track Workers
- cold
- creosote
- fungicides
- heat
- herbicides
- pitch
- poisonous plants
- sunlight
- tar

Rayon Workers
- acetic anhydride
- acids
- alkalis
- ammonium sulfide
- bleaches
- calcium bisulfite
- carbon disulfide
- coning oils
- sodium cyanide
- sodium sulfide
- sodium sulfite
- solvents

Refrigeration Workers
- ammonia
- brine
- chromates
- cold
- dry ice
- ethyl bromide
- ethyl chloride
- glass fiber
- methyl chloride
- sulfur dioxide

Road Workers
- asphalt
- cement
- cold
- concrete
- epoxy resins
- herbicides
- paint
- parasites
- pitch
- poisonous plants
- sunlight
- tar

Rocket Fuel Handlers
- aniline
- boron hydrides
- chlorine trifluoride
- dimethylhydrazine
- ethyl oxide
- fuming nitric acid
- gasoline

Rocket Fuel Handlers (cont'd)
- hydrazine
- hydrogen fluoride
- hydrogen peroxide
- kerosene
- liquid oxygen

Rope Makers
- alkalis
- bleaches
- dusts
- dyes
- oils
- pitch
- soaps
- tar

Rubber Workers
- accelerators
- acids
- activators
- adhesive removers
- alkalis
- antimony
- antioxidants
- benzol
- chloroprene dimers
- chromium pigments
- formaldehyde
- heat
- oils
- plasticizers
- resins
- retarders
- soaps
- solvents
- tar
- turpentine
- zinc chloride

Shipyard Workers
- burns (welding)
- chlorinated diphenyls
- chlorinated naphthalenes
- chromates
- cold
- fungicides
- glass fiber
- paint removers
- paint thinners
- paints
- resins
- solvents
- tar
- ultraviolet light
- wood preservatives

Shoemakers (Manufacturers)
- adhesives
- ammonia
- amyl acetate
- amyl alcohol
- aniline dyes
- benzine
- benzol
- fungicides
- hexane
- naphtha
- resins
- rubbers
- shoe polishes
- tanning agents
- waxes

Slaughterhouse Workers
- See Packinghouse Workers

Soap Makers
- alkalis
- bacteriostats
- detergents, synthetic
- oils, vegetable
- perfumes

Solderers
- acids
- cyanides
- fluxes
- heat
- hydrazine salts
- rosin
- zinc chloride

Stevedores
- See Dock Workers

Stockyard Workers
- bacteria
- fungi
- insecticides
- parasites

Stone Workers
- cement
- cold
- dusts
- heat
- lime
- vibrating tools

Sugar Refiners
- acids
- burlap
- fungi
- heat
- jute
- lime
- sugar

Tannery Workers
- acetic acid
- alum
- ammonium chloride
- arsenic salts
- bacteria
- benzol
- brine
- calcium hydrosulfide
- chromium compounds
- dimethylamine
- dyes, mineral
- dyes, vegetable
- formaldehyde
- lime
- oils
- pancreatic extract
- sodium hydroxide
- sodium sulfide
- solvents
- sulfuric acid
- tannin

Tar Workers
- heat
- pitch
- solvents
- sunlight
- tar

Taxidermists
- anthrax bacillus
- arsenic salts
- bacteria
- calcined alum
- fungi
- mercuric chloride
- parasites
- solvents
- tannin
- zinc chloride

Temperers
- oils
- sodium carbonate
- sodium cyanide
- sodium dichromate
- sodium nitrite

Tinners
- paint
- pitch
- sunlight
- zinc chloride

Typists
- See Clerks

Undertakers
- See Embalmers

Upholsterers
- bacteria
- flame retardants
- fungi
- glues
- lacquer
- lacquer solvents
- methyl alcohol
- parasites

Veterinarians
- anesthetics, local

Veterinarians (cont'd)
- antibiotics
- bacteria
- deodorants
- drugs
- fungi
- mercuric chloride
- parasites
- pesticides
- soaps & detergents
- viruses

Watchmakers
- acids
- chromates
- metal polishes
- nickel
- potassium cyanide
- rouge
- solvents

Waterproofers
- aluminum sulfate
- melamine formaldehyde resins
- oils
- paraffin
- pitch
- resin paints
- rubber
- solvents
- tar
- waxes

Welders
- fluxes
- heat
- ultraviolet light

Wire Drawers
- alkalis
- drawing oils
- lime
- soaps
- sulfuric acid

Wood Preservers
- chlorophenols
- chromates
- copper compounds
- creosote
- cresols
- mercuric chloride
- phenylmercuric compounds
- resins
- tar
- zinc chloride
- zinc sulfate

Wood Workers
- acid bleaches
- amino resin glues
- epoxy glues
- fillers
- formaldehyde
- lacquers
- oil stains
- paints
- phenolic resin glues
- rosin
- solvents
- varnishes
- woods

See also Cabinet Makers

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