

# Isobornyl acrylate

## MAK Value Documentation – Translation of the German version from 2019

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isobornyl acrylate; skin sensitization

## Abstract

The German Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area has evaluated isobornyl acrylate [5888-33-5] considering its skin and respiratory sensitizing potential.

There are several cases of contact sensitization in humans and the results were clearly exposure-related. A positive result in a local lymph node assay confirms that the substance is a skin sensitizer. Data for sensitization of the airways are not available. Isobornyl acrylate is designated with “Sh”.

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## Sensitization (2018) Sh

CAS number	5888-33-5
Synonyms	acrylic acid isobornyl ester IBOA exo-1,7,7-trimethylbicyclo[2.2.1]hept-2-yl acrylate ( <i>rel</i> -1S,2S,4S)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-ylprop-2-enoate

Isobornyl acrylate is a monomer in (UV-curing) acrylic resins or adhesives and can be used in these in high concentrations. Two products were found to contain 24% and 61.9% of isobornyl acrylate, but it was not declared as an ingredient (Henriks-Eckerman and Kanerva 1997; Kanerva et al. 1997). Isobornyl acrylate was detected as a low impurity in average amounts of 500 ng/g in a batch of cocoyl, decyl and dodecyl glucoside. The authors assumed that the substance was released from the plastic containers by the detergents (Foti et al. 2016).

## Allergenic Effects

### Effects in humans

#### Sensitizing effects on the skin

There are only a few publications on clinical findings with isobornyl acrylate, but these clearly show the substance has skin sensitization potential in humans. Isobornyl acrylate is not available as an approved or commercially available test preparation and is therefore generally not investigated in patch tests if acrylate sensitization is suspected. However, two cases of sensitization to isobornyl acrylate as a component of a UV-curing adhesive were reported as early as 1995. This adhesive was used to fix the cannula of an insulin infusion set to the plastic carrier. The adhesive contained also phenoxy poly(ethyleneoxy)ethyl acrylate and beta-carboxyethyl acrylate, which likewise caused positive reactions in the two female patients. The patients produced a 2+ and a 3+ reaction, respectively, to 0.1% isobornyl acrylate in petrolatum after 96 hours. One patient was tested also at lower concentrations and produced a 2+ reaction to 0.01% and a 1+ reaction to 0.001% isobornyl acrylate in petrolatum after 96 hours (Busschots et al. 1995).

A 47-year-old employee with recurrent eczema on the hand and atopic diathesis processed various acrylate-based UV-curing plastics in the manufacture of glass fibre products for 20 years. In a patch test, the employee reacted to 11 different acrylates and methacrylates predominately with 1+ reactions or to 2-hydroxyethyl acrylate and triethylene glycol diacrylate with 2+ reactions. None of the positively tested (meth)acrylates was declared as a component in the plastics processed. However, two coating materials and one UV-curing paint contained isobornyl acrylate, to which the employee produced a 2+ reaction in the 48-hour patch test with a 0.1% preparation in petrolatum after 3 and 7 days (Christoffers et al. 2013).

An extensive case series comprised 15 patients from the university hospitals of Antwerp, Leuven, Malmö and Saint-Luc/Brussels with skin reactions to an adhesive or the plastic of a sensor for continuous subcutaneous determination of the glucose content in capillary blood. The skin symptoms appeared after 2 weeks to 18 months. With the exception of one patient, all were tested with scrapings or acetone extracts of the plastic components of the sensor, in 13 cases with 1+ or 2+ results. Twelve of the patients were further tested with 0.01% to 0.1% isobornyl acrylate in petrolatum; 11 patients reacted to the 0.1% preparation after 96 hours (one 1+, nine 2+ and one 3+ reactions). The components of a (meth)acrylate series, which were likewise tested in 11 patients, led to a positive reaction in only 2 cases (1+ reaction to ethyl acrylate and to hydroxypropyl acrylate, respectively). The manufacturer of the sensor did not provide any information on the materials used in its production, but the authors were able to detect up to 0.4% isobornyl acrylate

in the plastic parts of the sensor by means of GC-MS. Since the isobornyl acrylate content in the adhesive used to fix the sensor to the skin was the lowest at about 0.006%, the authors assumed that the isobornyl acrylate was contained mainly in an adhesive used to join two parts of the sensor housing. In the other tests it is striking that 1 of the 9 tested persons with at least a 2+ reaction to 0.05% isobornyl acrylate produced also a 1+ reaction and 3 of the 9 tested persons produced a 2+ reaction to the sesquiterpene lactone mix (mixture of 0.033% each of costunolide, dehydrocostuslactone and alantolactone) (Herman et al. 2017).

Twelve of 80 employees who processed a light-curing adhesive containing, among other things, 25% to 50% isobornyl acrylate during four years in the manufacture of electric coils for televisions produced a reaction to at least one of the acrylates tested in the patch test. Most of the reactions involved triethylene glycol diacrylate and diethylene glycol diacrylate which, however, were not declared as components of the adhesive. Reactions to 0.1% isobornyl acrylate in petrolatum were not observed (Kiec-Swierczynska et al. 2005). In a case report of an allergic reaction to an adhesive containing isobornyl acrylate, reactions to the adhesive and the 2-hydroxyethyl methacrylate and other (meth)acrylates also contained in the adhesive were found, but not to the tested concentrations of 0.01%, 0.032% and 0.1% isobornyl acrylate (Kanerva et al. 1995).

In a study, a 0.1% preparation of isobornyl acrylate in petrolatum was tested in 428 patients with negative results, which prompted the authors to refrain from further testing with the substance (Aalto-Korte et al. 2008). There are no other clinical epidemiological studies that could show how frequently, compared with other acrylates, isobornyl acrylate leads to contact allergic reactions.

Cross-reactions with other acrylates apparently occur only very rarely. None of 49 subjects sensitized to acrylates reacted also to 0.1% isobornyl acrylate in petrolatum (Aalto-Korte et al. 2010). In another study, no reaction to 0.01%, 0.033% or 0.1% isobornyl acrylate in petrolatum was observed in 14 tested persons with existing sensitization to at least one acrylate or methacrylate. A 0.3% preparation led to an irritant reaction in 3 cases. Five volunteers with healthy skin did not produce reactions to any of the four preparations (Christoffers et al. 2013). Readings were taken after a maximum of 7 days, so that the question of possible active sensitization by the higher concentrated preparations cannot be answered with certainty.

### **Sensitizing effects on the airways**

No findings are available for respiratory sensitization.

## **Animal experiments**

### **Sensitizing effects on the skin**

In a local lymph node assay in CBA/Ca mice according to OECD Test Guideline 429, stimulation indices of 4.07, 14.97 and 22.84, respectively, were determined for isobornyl acrylate (tested in acetone/olive oil (4:1) as 5%, 10% and 25% test preparations) (ECHA 2018), so that an EC3 value (concentration producing a 3-fold increase in lymphocyte proliferation) could only be extrapolated. Consequently, isobornyl acrylate had a moderate skin sensitizing potential in this test system.

### **Sensitizing effects on the airways**

There are no data available.

## Manifesto (sensitization)

Contact sensitization from isobornyl acrylate has been reported only in relatively few cases. In these cases, however, there was clear, exposure-related sensitization. A positive result in a valid local lymph node assay also confirms that the substance has contact allergenic potential. Data for respiratory sensitization are not available. Isobornyl acrylate is therefore designated with “Sh” (for substances which cause sensitization of the skin) but not with “Sa” (for substances which cause sensitization of the airways).

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