

Dictionary of Contact Allergens: Chemical Structures, Sources and References

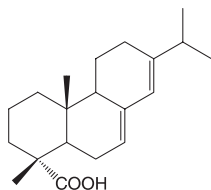
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1.1 Introduction

This chapter has been written in order to familiarize the reader with the chemical structure of chemicals implicated in contact dermatitis, mainly as haptens responsible for allergic contact dermatitis. For each molecule, the principal name is used for classification. We have also listed the most important synonym(s), the Chemical Abstract Service (CAS) Registry Number that characterizes the substance, and its chemical structure. The reader will find one or more relevant literature references. As it was not possible to be exhaustive, some allergens have been omitted since they were obsolete, extremely rarely implicated in contact dermatitis, their case reports were too imprecise, or they are extensively treated in other chapters of the textbook. From a practical chemical point of view, acrylates, cyanoacrylates and (meth)acrylates, cephalosporins, and parabens have been grouped together.

1. Abietic acid

CAS Registry Number [514-10-3]



Abietic acid is probably the major allergen of colophony, along with dehydroabietic acid, by way of oxidation products. Its detection in a material indicates that allergenic components of colophony are present.

Suggested Reading

- Bergh M, Menné T, Karlberg AT (1994) Colophony in paper-based surgical clothing. *Contact Dermatitis* 31:332–333
- Karlberg AT, Bergstedt E, Boman A, Bohlinder K, Lidén C, Nilsson JLG, Wahlberg JE (1985) Is abietic acid the allergenic component of colophony? *Contact Dermatitis* 13:209–215
- Karlberg AT, Bohlinder K, Boman A, Hacksell U, Hermansson J, Jacobsson S, Nilsson JLG (1988) Identification of 15-hydroperoxyabietic acid as a contact allergen in Portuguese colophony. *J Pharm Pharmacol* 40:42–47

2. Acetaldehyde

Acetic Aldehyde, Ethanal, Ethylic Aldehyde

CAS Registry Number [75–07–0]



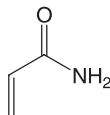
Acetaldehyde, as its metabolite, is responsible for many of the effects of ethanol, such as hepatic or neurological toxicity. A case of contact allergy was reported in the textile industry, where dimethoxane was used as a biocide agent in textiles and its degradation led to acetaldehyde.

Suggested Reading

- Eriksson CJ (2001) The role of acetaldehyde in the actions of alcohol (update 2000). *Alcohol Clin Exp Res* 25 [Suppl 5]:15S–32S
- Shmunis E, Kempton RJ (1980) Allergic contact dermatitis to dimethoxane in a spin finish. *Contact Dermatitis* 6:421–424

3. Acrylamide

CAS Registry Number [79–06–1]



Acrylamide is used in the plastic polymers industry, for water treatments, soil stabilization, and to prepare polyacrylamide gels for electrophoresis. This neurotoxic, carcinogenic, and genotoxic substance is known to have caused contact dermatitis in industrial and laboratory workers.

Suggested Reading

Beyer DJ, Belsito DV (2000) Allergic contact dermatitis from acrylamide in a chemical mixer. *Contact Dermatitis* 42:181–182

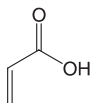
Dooms-Goossens A, Garmyn M, Degreef H (1991) Contact allergy to acrylamide. *Contact Dermatitis* 24:71–72

Lambert J, Mathieu L, Dockx P (1988) Contact dermatitis from acrylamide. *Contact Dermatitis* 19:65

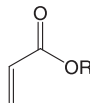
4. Acrylates, Cyanoacrylate, and Methacrylates

Acrylic Acid and Acrylates

CAS Registry Number
[79–10–7]



Acrylic acid



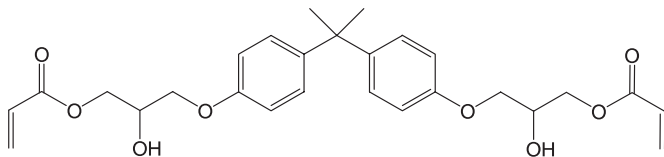
Acrylate

Acrylates are esters from acrylic acid. Occupational contact allergies from acrylates have frequently been reported and mainly concern workers exposed to the glues based on acrylic acid, as well as dental workers and beauticians.

Bisphenol A Diglycidylether Diacrylate

2,2-bis[4-(2-Hydroxy-3-Acryloxypropoxy)phenyl]-
Propane (Bis-GA)

CAS Registry Number [8687–94–9]



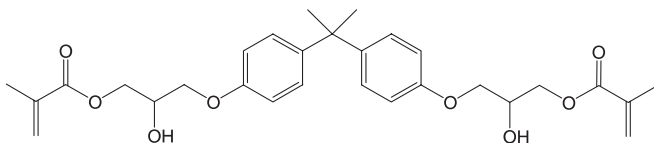
Bis-GA is an epoxy diacrylate. It caused contact dermatitis in a process worker, being contained in ultraviolet-light-curable acrylic paints.

Suggested Reading

Jolanki R, Kanerva L, Estlander T (1995) Occupational allergic contact dermatitis caused by epoxy diacrylate in ultraviolet-light-cured paint, and bisphenol A in dental composite resin. *Contact Dermatitis* 33: 94-99

Bisphenol A Glycidyl Methacrylate**Bis-GMA**

CAS Registry Number [1565-94-2]



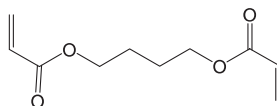
Bis-GMA is an epoxy-methacrylate. Sensitization occurs in dentists, in beauticians, and in consumers with sculptured photopolymerizable nails.

Suggested Reading

Kanerva L, Estlander T, Jolanki R (1989) Allergic contact dermatitis from dental composite resins due to aromatic epoxy acrylates and aliphatic acrylates. *Contact Dermatitis* 20: 201-211

1,4-Butanediol Diacrylate

CAS Registry Number [1070-70-8]



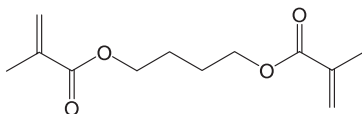
A positive patch test was observed in a male process worker in a paint factory, sensitized to an epoxy diacrylate contained in raw materials of ultraviolet-light-curable paint. The positive reaction was probably due to a cross-reactivity.

Suggested Reading

Jolanki R, Kanerva L, Estlander T (1995) Occupational allergic contact dermatitis caused by epoxy diacrylate in ultraviolet-light-cured paint, and bisphenol A in dental composite resin. *Contact Dermatitis* 33: 94-99

1,4-Butanediol Dimethacrylate

CAS Registry Number
[141–32–2]



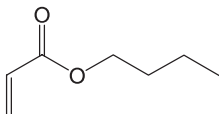
Sensitization to 1,4-butanediol dimethacrylate was reported in dental technicians, with cross-reactivity to methyl methacrylate.

Suggested Reading

Rustemeyer T, Frosch PJ (1996) Occupational skin diseases in dental laboratory technicians. (I). Clinical picture and causative factors. *Contact Dermatitis* 34:125–133

n-Butyl Acrylate

CAS Registry Number
[141–32–2]



Sensitization to *n*-butyl acrylate can occur in the dental profession.

Suggested Reading

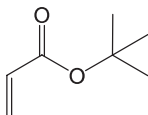
Daecke C, Schaller J, Goos M (1994) Acrylates as potent allergens in occupational and domestic exposures. *Contact Dermatitis* 30:190–191

Kanerva L, Estlander T, Jolanki R, Tarvainen K (1993) Occupational allergic contact dermatitis caused by exposure to acrylates during work with dental prostheses. *Contact Dermatitis* 28:268–275

Rustemeyer T, Frosch PJ (1996) Occupational skin diseases in dental laboratory technicians. (I). Clinical picture and causative factors. *Contact Dermatitis* 34:125–133

tert-Butyl Acrylate

CAS Registry Number
[1663–39–4]



Sensitization may affect dental workers.

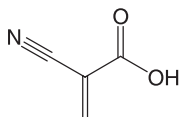
Suggested Reading

Kanerva L, Estlander T, Jolanki R, Tarvainen K (1993) Occupational allergic contact dermatitis caused by exposure to acrylates during work with dental prostheses. *Contact Dermatitis* 28:268–275

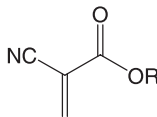
Cyanoacrylic Acid and Cyanoacrylates

2-Cyanoacrylic Acid

CAS Registry Number [15802–18–3]



Cyanoacrylic acid



Cyanoacrylate

Cyanoacrylates, particularly 2-ethyl cyanoacrylate, are derived from cyanoacrylic acid. They are used as sealants.

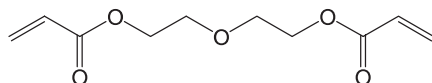
Suggested Reading

Fischer AA (1985) Reactions to cyanoacrylate adhesives: “instant glue”.
Cutis 35:18, 20, 22

Tarvainen K (1995) Analysis of patients with allergic patch test reactions to a plastics and glue series. *Contact Dermatitis* 32:346–351

Diethyleneglycol Diacrylate

CAS Registry Number [4074–88–8]



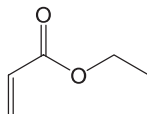
Diethyleneglycol diacrylate was positive in a painter sensitized to his own acrylate-based paint.

Suggested Reading

Nakamura M, Arima Y, Yoneda K, Nobuhara S, Miyachi Y (1999) Occupational contact dermatitis from acrylic monomer in paint. *Contact Dermatitis* 40:228–229

Ethyl Acrylate

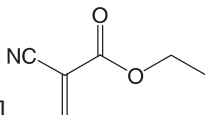
CAS Registry Number [140–88–5]



Ethyl acrylate is a sensitizer in the dental profession.

Suggested Reading

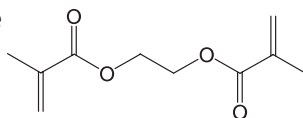
- Kanerva L, Estlander T, Jolanki R, Tarvainen K (1993) Occupational allergic contact dermatitis caused by exposure to acrylates during work with dental prostheses. *Contact Dermatitis* 28:268–275
- Rustemeyer T, Frosch PJ (1996) Occupational skin diseases in dental laboratory technicians. (I). Clinical picture and causative factors. *Contact Dermatitis* 34:125–133

Ethyl Cyanoacrylate**Ethyl-2-Cyanoacrylate****CAS Registry Number [7085–85–0]**

Ethyl cyanoacrylate is contained in instant glues for metal, glass, rubber, plastics, textiles, tissues, and nails. It polymerizes almost instantaneously in air at room temperature and bonds immediately and strongly to surface keratin. Beauticians are exposed to contact dermatitis from nail glues.

Suggested Reading

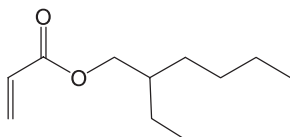
- Bruze M, Björkner B, Lepoittevin JP (1995) Occupational allergic contact dermatitis from ethyl cyanoacrylate. *Contact Dermatitis* 32:156–159
- Fitzgerald DA, Bhaggoe R, English JSC (1995) Contact sensitivity to cyanoacrylate nail-adhesive with dermatitis at remote sites. *Contact Dermatitis* 32:175–176
- Jacobs MC, Rycroft RJG (1995) Allergic contact dermatitis from cyanoacrylate? *Contact Dermatitis* 33:71
- Tomb R, Lepoittevin JP, Durepaire F, Grosshans E (1993) Ectopic contact dermatitis from ethyl cyanoacrylate instant adhesives. *Contact Dermatitis* 28:206–208

Ethyleneglycol Dimethacrylate**CAS Registry Number [97–90–5]**

Ethyleneglycol dimethacrylate (EGDMA) is a cross-linking agent of acrylic resins and is employed to optimize the dilution of high-viscosity monomers and to link together the macromolecules constituting the polymer. It caused contact dermatitis in dental technicians and dental assistants. A case was also reported in a manufacturer of car rearview mirrors.

Suggested Reading

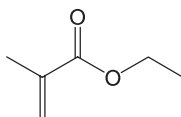
- Farli M, Gasperini M, Francalanci S, Gola M, Sertoli A (1990) Occupational contact dermatitis in 2 dental technicians. *Contact Dermatitis* 22: 282–287
- Kanerva L, Jolanki R, Estlander T (1995) Occupational allergic contact dermatitis from 2-hydroxyethyl methacrylate and ethylene glycol dimethacrylate in a modified acrylic structural adhesive. *Contact Dermatitis* 35: 84–89
- Rustemeyer T, Frosch PJ (1996) Occupational skin diseases in dental laboratory technicians. (I). Clinical picture and causative factors. *Contact Dermatitis* 34: 125–133
- Tosti A, Rapacchiale S, Piraccini BM, Peluso AM (1991) Occupational airborne contact dermatitis due to ethylene glycol dimethacrylate. *Contact Dermatitis* 24: 152–153

2-Ethylhexyl Acrylate**2-EHA****CAS Registry Number [1322–13–0]**

2-EHA was contained in a surgical tape and caused allergic contact dermatitis in a patient.

Suggested Reading

- Daecke C, Schaller J, Goos M (1994) Acrylates as potent allergens in occupational and domestic exposures. *Contact Dermatitis* 30: 190–191

Ethyl Methacrylate**CAS Registry Number [97–63–2].**

Ethyl methacrylate is used in dental prostheses or in photobonded sculptured nails.

Suggested Reading

- Kanerva L, Estlander T, Jolanki R, Tarvainen K (1993) Occupational allergic contact dermatitis caused by exposure to acrylates during work with dental prostheses. *Contact Dermatitis* 28: 268–275
- Kanerva L, Lauerman A, Estlander T, Alanko K, Henriks-Eckerman ML, Jolanki R (1996) Occupational allergic contact dermatitis caused by photobonded sculptured nails and a review of (meth) acrylates in nail cosmetics. *Am J Contact Dermat* 7: 109–115