



Industries and Asthmagens Associated with Work-Related Asthma

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Listed below are industries where work-related asthma has been identified, and the asthmagens (asthma-causing agents) associated with each. The list includes agents that are sensitizers known to cause allergic asthma, as well as irritants known to be responsible for inducing reactive airways dysfunction syndrome (RADS).

Additional information on industries and occupations, and associated asthmagens can be found through sources listed at the end of the table.

Industry	Asthmagen
Adhesives industry	acid anhydrides, aliphatic amines, polycyclic compounds, colophony, diisocyanates, methyl methacrylate, cyanoacrylates
Agriculture	insect proteins, pollens, aromatic herbs, livestock, organophosphorous insecticides, soya, chloramides, sulfones, mites
Aircraft filter manufacturing	triethylenetetramine
Aluminum cable soldering	aminoethylethanolamine
Aluminum industry	aluminium salts, fluorides
Animal handling and processing	animal urine/dander, feathers, avian proteins, penicillins, cephalosporins, cereal seeds, macrolids, oilseed
Artificial fingernail application	methyl methacrylate, cyanoacrylates
Autobody repair	diisocyanates, acrylates, styrene
Automobile painting	diisocyanates
Baking	enzymes, flour/grain dust, grain mites, insect proteins, cereal seeds, powdered chicken egg
Bath enameling	acid fumes
Boat manufacturing	styrene, diisocyanates, wood dust
Boiler/gas turbine cleaning	vanadium
Brewery	hops, chloramine-T
Button manufacturing	nacre (mother of pearl)
Candy manufacturing	vegetable gums
Carpentry	wood dust, formaldehyde, diisocyanates, epoxy resins
Cement manufacturing	potassium dichromate
Ceramic industry	chromium salts, nickel salts
Chemical industry	acid anhydrides, formaldehyde, diisocyanates, methyl methacrylate, cyanoacrylates, sulphites, persulphates, piperazine, platinum salts, quaternary ammonium compounds, coloring reagents, n-methylmorpholine, isothiazolinones

Industry	Asthmagens
Chrome plating	sodium bichromate, chromic acid, potassium chromate
Coffee processing	green coffee beans
Condom manufacturing	latex, lycopodium powder
Cooking	garlic dust, spices, aromatic herbs, papain
Cosmetics manufacturing	aliphatic amines, polycyclic compounds, cochineal dust, carmine red, enzymes, formaldehyde, vegetable gums, lycopodium powder, vanillin, quaternary ammonium compounds
Custodial services	cleaning agents, latex, mold, dust, bird/bat droppings, quaternary ammonium compounds
Dairy industry	animal urine/dander, lactoserum, casein, enzymes
Dentistry	latex, methyl methacrylate, cyanoacrylates, epoxy, diisocyanates, formaldehyde, glutaraldehyde, quaternary ammonium compounds
Detergent manufacturing	subtilisins (<i>Bacillus subtilis</i>), amylase, enzymes
Diamond industry	metal carbides, cobalt, nickel
Dye manufacturing and dyeing	levafix brilliant yellow, drimarene brilliant yellow and blue, cibachrome brilliant scarlet, aromatic amines and their derivatives, acid anhydrides, cochineal, carmine red, coloring reagents, sulphites, persulphates
Electronics	solder flux fume, colophony, aliphatic amines, polycyclic compounds, acid anhydrides, zinc chloride, ammonium chloride
Entomology	insect proteins
Enzyme manufacturing	fungi, alpha-amylase, enzymes
Epoxy resin manufacturing	acid anhydrides
Explosives manufacturing	vegetable gums, tetrazene, freon, lycopodium powder
Firefighting	combustion products of plastics
Floral industry	pollens, house plants, dried flowers
Food industry	garlic dust, spices, aromatic herbs, insect proteins, arthropods, shellfish, cochineal, carmine red, enzymes, vegetable gums, oil seeds, dust mites, maiko dust, seafood, powdered chicken egg, sulphites, persulphates, soya, vanillin, tea dust, casein, flours, papain, castor beans, herbal tea, chicory, vegetable oil mist
Food packaging	combustion products of polyvinyl chloride
Forensics	ninhydrin
Foundry	formaldehyde, derivatives of furan, diisocyanates
Fur dyeing	para-phenylenediamine
Galvanizing	zinc fume
Grain handling and processing	grain dust, grain mites, molds
Gum manufacturing	vegetable gums
Hairdressing	henna, sulphites, persulphates, ethanolamine, formaldehyde, sericin

Industry	Asthmagens
Health care	glutaraldehyde, latex, formaldehyde, methyl methacrylate, cyanoacrylates, quaternary ammonium compounds, methylidopa, penicillins, psyllium, hexachlorophene, chlorhexidine
Insect breeding	insect proteins, arthropods
Jewelry polishing	cuttlefish bone dust, ivory dust
Laundry	enzymes, sulphites, persulphates
Machine shop	tungsten carbide, cobalt, nickel, oil mist, coolants, ethanolamines
Meat wrapping	polyvinyl chloride fume
Metallurgy	aliphatic amines, polycyclic compounds, metal carbides, cobalt, nickel, derivatives of furan, diisocyanates, chromium salts, nickel salts, platinum salts, palladium salts, acid fumes, aluminum salts, fluorides
Mining	bioaerosols, styrene, polyester resins
Mortuary science	formaldehyde, glutaraldehyde
Mushroom cultivation and processing	mushroom spores
Nickel plating	nickel sulphate
Office work	bioaerosols, cleaning agents
Oyster farming	hoya
Paint spraying	dimethylethanolamine, diisocyanates, zinc chromate
Paper/pulp manufacturing	wood dust, formaldehyde, sulphites, persulphates, acid fumes, quaternary ammonium compounds, proteolytic enzymes, chlorine, diazonium salts
Pea processing	mexican bean weevils
Pharmaceutical industry	aliphatic amines, polycyclic compounds, aromatic amines and derivatives, acid anhydrides, penicillins, cephalosporins, cochineal dust, carmine red, enzymes, vegetable gums, lycopodium powder, macrolids, sulphites, persulphates, volatile acid chlorides, piperazine, psyllium, chloramides, sulfones, tetracyclines, cynorhodon, hydralazine, rose hips, trypsin, bromelin, papain, pepsin, ipecacuanha dust, morphine, pancreatin, isoniazid, spiramycin, cimetidine, acetic acid, phenylglycine
Pharmacy	gentian powder, flaviastase
Phenolic resin manufacturing	formaldehyde
Photographic processing	aliphatic amines, polycyclic compounds, coloring reagents, chromium salts, glutaraldehyde
Plastics manufacturing	aliphatic amines, polycyclic compounds, acid anhydrides, diazonium salts, formaldehyde, methyl methacrylate, diisocyanates, trypsin, bromelin, polyvinyl chloride (fume & dust), azodicarbonamide, styrene, polypropylene fume, dioctyl phthalate
Platinum refining	chloroplatinic acid, ammonium hexachloroplatinate, soluble platinum salts
Polyurethane foam manufacturing	toluene diisocyanate, diphenylmethane diisocyanate, 4-methylmorpholine
Polyurethane foam spraying	diisocyanates

Industry	Asthmagen
Poultry processing	chicken dander and feathers, amprolium hydrochloride
Prawn/crab processing	prawns, crabs
Printing/lithography	vegetable gums
Refuse collection processing	bioaerosols
Rubber industry	aliphatic amines, polycyclic compounds, aromatic amines and derivatives, diazonium salts, formaldehyde
Seafood industry	shellfish
Silkworm culturing	silkworms, sericin
Soldering	solder flux fume, colophony, polyether alcohol, polypropylene glycol
Steel industry	vanadium
Surgical glove manufacturing	latex
Tanning	aliphatic amines, polycyclic compounds, coloring reagents, enzymes, formaldehyde, chromium salts, sulphites, persulphates, casein
Tea processing	tea dust
Teaching	cleaning agents, mold, dusts
Textile industry	cochineal dust, carmine red, coloring reagents, enzymes, vegetable gums, chromium salts, sericin, natural fibers, latex
Tobacco farming and processing	tobacco leaf, tobacco dust
Tungsten carbide tool manufacturing/grinding	cobalt, nickel
Venipuncture	bis (tri-n-butyltin) oxide
Veterinary medicine	animal proteins, urine/dander, penicillins, cephalosporins, macrolids, piperazine
Water treatment industry	chloramides, sulfones, chloramine-T
Welding	chromium salts, nickel, chromium, vanadium, zinc chloride, ammonium chloride
Winery	mites, organophosphorous insecticides
Woodworking	wood dust, ramin
Wool processing	wool
X-ray processing	glutaraldehyde

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SOURCES:

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- Association of Occupational and Environmental Clinics: www.aoec.org/aoeccode.htm
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- Canadian Centre for Occupational Health and Safety: www.ccohs.ca/oshanswers/diseases/asthma.html
- National Institute of Health: http://hazmap.nlm.nih.gov/cgi-bin/hazmap_generic?tbl=TblDiseases&id=23