EFSA Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (CEF); Scientific Opinion on Flavouring Group Evaluation 211 (FGE.211): Consideration of genotoxicity data on representatives for one alpha, beta-unsaturated ketone and three precursors from chemical subgroup 2.5 of FGE.19 by EFSA

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Scientific Opinion on Flavouring Group Evaluation 211 (FGE.211):

Consideration of genotoxicity data on representatives for one alpha,beta-unsaturated ketone and three precursors from chemical subgroup 2.5 of FGE.19 by EFSA

EFSA Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (CEF)

European Food Safety Authority (EFSA), Parma, Italy

SUMMARY

The European Food Safety Authority (EFSA) asked the Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (the Panel) to provide scientific advice to the Commission on the implications for human health of chemically defined flavouring substances used in or on foodstuffs in the Member States. In particular, the Panel was requested to consider the Joint FAO/WHO Expert Committee on Food Additives (the JECFA) evaluations of flavouring substances assessed since 2000, and to decide whether no further evaluation is necessary, as laid down in Commission Regulation (EC) No 1565/2000. These flavouring substances are listed in the Register, which was adopted by Commission Decision 1999/217/EC and its consecutive amendments.

The present Flavouring Group Evaluation 211 (FGE.211), corresponding to subgroup 2.5 of FGE.19, concerns one alicyclic ketone and three precursors for such a ketone. The alpha,beta-unsaturated aldehyde and ketone structures are considered by the Panel to be structural alerts for genotoxicity (EFSA, 2008b) and the data on genotoxicity previously available did not rule out the concern for genotoxicity.

The Panel has identified one substance (or its predicted metabolite) in subgroup 2.5 which will represent the other three substances in this subgroup. For one of these two substances, genotoxicity data according to the test strategy have been requested.

1 On request from the Commission, Question No EFSA-Q-2010-01250, adopted on 4 February 2011.
3 Acknowledgement: The Panel wishes to thank the members of the Working Group on Genotoxicity of Flavourings for the preparation of this Opinion: Vibe Beltoft, Mona-Lise Binderup, Wilfried Bursch, Angelo Carere, Riccardo Crebelli, Karl-Heinz Engel, Rainer Gürtler, John Christian Larsen, Wim Mennes, Karin Norby and EFSA’s staff member Kim Rygaard Nielsen for the preparatory work on this scientific Opinion.

Subsequently, the Flavour Industry has performed new genotoxicity studies, and submitted *in vitro* genotoxicity data for one of the representative substances in this subgroup, 1(7),8-p-menthadien-2-yl acetate [FL-no: 09.930].

The Panel has examined these new data and concluded based on these that the *in vitro* genotoxicity data on 1(7),8-p-menthadien-2-yl acetate [FL-no: 09.930] do not indicate genotoxic potential. Accordingly the four substances in subgroup 2.5 of FGE.19 would be of no safety concern with respect to genotoxicity and will then be evaluated through the Procedure.

[FL-no: 02.100] will be evaluated in FGE.87Rev1.
[FL-no: 02.119] will be evaluated in FGE.47Rev1.
[FL-no: 07.034 and 09.930] will be evaluated in FGE.51Rev1.

**KEY WORDS**

1(7),8-p-menthadien-2-yl acetate, FL-no: 09.930, Subgroup 2.5, FGE.19, FGE.211, Genotoxicity.
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BACKGROUND

Regulation (EC) No 2232/96 of the European Parliament and the Council (EC, 1996a) lays down a procedure for the establishment of a list of flavouring substances, the use of which will be authorised to the exclusion of all other substances in the EU. In application of that Regulation, a Register of flavouring substances used in or on foodstuffs in the Member States was adopted by Commission Decision 1999/217/EC (EC, 1999a), as last amended by Commission Decision 2009/163/EC (EC, 2009a). Each flavouring substance is attributed a FLAVIS-number (FL-number) and all substances are divided into 34 chemical groups. Substances within a group should have some metabolic and biological behaviour in common.

Substances which are listed in the Register are to be evaluated according to the evaluation programme laid down in Commission Regulation (EC) No 1565/2000 (EC, 2000a) which is broadly based on the Opinion of the Scientific Committee on Food (SCF, 1999a). For the submission of data by the manufacturer, deadlines have been established by Commission Regulation (EC) No 622/2002 (EC, 2002b).

After the completion of the evaluation programme the Union list of flavouring substances for use in or on foods in the EU shall be adopted (Article 5 (1) of Regulation (EC) No 2232/96) (EC, 1996a).

Flavouring Group Evaluation 19 (FGE.19) contains 360 flavouring substances from the EU Register being alpha, beta-unsaturated aldehydes or ketones and precursors which could give rise to such carbonyl substances via hydrolysis and / or oxidation (EFSA, 2008b).

The alpha, beta-unsaturated aldehyde and ketone structures are structural alerts for genotoxicity. The Panel noted that there were limited genotoxicity data on these flavouring substances but that positive genotoxicity studies were identified for some substances in the group.

The alpha, beta-unsaturated carbonyls were subdivided into 28 subgroups on the basis of structural similarity (EFSA, 2008b). In an attempt to decide which of the substances could go through the Procedure, a (quantitative) structure-activity relationship (Q)SAR prediction of the genotoxicity of these substances was undertaken considering a number of models (DEREKfW, TOPKAT, DTU-NFI-MultiCASE Models and ISS-Local Models, (Gry et al., 2007)).

The Panel noted that for most of these models internal and external validation has been performed, but considered that the outcome of these validations was not always extensive enough to appreciate the validity of the predictions of these models for these alpha, beta-unsaturated carbonyls. Therefore, the Panel considered it inappropriate to totally rely on (Q)SAR predictions at this point in time and decided not to take substances through the procedure based on negative (Q)SAR predictions only.

The Panel took note of the (Q)SAR predictions by using two ISS Local Models (Benigni & Netzeva, 2007a; Benigni & Netzeva, 2007b) and four DTU-NFI MultiCASE Models (Gry et al., 2007; Nikolov et al., 2007) and the fact that there are available data on genotoxicity, in vitro and in vivo, as well as data on carcinogenicity for several substances. Based on these data the Panel decided that 15 subgroups (1.1.1, 1.2.1, 1.2.2, 1.2.3, 2.1, 2.2, 2.3, 2.5, 3.2, 4.3, 4.5, 4.6, 5.1, 5.2 and 5.3) (EFSA, 2008b) could not be evaluated through the Procedure due to concern with respect to genotoxicity. Corresponding to these subgroups, 15 Flavouring Group Evaluations (FGEs) were established, FGE.200, 204, 205, 206, 207, 208, 209, 211, 215, 219, 221, 222, 223, 224 and 225).

For 11 subgroups the Panel decided, based on the available genotoxicity data and (Q)SAR predictions, that a further scrutiny of the data should take place before requesting additional data from the Flavouring Industry on genotoxicity. These subgroups were evaluated in FGE.201, 202, 203, 210, 212, 213, 214, 216, 217, 218 and 220. For the substances in FGE.202, 214 and 218 it was concluded that a genotoxic potential could be ruled out and accordingly these substances will be evaluated using the Procedure. For all or some of the substances in the remaining FGEs, FGE.201, 203, 210, 212, 213, 216, 217 and 220 the genotoxic potential could not be ruled out.
To easy the data retrieval of the large number of structurally related alpha,beta-unsaturated substances in the different subgroups for which additional data are requested, EFSA has worked out a list of representative substances for each subgroup (EFSA, 2008bc). Likewise an EFSA genotoxicity expert group has worked out a test strategy to be followed in the data retrieval for these substances (EFSA, 2008bb).

The Flavouring Industry has been requested to submit additional genotoxicity data according to the list of representative substances and test strategy for each subgroup.

The Flavouring industry has now submitted additional data and the present FGE concerns the evaluation of these data requested on genotoxicity.

**TERMS OF REFERENCE**

The European Commission requests the European Food Safety Authority to carry out an evaluation of the data on 1(7),8-p-menthadien-2-yl acetate (mixture of (E) and (Z) isomers) [FL-no: 09.930], in accordance with Commission Regulation (EC) No 1565/2000. Depending on the outcome, the European Commission asks EFSA to evaluate all the substances of the corresponding subgroup (FGE.19 subgroup 2.5) through the Procedure.

**ASSESSMENT**

1. **Presentation of the substances in the JECFA Flavouring Group**

1.1. **Description**

The present Flavouring Group Evaluation 211 (FGE.211), corresponding to subgroup 2.5 of FGE.19, concerns one alicyclic ketone and three precursors for such a ketone. The four substances under consideration in the present evaluation are listed in Table 1.

Three of the substances have previously been evaluated by the JECFA, a summary of their current evaluation status by the JECFA and the outcome of this consideration is presented in Table 2 (JECFA, 2003a; JECFA, 2006a).

The alpha,beta-unsaturated aldehyde and ketone structures are considered alerts for genotoxicity (EFSA, 2008b) and the data on genotoxicity previously available did not rule out the concern for genotoxicity.

1.2. **Representative substances for subgroup 2.5**

The Panel has identified one substance (or its predicted metabolite) in subgroup 2.5 which will represent the other three substances this subgroup (EFSA, 2008bc). For one of these two substances genotoxicity data according to the test strategy (EFSA, 2008bb) have been requested. The representative substances are shown in Table 1.1.

**TABLE 1.1 REPRESENTATIVE SUBSTANCES FOR SUBGROUP 2.5 OF FGE.19**

<table>
<thead>
<tr>
<th>FL-no</th>
<th>JECFA-no</th>
<th>Subgroup</th>
<th>EU Register name</th>
<th>Structural formula</th>
<th>FEMA no</th>
<th>CoE no</th>
<th>CAS no</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

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### Table 1.1 Representative Substances for Subgroup 2.5 of FGE.19

<table>
<thead>
<tr>
<th>FL-no</th>
<th>Subgroup</th>
<th>EU Register name</th>
<th>Structural formula</th>
<th>FEMA no</th>
<th>CoE no</th>
<th>CAS no</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.930</td>
<td>2.5</td>
<td>1(7),8-p-Menthadien-2-yl acetate (mixture of (E) and (Z) isomers)</td>
<td><img src="image" alt="Structural formula" /></td>
<td>-</td>
<td>-</td>
<td>71660-03-2</td>
</tr>
<tr>
<td>1098</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Register</td>
<td>2.5</td>
<td>1(7),8-p-menthadien-2-one (Cyclohexanone, 2-methylene-5-(1-methylethenyl)-)</td>
<td><img src="image" alt="Structural formula" /></td>
<td>-</td>
<td>-</td>
<td>79367-79-6</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

2. Additionally submitted genotoxicity data on representative substances of subgroup 2.5

**Introduction**

The Industry has submitted data concerning genotoxicity studies for the one representative substance for this subgroup, 1(7),8-p-menthadien-2-yl acetate [FL-no: 09.930] (structurally related to 1(7),8-p-menthadien-2-one).

2.1. **In vitro data**

The newly available data comprise a bacterial reverse mutation assay and an in vitro micronucleus assay with human peripheral blood lymphocytes. The genotoxicity assays have been performed on a commercial mixture of the representative substance 1(7),8-p-menthadien-2-yl acetate and a positional isomer, carvyl acetate. Carvyl acetate can be hydrolysed followed by oxidation to carvone, which has been evaluated by EFSA in FGE.212 (EFSA, 2009ai) and NTP (NTP, 1990b) as non-genotoxic. The highest concentration of d-carvone that could be tested without cytotoxicity was 333 µg/plate (Mortelmans et al., 1986), i.e. the cytotoxicity was in the same range as observed for the mixture of 1(7),8-p-menthadien-2-yl acetate/carvyl acetate. The Panel concluded that testing the commercial mixture of 1(7),8-p-menthadien-2-yl acetate/carvyl acetate for genotoxicity allows the evaluation of the genotoxic potential of 1(7),8-p-menthadien-2-yl acetate. The concentrations reported in Table 3 are for the mixture of substances.

2.1.1. **Bacterial Reverse Mutation Assay**

1(7),8-p-menthadien-2-yl acetate/carvyl acetate was tested for mutagenic activity according to OECD guideline 471 and in compliance with GLP (Beevers, 2010a). The test material exhibited a marked toxicity as indicated by thinning of the background lawn, reduced revertant counts and complete killing of test bacteria. However, the Panel considered the remaining number of concentrations without signs of toxicity sufficient to draw a conclusion on mutagenicity in this system (for details see table 3).

Overall, the Panel concluded that there was no evidence of mutagenic activity of 1(7),8-p-menthadien-2-yl acetate/carvyl acetate at concentrations up to those causing bactericidal effects.
2.1.2. **In vitro Micronucleus Test**

*1(7),8-p-menthadien-2-yl acetate/carvyl acetate* was tested for induction of micronuclei in human peripheral blood lymphocytes according to OECD guideline 487 and in compliance with GLP (Whitwell, 2010b). The Panel considered that acceptable levels of cytotoxicity as judged upon the replication index were achieved at the top concentrations (for details see Table 3).

Overall, the Panel concluded that no evidence of chromosomal damage or aneuploidy was observed by increased levels of micronucleated binucleate cells (MNBN) in the presence or absence of S9 metabolic activation.

A summary of the *in vitro* genotoxicity data is given in Table 3.

2.2. **In vivo data**

Based on the *in vitro* data available no *in vivo* data are needed.

2.3. **Discussion of Mutagenicity/Genotoxicity Data**

The commercial mixture of the representative substance *1(7),8-p-menthadien-2-yl acetate* and a positional isomer, carvyl acetate was tested for all three genetic endpoints: gene mutations, structural and numerical chromosomal aberrations. The test material did not induce gene mutations in bacteria and was not clastogenic and/or aneugenic in mammalian cells *in vitro*. Although this commercial mixture was cytotoxic at high concentrations, the remaining concentrations without signs of toxicity provide a valid data set.

3. **Conclusion**

The *in vitro* genotoxicity data on the commercial mixture of the representative substance *1(7),8-p-menthadien-2-yl acetate* [FL-no: 09.930] and a positional isomer, carvyl acetate do not indicate genotoxic potential. Accordingly the four substances in subgroup 2.5 of FGE.19 would be of no safety concern with respect to genotoxicity and will then be evaluated through the Procedure.

[FL-no: 02.100] will be evaluated in FGE.87Rev1.
[FL-no: 02.119] will be evaluated in FGE.47Rev1.
[FL-no: 07.034 and 09.930] will be evaluated in FGE.51Rev1.
## Table 1: Specification Summary of the Substances in the present group (JECFA, 2002d; JECFA, 2005b)

<table>
<thead>
<tr>
<th>FL-no</th>
<th>EU Register name</th>
<th>Structural formula</th>
<th>FEMA no</th>
<th>Phys.form</th>
<th>Mol.formula</th>
<th>Mol.weight</th>
<th>Solubility 1)</th>
<th>Solubility 2)</th>
<th>Boiling point, °C 3)</th>
<th>Melting point, °C 3)</th>
<th>ID test</th>
<th>Assay minimum</th>
<th>Refrac. Index 4)</th>
<th>Spec.gravity 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02.100</td>
<td>Pinocarveol</td>
<td><img src="image" alt="Pinocarveol" /></td>
<td>3587</td>
<td>Liquid</td>
<td>C₉H₁₆O₂</td>
<td>152.24</td>
<td>Insoluble</td>
<td>Soluble</td>
<td>210</td>
<td>n.a</td>
<td>1.445-1.453</td>
<td>0.977-0.983</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02.119</td>
<td>Cedrenol</td>
<td><img src="image" alt="Cedrenol" /></td>
<td>10189</td>
<td>Solid</td>
<td>C₁₅H₂₄O</td>
<td>220.35</td>
<td>Practically insoluble or insoluble</td>
<td>Soluble</td>
<td>98 (0.27 hPa)</td>
<td>128</td>
<td>MS</td>
<td>95 %</td>
<td>n.a</td>
<td>n.a</td>
</tr>
<tr>
<td>07.034</td>
<td>2-Hexylidencyclopentan-1-one</td>
<td><img src="image" alt="2-Hexylidencyclopentan-1-one" /></td>
<td>2573</td>
<td>Liquid</td>
<td>C₁₁H₁₈O</td>
<td>166.26</td>
<td>240</td>
<td>1.477-1.484</td>
<td>0.907-0.914</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.930</td>
<td>1(7),8-p-Menthadien-2-yl acetate (mixture of (E) and (Z) isomers)</td>
<td><img src="image" alt="1(7),8-p-Menthadien-2-yl acetate" /></td>
<td>71660-03-2</td>
<td>Liquid</td>
<td>C₁₂H₂₀O₃</td>
<td>194.27</td>
<td>77-79 (0.1 hPa)</td>
<td>1.473-1.479</td>
<td>0.964-0.970</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Solubility in water, if not otherwise stated.
2) Solubility in 95 % ethanol, if not otherwise stated.
3) At 1013.25 hPa, if not otherwise stated.
4) At 20°C, if not otherwise stated.
5) At 25°C, if not otherwise stated.
### Table 2: Summary of Safety Evaluation of the JECFA substances in the present group (JECFA, 2003a; JECFA, 2006a)

<table>
<thead>
<tr>
<th>FL-no</th>
<th>EU Register name</th>
<th>Structural formula</th>
<th>EU MSDI 1) US MSDI (µg/capita/day)</th>
<th>Class 2) Evaluation procedure path 3)</th>
<th>JECFA Outcome on the named compound [4] or 5]</th>
<th>EFSA conclusion on the named compound (genotoxicity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02.100 1403</td>
<td>Pinocarveol</td>
<td><img src="image" alt="Pinocarveol structure" /></td>
<td>0.012 0.01</td>
<td>Class I A3: Intake below threshold</td>
<td>4) Evaluated in FGE.211, genotoxicity concern could be ruled out..</td>
<td></td>
</tr>
<tr>
<td>02.119</td>
<td>Cedrenol</td>
<td><img src="image" alt="Cedrenol structure" /></td>
<td>34</td>
<td>Class I No evaluation</td>
<td>Not evaluated by JECFA</td>
<td>Evaluated in FGE.211, genotoxicity concern could be ruled out..</td>
</tr>
<tr>
<td>07.034 1106</td>
<td>2-Hexylidenecyclopentan-1-one</td>
<td><img src="image" alt="2-Hexylidenecyclopentan-1-one structure" /></td>
<td>0.24 0.01</td>
<td>Class II A3: Intake below threshold</td>
<td>4) Evaluated in FGE.211, genotoxicity concern could be ruled out..</td>
<td></td>
</tr>
<tr>
<td>09.930 1098</td>
<td>1(7),8-Menthadien-2-yl acetate (mixture of (E) and (Z) isomers)</td>
<td><img src="image" alt="1(7),8-Menthadien-2-yl acetate structure" /></td>
<td>0.61 0.6</td>
<td>Class II A3: Intake below threshold</td>
<td>4) Evaluated in FGE.211, genotoxicity concern could be ruled out..</td>
<td></td>
</tr>
</tbody>
</table>

1) EU MSDI: Amount added to food as flavour in (kg/year) x 10^9 / (0.1 x population in Europe (≈ 375 x 10^6) x 0.6 x 365) = µg/capita/day.
2) Thresholds of concern: Class I = 1800 µg/person/day, Class II = 540 µg/person/day, Class III = 90 µg/person/day.
3) Procedure path A substances can be predicted to be metabolised to innocuous products. Procedure path B substances cannot.
4) No safety concern based on intake calculated by the MSDI approach of the named compound.
5) Data must be available on the substance or closely related substances to perform a safety evaluation.
### TABLE 3: GENOTOXICITY (*IN VITRO*)

Table 3: Summary of Additionally submitted genotoxicity data on the representative substance of subgroup 2.5

<table>
<thead>
<tr>
<th>FL-no</th>
<th>JECFA-no</th>
<th>Chemical Name</th>
<th>Test System</th>
<th>Test Object</th>
<th>Concentrations of Substance and Test Conditions</th>
<th>Result</th>
<th>Reference</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.930</td>
<td>1098</td>
<td>1(7),8-p-Menthadien-2-ylacetate</td>
<td>Reverse Mutation</td>
<td><em>S. typhimurium TA98, TA100, TA1535, TA1537 and TA 102</em></td>
<td>1.6*, 8*, 40*, 200, 1000 and 5000 μg/plate [1,2]</td>
<td>Negative</td>
<td>(Beevers, 2010a)</td>
<td>* concentration without cytotoxicity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>S. typhimurium TA98, TA1535 and TA1537</em></td>
<td>15.6*, 31.3*, 62.5*, 125, 250 and 500 μg/plate [2,3]</td>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>S. typhimurium TA100 and TA 102</em></td>
<td>78.1*, 156.3*, 312.5, 625, 1250 and 2500 μg/plate [2,3]</td>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>S. typhimurium TA98 and TA100</em></td>
<td>156.3*, 312.5, 625, 1250, 2500 and 5000 μg/plate [4,5]</td>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>S. typhimurium TA1535, TA1537 and TA 102</em></td>
<td>78.1*, 156.3*, 312.5, 625, 1250 and 2500 μg/plate [4,5]</td>
<td>Negative</td>
<td></td>
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<td><em>S. typhimurium TA100</em></td>
<td>25*, 50*, 100*, 200 and 400 μg/plate [2,3]</td>
<td>Negative</td>
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<tr>
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<td></td>
<td><em>S. typhimurium TA98</em></td>
<td>50*, 100*, 200*, 400 and 800 μg/plate [4,5]</td>
<td>Negative</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td><em>S. typhimurium TA100, TA1535, TA1537 and TA 102</em></td>
<td>25*, 50*, 100*, 200 and 400 μg/plate [4,5]</td>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Micronucleus induction</td>
<td>Human peripheral blood lymphocytes</td>
<td></td>
<td>80, 90 and 110 μg/ml [3,6]; 200, 300 and 400 μg/ml [5,6]</td>
<td>Negative</td>
<td>(Whitwell, 2010b)</td>
<td>50 to 65 % cytotoxicity at top concentrations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20, 50, 80 and 100 μg/ml [3,7]</td>
<td>Negative</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[1] With and without S9 metabolic activation.  
REFERENCES


ABBREVIATIONS

CAS     Chemical Abstract Service
CEF     Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids
CoE     Council of Europe
EFSA    The European Food Safety Authority
EU      European Union
FAO     Food and Agriculture Organization of the United Nations
FGE     Flavouring Group Evaluation
FLAVIS (FL)  Flavour Information System (database)
ID      Identity
IR      Infrared spectroscopy
JECFA   The Joint FAO/WHO Expert Committee on Food Additives
MNBN    MicroNucleated BiNucleate cells
MS      Masse spectra
MSDI    Maximised Survey-derived Daily Intake
mTAMDI  Modified Theoretical Added Maximum Daily Intake
NMR     Nuclear Magnetic Resonance
No      Number
NOAEL   No observed adverse effect level
NTP     National Toxicology Program
OECD    Organisation for Economic Co-operation and Development
(Q)SAR  (Quantitative) Structure Activity Relationship
SCF     Scientific Committee on Food
WHO     World Health Organisation