

Citric acid skin irritation classification proposal

Date: 17th January 2019

1. Introduction

The harmonised classification proposal for citric acid (EC 201-069-1, CAS 77-92-9) includes classification for skin irritation. This document discusses the proposed classification, concluding that it is not consistent with the data.

1.1 The proposal

The proposed entry in Annex VI of Regulation (EC) No 1272/2008 (CLP)¹ includes Skin Irrit. 2, H315. This conclusion is based on the pH of citric acid in aqueous solution (as reported in IUCLID 2000 and in a solubility study), supported by:

1. OECD SIDS observations on dermatitis in bakers.
2. Use in anti-aging cosmetics as a chemical peel.
3. The difference in results in the Registration dossier between neat substance applied semi-occlusively and a 30% solution applied to scarified skin.

2. Response to the proposal

2.1 Classification based on pH

According to Regulation (EC) No 1272/2008, pH can be used for classification: *“In the absence of any other information, a substance is considered as corrosive to skin (Skin Corrosion Category 1) if it has a $pH \leq 2$ or a $pH \geq 11,5$.”*

¹ Proposal for Harmonised Classification and Labelling
Based on Regulation (EC) No 1272/2008 (CLP Regulation),
Annex VI, Part 2
International Chemical Identification: Citric acid
EC Number: 201-069-1
CAS Number: 77-92-9
Index Number: N/A
Contact details for dossier submitter:
FPS Public Health, Food Chain Safety and Environment
DG 5/ Department of Product Policy and chemical Substances / Management of Chemical Substances
On behalf of the Biocides Unit
BELGIUM
Version number: 3 Date: 30 October 2018

In the tiered approach to classification under Regulation (EC) No 1272/2008, emphasis is placed human data followed by animal data, so where data exists pH is not sufficient to classify.

2.2 Observations of dermatitis

There is no information about what other substances the bakers have been exposed to, so this evidence is not sufficient to classify. The OECD SIDS reports that patch testing of 60 eczema patients with 2.5% citric acid in petrolatum did not produce any irritant or allergic response.

2.3 Use as a chemical peel

The harmonised classification and labelling (CLH) report references Yates, 1999 for evidence of use of citric acid as a chemical peel. This publication indicates the presence of citric acid in 4 salon or commercial skin-peel products. No toxicity data are included in the paper. Since there is no information on which other substances were present in the products, it is not evidence of use of citric acid as the effective ingredient in skin peel. Therefore we do not consider this is grounds for classification.

2.4 Results of animal studies

The *in vivo* skin irritation guideline, OECD TG 404, requires that “care should be taken to avoid abrading the skin, and only animals with healthy, intact skin should be used.” The application of a 30% solution of citric acid to scarified skin is not appropriate to use to justify classification for skin irritation and should be discounted from the overall conclusions on classification.

In a study conducting according to OECD TG 404 and in compliance with GLP neat citric acid was applied semi-occlusively, with results which do not trigger classification for skin irritation.

3. Conclusion

Based on the data presented in the CLH report, and the considerations presented above, there is not sufficient evidence for classification of citric acid as irritating to the skin.

References

Yates R.L and Havery D.C., 1999. Determination of Phenol, Resorcinol, Salicylic Acid and α -Hydroxy Acids in Cosmetic Products and Salon Preparations, *Journal of Cosmetic Science*, vol. 50, pp. 315-325

Annex

Section 10.4.1 of the Proposal for Harmonised Classification and Labelling

“Short summary and overall relevance of the provided information on skin corrosion/irritation

According to paragraph 6.1.4 of the TNsG on Data Requirements for Active Substances and Biocidal Products, an acute dermal irritation study is not required in the case that the active substance is a strong acid or base (pH below 2 or above 11.5).

The pH of solutions of anhydrous citric acid of differing concentrations were measured as part of a water solubility test (O’Connor B.J., SPL Project No. 2189/0001, 2006) and were found to be less than 2. In addition, the pH data reported in the IUCLID for a 5 vol% solution of citric acid was given as 1.8 (European Chemical Bureau, IUCLID Dataset Citric Acid, 2000).

The results of a study using 30 % citric acid solution indicate that, when applied to scarified skin, a 30 % aqueous solution of citric acid caused well-defined skin reactions lasting longer than 48 hours. According to the study, a DRAIZE primary irritation index of 0.84 means that citric acid was classified as primary non-irritating to man at a concentration of 30 %. (000000 0, 1984). An unpublished study reported in both the OECD SIDS and the REACH registration dossiers states that the neat substance when only moistened by the semi-occlusive covering is only slightly irritating to rabbit skin. This further supports the conclusion that the substance is irritating as a result of the pH in aqueous solution.

OECD SIDS identified reported information on irritant skin dermatitis attributed to citric acid amongst waiters and bakers. The SIDS summary stated “presumably aqueous solutions (2 % in one case, not stated in the other) may produce pain or “sting”. Patch testing of 60 eczema patients with 2.5 % citric acid in petrolatum did not produce any irritant or allergic reactions; thus, the reaction appears to reflect mainly the acid effect of the substance, which in unbuffered 2to 2.5 % aqueous solution results in a pH of approximately 2.”

Supporting the argument for the potential irritant behaviour of citric acid is its use in anti-aging cosmetics. Citric acid has been identified as one of a group of ingredients collectively known as alpha hydroxyl acids or AHAs. AHAs were originally used by doctors as chemical peels. While the precise mechanism of action of the AHA is not known, the acid irritates the skin so triggering a healing response and cell renewal.

Surveys by the USA FDA identified that AHA products were available to various levels of practitioner based on the concentration of AHA (Yates et al., 1999; Barrows, 2002):

General public use: 10 % or less

Trained cosmetologists: 20 – 30 %

Doctors: 50 – 70 %

This demonstrates the irritant potential of citric acid at the above concentrations.

Conclusion:

Citric acid is therefore potentially irritating.”