RISK PROFILE

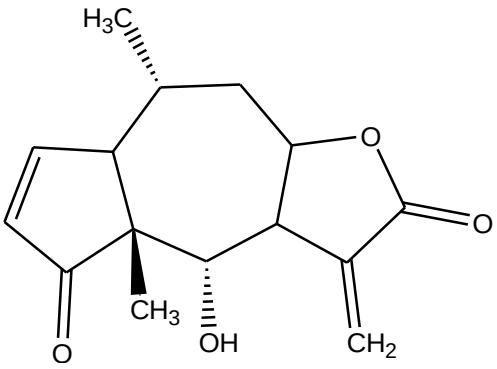
Arnica Montana flower extract

CAS No.8057-65-6

Date of reporting 29.01.2012

Content of document

1. Identification of substance

Chemical name (IUPAC):	Not applicable.
INCI	*Arnica Montana* flower extract
Synonyms	Synonyms for Arnica Montana flower extract: Arnica extract; Extract of Arnica; Extract of Arnica Montana. Synonyms for the flower Arnica Montana: leopard`s bane, mountain tobacco, mountain snuff, and wolf`s bane.
CAS No.	8057-65-6 and 68990-11-4 Helenalin: 6754-13-8
EINECS No.	273-579-2
Molecular formula	Not applicable for whole extract
Chemical structure	Helenalin is with quercetin one of the main constituent of *Arnica montana* 

	Henalin
Molecular weight	Not applicable for whole extract
Contents (if relevant)	Composition of the plant Arnica Montana and the extract of the plant have been described in the literature, although, the description is not always similar. Compounds that have been reported to be constituents of the extract are: essential oil, hydrocarbons, esters, ethers, alcohols, triterpenic alcohols, sesquiterpene lactones (helenalin), sugars, phytosterols, phenol acids, tannins, choline, inulin, flavonoids, carotenoids, coumarins, and fatty acids (CIR, 2001). Other reports state that helenalin (a sesquiterpene lactone), is with quercetin one of the main constituents of *Arnica montana.* More data on the chemical composition of the plant part used and the extracts can be obtained from the monograph on *Arnica Montana L*. in the Council of Europe publication on plants (1989) and Plants used in cosmetics, Volume I 2002. For manufacture and production, see the Cosmetic Ingredient Review safety assessment (2001).
Physiochemical properties	From the Cosmetic Ingredient Review safety assessment: "Arnica Montana extract is a dark brown clear liquid that has a pungent characteristic odor. It is soluble in water and insoluble in mineral oil. Arnica Montana extract has a specific gravity of 0.917 to 0.927 (25°C). A mixture of Arnica Montana extract (1-5 %), soybean (glycine Soja) oil (>50 %), and tocopherol (<0.1 %) is yellow with a characteristic, aromatic odor. It is soluble in oils, has a refractive index (n_D 20°C) of 1.473 to 1.476, density (20°C) of 0.918 to 0.922 g/ml, and acid value of <3. A mixture of Arnica Montana extract, butylene glycol, and water (percentages not specified) is a reddish-brown, transparent liquid with a characteristic odor. It has a specific gravity (d20/20) of 1.01 to 1.05 and a pH of 6.0 to 7.0. Arnica oil is a yellow aromatic liquid that is soluble in alcohol. It has a density of 0.906, and acid value of 75.1, and a saponification value of 29.9". References: (Council of Europe, 2008; CIR, 2001).

2. Uses and origin

Uses	➢ **Cosmetic products:** ***Functions according to:*** o CosIng database "Skin conditioning" – Maintains the skin in good condition "Masking" – Reduces or inhibits the basic odour or taste of the product

Concentrations being applied

Use concentrations reported by Council of Europe (2008):
10 % (aqueous extracts)
8 % (oil extracts)
2 % (in stimulant products for scalp and in oils and emulsions for body massage).
(Council of Europe, 2008).

A total of 97 cosmetic formulations with Arnica Montana extract have been reported to the Food and Drug Administration (FDA). The concentrations in different product categories have been presented by the Cosmetic Ingredient Review (2001):

Bubble baths: 0.1 – 1 %
Hair conditioners: 0 – 0.1 %
Shampoos: 0 – 0.1 %
Tonics/dressings/other hair-grooming aids: 0.1 – 1 %
Wave sets: unknown
Skin cleansing products: 0.1 – 1 %
Face/body/hand preparations: 0.1 – 5 %
Moisturizing products: 0.1 – 5 %
Night preparations: 0.1 – 1 %
Skin fresheners: 0.1 – 1 %
Other skin care preparations: 0.1 – 5 %
(CIR, 2001).

Frequency of use

In a search at Codecheck.info, Arnica Montana extract showed up as an ingredient in a total of 301 different cosmetic products (Codecheck [online]). At EWG's Skin Deep around 200 cosmetic products containing Arnica Montana extract was identified, see below for the distribution of the different cosmetic products in various product categories.

Face cream (70 products)
Moisturizer (40 products)
Anti-aging (38 products)
Around-eye cream (23 products)
Facial cleanser (22 products)

(EWG's Skin Deep [online]).

- **Medicinal products/applications**

Arnica Montana L. is used in traditional and homeopathic medicine (Puhlmann et al., 1991), and is believed to have antiseptic, antiphlogistic, analgesic, and anti-inflammatory properties (CIR, 2001). The extract of the plant is used in liniments CIR, 2001), and as a topical counterirritant (Hausen,1980).

- **Food**

Arnica Montana extract can be found in teas and liqueurs (Hausen,

	1980).
Origin Natural (exo /endo) Synthetic	Natural, plant-derived.

3. Regulation

Norway	No regulation.[1]
EU	No regulation.
Rest of the world	No regulation.

4. Relevant toxicity studies

Absorption Skin GI tractus	No data available.
Distribution	No data available.
Metabolism	No data available.
Excretion	No data available.
Local toxic effects Irritation Sensitivity	Skin irritation: Arnica Montana extract was not irritating, sensitising or phototoxic to mouse or guinea pig skin and did not produce significant ocular irritation. The extract also has high sensitising capacity that is likely caused by the sesqutiterpene lactone helenalin (Hausen, 1980). More than 100 cases of contact dermatitis caused by Arnica Montana are reported in the literature. In most cases, sensitisation was induced by self-treatment with tincture of Arnica (Council of Europe, 2008). Analysis of positive patch tests revealed an increasing incidence of contact allergy to Arnica (Eberhartiner, 1984).
Systemic toxic effects Acute Repeated dose Mutagenicity /genotoxicity	 Dermal LD_{50} of arnica resinoid was >5 g/kg for rabbits (CIR, 2001). Oral LD_{50} of Arnica Montana extract in rats was >5 g/kg (CIR, 2001). The intraperitoneal LD_{50} of Arnica Montana extract was 31 mg/kg for mice (CIR, 2011). Only one study with repeated doses was found. Mice were fed a mixture of Arnica Montana extract, butylene glycol and water (percentages not specified) at doses of 10, 20 or 30 ml/kg for 14 days. One mouse of the 30 ml/kg group died. The oral LD_{50} dose was >20 ml/kg (CIR, 2001). An ethanolic extract of Arnica, 10-400 µl, was mutagenic in the Ames test with and without metabolic activation for the Salmonella typhimurium strain TA98 and for strain TA100 with metabolic activation (Göggelmann

[1] The Norwegian medicinal products agency considered Arnica montana non-water extracts medicinal remedies. Because of that up till 2008 topical products containing these extracts were considered medicines – meaning a topical product containing such an extract were automatically classified a medicine. This regime has since been lifted.

	et al., 1986).
Carcinogenicity	No available data.
Reproductive toxicity / teratogenicity	No available data.

5. Exposure estimate and critical NOAEL / NOEL

NOAEL/NOEL critical	Not possible to estimate a NOEL/NOAEL on the currently existing data.
Exposure cosmetic products	A roughly estimated systemic exposure dose (SED): Surface area: 17,500 cm^2 Amount of product per cm^2: 1 mg (SCCS guidelines) Number of applications per day: 1 Concentration of Arnica in products: 10 % (worst case scenario) Skin penetration rate: not available, assumed 100 % (worst case scenario) Body weight: 60 kg (SCCS guidelines). SED: 17,500 x 1 x 0.1 x 1/ 60 = **29 mg/kg bw/day**
Margin of Safety (MoS)	Not calculated.

6. Other sources of exposure than cosmetic products

Food stuffs	No data found.
Pharmaceuticals	The concentration of topical Arnica preparations varies from 2-20 %. However, we found no data on the frequency and amount of use.
Other sources	
Adverse side effects - from uses other than cosmetics	Ingestion of helenalin, a constituent of the extract of Arnica Montana, can lead to severe intestinal upset, nervous disturbances, irregular heartbeat and collapse. Ingestion of 30 grams is reported to have caused severe illness, but not death. Helenanin has also been reported to be irritant to mucous membranes (Council of Europe, 2008). A person died after ingesting a 70 gram tincture of Arnica Montana. Arnica tincture has also been reported to caused oedema of eye lids and hyperaemia of the conjunctiva (Council of Europe, 2008).

7. Assessment

The Cosmetic Ingredient Review assessed the safety of the use of Arnica Montana Extract and Arnica Montana in cosmetic products, and concluded that the available data are insufficient to support the use of this plant and its extracts in cosmetic products (CIR, 2001).

We were able to identify this extract in over 300 different cosmetic products, and the use concentration might possibly be as high as 10 %, although the most frequent concentrations used are likely to be in

the range of 0.1- 5 %. The plant is known to have certain medicinal properties, such as antiseptic, analgesic, and anti-inflammatory, although the exposure through medicinal use is not known.

Systemic toxicity data are scarce, with only acute toxicity and an in vitro mutagenicity study available. The estimated systemic exposure dose equals to 29 mg/kg bw, which assumes a 100 % dermal absorption rate. The intraperitoneal LD_{50} of Arnica Montana Extract was 31 mg/kg bw for mice, and when comparing this with the estimated exposure from cosmetics of 29 mg/kg bw, it becomes apparent that the current use of Arnica Montana Extract in cosmetics does not possess the necessary safety precautions. In addition, the extract is shown to be mutagenic in vitro and information concerning dermal absorption, carcinogenicity and teratogenicity is necessary to ensure the safety of use of Arnica Montana extract in cosmetic products. The extract has high sensitizing capacity.

8. Conclusion

In conclusion, we propose to prohibit the use of Arnica Montana extract in all cosmetic products.

9. References

CIR, Cosmetic Ingredient Review. Final report on the safety assessment of Arnica montana extract and Arnica montana. Int J Toxicol. 2001;20 Suppl 2:1-11.

Council of Europe. Active ingredients used in cosmetics: safety survey. Council of Europe Publishing. Strasbourg, March 2008.

Eberhartinger C. Comments on the incidence of contact allergy. Z Hautkr. 1984 Oct 1;59(19):1283-6, 1289.

Göggelmann W, Schimmer O. Mutagenic activity of phytotherapeutical drugs. Prog Clin Biol Res. 1986;206:63-72.

Hausen BM. Arnica allergy. Hautarzt. 1980 Jan;31(1):10-7.

Puhlmann J, Zenk MH, Wagner H. Immunologically active polysaccharides of Arnica montana cell cultures. Phytochemistry. 1991;30(4):1141-5.

Online:

Codecheck © 2011. Available at: http://www.codecheck.info/ (accessed 25th November 2011).

CosIng, European Commission, Health and Consumers, Cosmetics. Available at: http://ec.europa.eu/consumers/cosmetics/cosing/) (accessed 25th November 2011).

EWG's Skin Deep © Cosmetic Safety Database. Environmental Working group. Available at: http://www.ewg.org/skindeep/ (accessed 25th November 2011).