EUROPEAN COMMISSION
HEALTH & CONSUMER PROTECTION DIRECTORATE-GENERAL

Directorate C - Scientific Opinions
C2 - Management of scientific committee; scientific co-operation and networks

Scientific Committee on Food

SCF/CS/ADD/CONS/43 Final
12 July 2001

Opinion of the Scientific Committee on Food on the use of dimethyl dicarbonate (DMDC) in wines

(opinion expressed on 11 July 2001)

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Terms of Reference

The Committee is asked to indicate if its conclusions on the safety of dimethyl dicarbonate (DMDC) used in non-alcoholic beverages is also applicable to its use in wine.

Background

DMDC was evaluated by the SCF in 1990 and considered acceptable for the cold sterilization of soft drinks and fruit juices at levels of addition up to 250 mg/L (1). At that time no application for its use in alcoholic beverages and wines had been made. The EC Directive 95/2 of 1995 (2) authorised the use of DMDC as preservative only for non-alcoholic aromatised beverages, alcohol-free wine and liquid tea concentrates at a maximum level of addition of 250 mg/L with no detectable residues. In 1996 the Committee also considered some further aspects of DMDC in response to a request from the French authorities (3). This opinion did not alter the Committee's earlier opinion.

The FDA in 1988 allowed the use of DMDC to prevent the growth of yeast in wine and for the inhibition of yeasts in alcohol-free wine and low alcohol wines by the addition of up to 200 mg/L provided the initial yeast counts were reduced to less than 500 viable cells per ml after an initial filtration or pasteurisation. DMDC is used to stabilise slightly sweet white wines and unfiltered red wines (4).

DMDC was also evaluated in 1990 by JECFA (5) which considered it inappropriate to establish an ADI taking into account that the compound hydrolyses in aqueous media and that residual levels are below analytical detection limits. It was considered acceptable as a cold-sterilising agent for beverages up to a level of addition of 250 mg/L.

Evaluation

DMDC decomposes primarily to CO_2 and methanol and forms minute amounts of reaction products such as carboxymethoxylation products of naturally occurring amines, amino acids, sugars and fruit acids (lactic acid, citric acid, tartaric acid, ascorbic acid) (total carboxymethoxy derivatives 1.7-5 mg/L). In the presence of ammonia or ammonium ions small amounts of methylcarbamate (< 25 µg/L) are formed. In the case of alcoholic and non-alcoholic beverages other reaction products with methanol such as monomethylcarbonate and dimethylcarbonate were identified and in the case of alcoholic beverages the reaction product with ethanol, i.e. methylethylcarbonate, was also detected (8.2-10.3 mg/L).

The toxicology data on DMDC and its reaction products, including those formed by reaction with ethanol, were previously assessed by the SCF (1). It was concluded that they were not of concern.

The amount of methylcarbamate formed in wine is unaffected by the presence of ethyl alcohol and depends only on the presence of ammonia or ammonium ions as occurs with non-alcoholic beverages. Further analyses of treated wines stored for 12 months have shown no increase in ethylcarbamate beyond background levels.

The use of 200 mg DMDC/L would add 98 mg/L of methanol to wine which already contains an average of about 140 mg/L from natural sources. A healthy person metabolises 1500 mg methanol/hr without any physiological problems and this should be compared to the amount of up to 240 mg/L methanol in wine, treated with DMDC up to 200 mg/L. Metabolism of the amounts of methanol resulting from consumption of wine containing such levels is therefore well within the capacity of the human body. Thus consumption of even large quantities of wine would not pose any hazards from methanol.

Conclusion

The formation of methanol and other reaction products following the use of DMDC for the treatment of alcoholic beverages and wine is similar to that formed in non-alcoholic beverages. Therefore the previous opinion on the use of DMDC for non-alcoholic beverages (1) is equally applicable to wines treated with DMDC.

References:

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2. European Parliament and Council Directive 95/2/EC on food additives other than colours and sweeteners. O.J. No. L 61 18.3.1995, p. 1

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4. US Food and Drug Administration (FDA) (1988) Federal Register 53:41325-41329. 21 October, 1988.

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