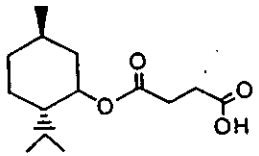
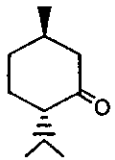
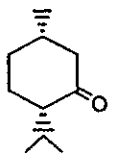
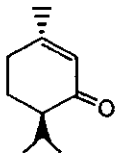
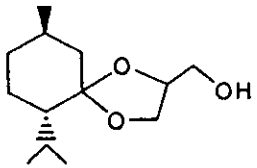
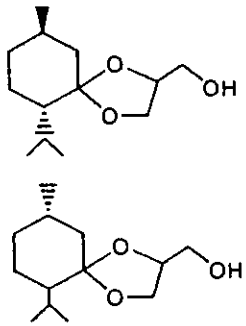
Table 9 (*continued*)

Substance	No.	CAS structure and no.	*Step A3*[b] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Conclusion based on current intake
mono-Menthyl succinate	447	77341-67-4 	No Europe: ND USA: 22	NR	NR	No safety concern
Structural class II						
Menthone	429	89-80-5 	Yes Europe: 1000 USA: 2500	No	Yes The NOEL of 400 mg/kg of body weight per day reported in a 28-day toxicity study in rats is about 10000 times the daily per capita intake of menthone in both Europe and the USA	No safety concern
(±)-Isomenthone	430	491-07-6 	No Europe: 200 USA: 0.1	NR	NR	

Piperitone	435	6091-50-5 	No Europe: 51 USA: 10	NR	NR	No safety concern
(–)-Menthone 1,2-glycerol ketal	445	563187-91-7 	No Europe: ND USA: 190	NR	NR	
(±)-Menthone 1,2-glycerol ketal	446	63187-91-7 	No Europe: ND USA: 190	NR	NR	

CAS: Chemical Abstract Service; ND: no intake data reported; NR: not required for evaluation because consumption of the substance was determined to be of no safety concern at step A3 of the Procedure.

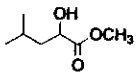
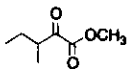
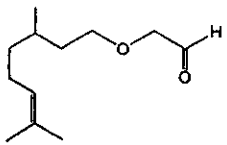
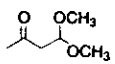
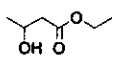
[a] *Step 2*: All of the substances in this group are metabolized to innocuous products.

[b] The thresholds for human intake for structural classes I and II are 1800 µg per day and 540 µg per day, respectively. All intake values are expressed in µg per day.

[c] An ADI of 0–4 mg/kg of body weight was established for this substance at the present meeting.

Table 3

Summary of the results of the safety evaluation of 47 aliphatic primary alcohols, aldehydes, carboxylic acids, acetals and esters containing additional oxygenated functional groups[a]

Substance[b]	No.	CAS no. and structure	*Step A3*[c] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Conclusion based on current intake
2-Oxobutyric acid (2-oxobutanoic acid)	589	600-18-0 	No Europe: 0.03 USA: 2	NR	NR	No safety concern
Methyl 2-hydroxy-4-methyl-pentanoate (methyl 2-hydroxy-4-methylvalerate)	590	40348-72-9 	No Europe: ND USA: 0.8	NR	NR	
Methyl 2-oxo-3-methyl-pentanoate (methyl 3-methyl-2-oxo-pentanoate)	591	3682-42-6 	No Europe: ND USA: 19	NR	NR	
Citronelloxyacetaldehyde ([(3,7-dimethyl-6-octenyl) oxy]-acetaldehyde)	592	7492-67-3 	No Europe: 34 USA: 0.1	NR	NR	
3-Oxobutanal dimethyl acetal (4,4-dimethoxy-2-butanone)	593	5436-21-5 	No Europe: 0.01 USA: 0.1	NR	NR	
Ethyl 3-hydroxybutyrate	594	5405-41-4 	No Europe: 12 USA: 29	NR	NR	

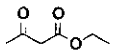
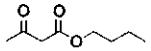
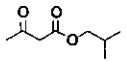
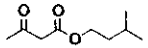
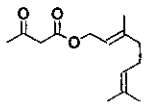
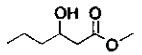
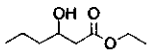
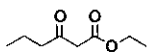
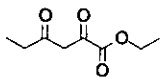
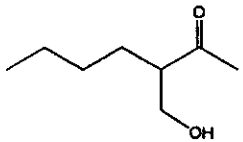
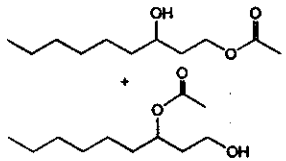
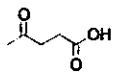
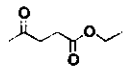
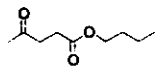
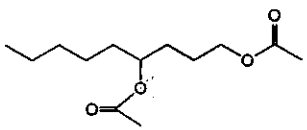
Ethyl acetoacetate	595	141-97-9 	Yes Europe: 1900 USA: 3900	Yes[d]	NR	No safety concern
Butyl acetoacetate	596	591-60-6 	No Europe: 98 USA: 6	NR	NR	
Isobutyl acetoacetate	597	7779-75-1 	No Europe: ND USA: 4	NR	NR	
Isoamyl acetoacetate (isopentyl acetoacetate)	598	2308-18-1 	No Europe: ND USA: 11	NR	NR	
Geranyl acetoacetate (3,7-dimethyl-2,6-octadienyl acetoacetate)	599	10032-00-5 	No Europe: ND USA: 0.04	NR	NR	
Methyl 3-hydroxyhexanoate	600	21188-58-9 	No Europe: 1 USA: 1	NR	NR	
Ethyl 3-hydroxyhexanoate	601	2305-25-1 	No Europe: 93 USA: 0.1	NR	NR	
Ethyl 3-oxohexanoate	602	3249-68-1 	No Europe: 0.04 USA: 1	NR	NR	
Ethyl 2,4-dioxohexanoate	603	13246-52-1 	No Europe: ND USA: 0.02	NR	NR	

Table 3 (*continued*)

Substance[b]	No.	CAS no. and structure	*Step A3*[c] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Conclusion based on current intake
3-(Hydroxymethyl)-2-heptanone	604	65405-68-7 	No Europe: 38 USA: 8	NR	NR	No safety concern
1,3-Nonanediol acetate (mixed esters) (1,3-nonanediol monoacetate)	605	1322-17-4 	No Europe: 15 USA: 8	NR	NR	
Levulinic acid (4-oxopentanoic acid)	606	123-76-2 	No Europe: 1600 USA: 1200	NR	NR	
Ethyl levulinate (ethyl 4-oxopentanoate)	607	539-88-8 	No Europe: 740 USA: 84	NR	NR	
Butyl levulinate (butyl 4-oxopentanoate)	608	2052-15-5 	No Europe: ND USA: 3	NR	NR	
1,4-Nonanediol diacetate	609	67715-81-5 	No Europe: 0.06 USA: 0.4	NR	NR	

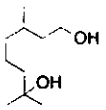
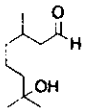
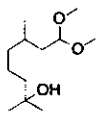
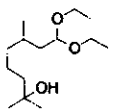
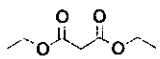
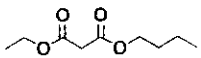
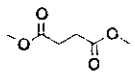
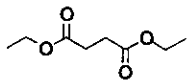
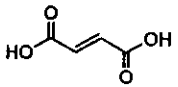
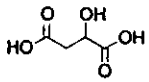
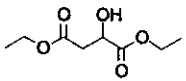
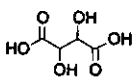
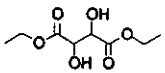
Hydroxycitronellol (3,7-dimethyloctane-1,7-diol)	610	107-74-4 	No Europe: 11 USA: 6	NR	NR	No safety concern
Hydroxycitronellal (7-hydroxy-3,7-dimethyloctanal)	611	107-75-5 	No Europe: 28 USA: 30	NR	NR	
Hydroxycitronellal dimethyl acetal (8,8-dimethoxy-2,6-dimethyl-2-octanol)	612	141-92-4 	No Europe: 0.04 USA: 0.8	NR	NR	
Hydroxycitronellal diethyl acetal (8,8-diethoxy-2,6-dimethyloctan-2-ol)	613	7779-94-4 	No Europe: 0.01 USA: 2	NR	NR	
Diethyl malonate (diethyl propanedioate)	614	105-53-3 	No Europe: 760 USA: 370	NR	NR	
Butyl ethyl malonate (butyl ethyl propanedioate)	615	17373-84-1 	No Europe: ND USA: 0.1	NR	NR	
Dimethyl succinate (dimethyl butanedioate)	616	106-65-0 	No Europe: 78 USA: 120	NR	NR	

Table 3 (*continued*)

Substance[b]	No.	CAS no. and structure	*Step A3*[c] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Conclusion based on current intake
Diethyl succinate (diethyl butanedioate)	617	123-25-1 	No Europe: 150 USA: 180	NR	NR	No safety concern
Fumaric acid[e] ((2*E*)-2-butenedioic acid)	618	110-17-8 	Yes Europe: 920 USA: 220000	Yes[f]	NR	
(–)-Malic acid ((2*S*)-hydroxybutanedioic acid)	619	97-67-6 	Yes Europe: 16000 USA: 58000	Yes[e]	NR	
Diethyl malate (diethyl hydroxybutanedioate)	620	7554-12-3 	No Europe: 5 USA: 34	NR	NR	
Mixture of (+)-, (–)-, (+/–)- and meso-tartaric acid (mixture of (+)-, (–)-, (+/–)- and meso-2,3-dihydroxybutanedioic acid)	621	87-69-4 	Yes Europe: 4400 USA: 14000	No	Yes; the NOEL of 1200 mg/kg of body weight per day reported in a 2-year study in rats is >1000 times the daily per capita intake	
Diethyl tartrate (diethyl 2,3-dihydroxybutanedioate)	622	87-91-2 	No Europe: 17 USA: 0.02	NR	NR	

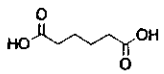
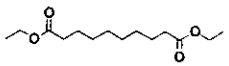
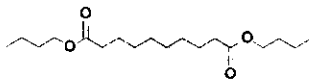
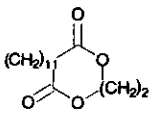
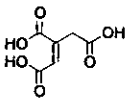
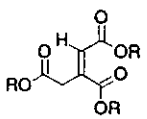
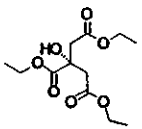
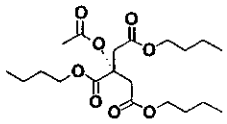
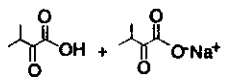
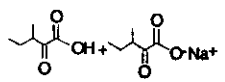
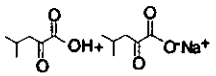
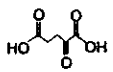
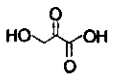
Adipic acid (hexanedioic acid)	623	124-04-9 	Yes Europe: 12 USA: 18000	No	Yes; the NOEL of 6200 mg/kg of body weight per day reported for the structurally related substance, dibutyl sebacate, in a 2-year study in rats is >10000 times the daily per capita intake	No safety concern
Diethyl sebacate (diethyl decanedioate)	624	110-40-7 	No Europe: 135 USA: 76	NR	NR	
Dibutyl sebacate (dibutyl decanedioate)	625	109-43-3 	No Europe: ND USA: 0.08	NR	NR	
Ethylene brassylate (1,4-dioxacycloheptadecane-5,17-dione)	626	105-95-3 	No Europe: 4 USA: 0.8	NR	NR	
Aconitic acid (1-propene-1,2,3-tricarboxylic acid)	627	499-12-7 	No Europe: 0.01 USA: 0.02	NR	NR	
Ethyl aconitate (mixed esters) (ethyl 1-propene-1,2,3-tricarboxylate)	628	1321-30-8  R = C_2H_5	No Europe: ND USA: 4	NR	NR	

Table 3 (*continued*)

Substance[b]	No.	CAS no. and structure	*Step A3*[c] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Conclusion based on current intake
Triethyl citrate[e] (triethyl 2-hydroxy-1,2,3-propanetricarboxylate)	629	77-93-0 	Yes Europe: 3400 USA: 2400	Yes[f]	NR	No safety concern
Tributyl acetylcitrate (tributyl 2-(acetyloxy)-1,2,3-propanetricarboxylate)	630	77-90-7 	No Europe: ND USA: 0.4	NR	NR	
3-Methyl-2-oxobutanoic acid and its sodium salt	631	759-05-7 and 3715-29-5 	No Europe: 0.01 USA: 0.2	NR	NR	
3-Methyl-2-oxopentanoic acid and its sodium salt	632	1460-34-0 and 66872-74-0 	No Europe: ND USA: 0.2	NR	NR	

4-Methyl-2-oxopentanoic acid and its sodium salt	633	816-66-0 and 4502-00-5 	No Europe: ND USA: 0.2	NR	NR	No safety concern
2-Oxopentanedioic acid	634	328-50-7 	No Europe: ND USA: 0.2	NR	NR	
3-Hydroxy-2-oxopropionic acid	635	1113-60-6 	No Europe: ND USA: 0.2	NR	NR	

CAS: Chemical Abstracts Service; ND: no data available; NR: not required for evaluation because an adequate NOEL for the substance or a related substance was identified at step A3 or A4 of the Procedure.

[a] *Step 1*: All of the substances in this group are in structural class I.
Step 2: All of the substances in this group are metabolized to innocuous products.

[b] The substance names are given as they appear in the specifications monograph (FAO Food and Nutrition Paper, No. 52, Add. 7, 1999). In cases where substances were evaluated under their trivial name, the systematic name is given in parentheses.

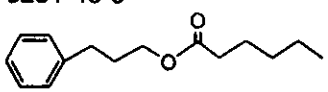
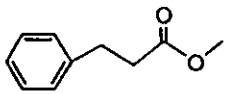
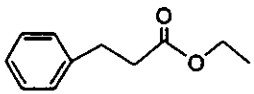
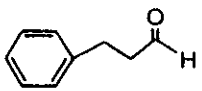
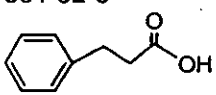
[c] The threshold for human intake of class I is 1800 µg per day. All intake values are expressed in µg per day.

[d] Ethyl acetoacetate is expected to be hydrolysed to acetoacetic acid, which is endogenous in humans.

[e] The ADI for this substance was maintained.

[f] Fumaric acid, (–)-malic acid and triethyl citrate are components of the tricarboxylic acid cycle.

Table 1 (*continued*)

Flavouring agent[b]	No.	CAS no. and structure	*Step A3*[c] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Comments	Conclusion based on current intake
3-Phenylpropyl hexanoate	642	6281-40-9 	No Europe: ND USA: 0.4	NR	NR	See note 2	No safety concern
Methyl 3-phenylpropionate	643	103-25-3 	No Europe: ND USA: 3	NR	NR	See note 2	
Ethyl 3-phenylpropionate	644	2021-28-5 	No Europe: 1 USA: 0.07	NR	NR	See note 2	
3-Phenylpropionaldehyde (benzenepropanal)	645	104-53-0 	No Europe: 19 USA: 19	NR	NR	See note 1	
3-Phenylpropionic acid (benzenepropanoic acid)	646	501-52-0 	No Europe: 23 USA: 0.5	NR	NR	See note 3	

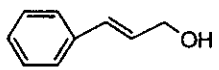
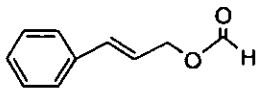
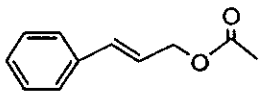
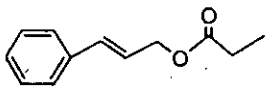
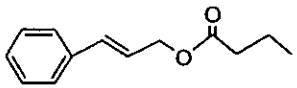
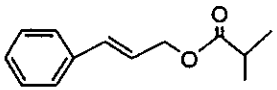
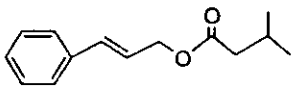
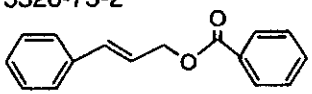
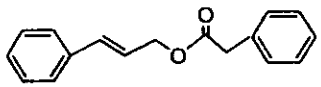
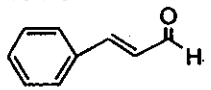
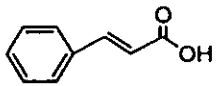
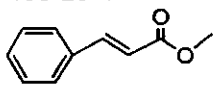
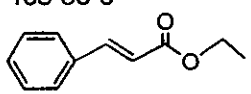
Cinnamyl alcohol	647	104-54-1 	Yes Europe: 1800 USA: 1900	No	Yes[a]	See note 4	No safety concern
Cinnamyl formate	649	104-65-4 	No Europe: 2 USA: 17	NR	NR	See note 5	
Cinnamyl acetate	650	103-54-8 	No Europe: 210 USA: 300	NR	NR	See note 5	
Cinnamyl propionate	651	103-56-0 	No Europe: 4 USA: 25	NR	NR	See note 5	
Cinnamyl butyrate	652	103-61-7 	No Europe: 3 USA: 2	NR	NR	See note 5	
Cinnamyl isobutyrate	653	103-59-3 	No Europe: 13 USA: 22	NR	NR	See note 5	
Cinnamyl isovalerate	654	140-27-2 	No Europe: 5 USA: 8	NR	NR	See note 5	

Table 1 (*continued*)

Flavouring agent[b]	No.	CAS no. and structure	*Step A3*[c] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Comments	Conclusion based on current intake
Cinnamyl benzoate	760	5320-75-2 	No Europe: ND USA: 1	NR	NR	See note 6	No safety concern
Cinnamyl phenylacetate	655	7492-65-1 	No Europe: 0.003 USA: 1	NR	NR	See note 7	
Cinnamaldehyde (3-phenyl-2-propenal)	656	104-55-2 	Yes Europe: 2500 USA: 59 000	No	Yes[e]	See note 4	
Cinnamic acid (3-phenyl-2-propenoic acid)	657	621-82-9 	No Europe: 32 USA: 44	NR	NR	See note 8	
Methyl cinnamate	658	103-26-4 	Yes Europe: 2800 USA: 830	No	Yes[f]	See note 9	
Ethyl cinnamate	659	103-36-6 	No Europe: 100 USA: 70	NR	NR	See note 9	

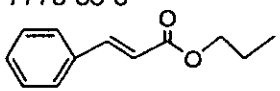
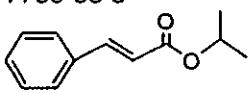
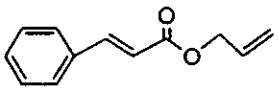
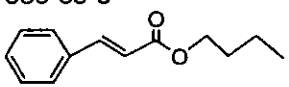
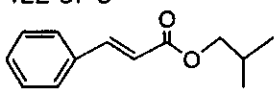
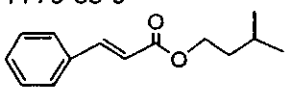
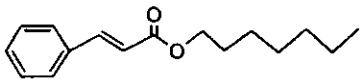
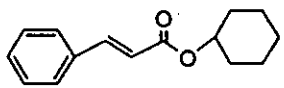
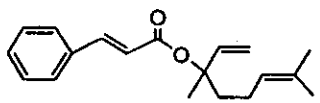
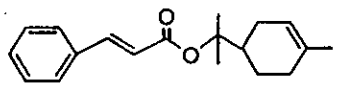
Propyl cinnamate	660	7778-83-8 	No Europe: 0.4 USA: 4	NR	NR	See note 9	No safety concern
Isopropyl cinnamate	661	7780-06-5 	No Europe: 19 USA: 3	NR	NR	See note 9	
Allyl cinnamate (3-propenyl 3-phenyl-2-propenoate)	19	1866-31-5 	No Europe: 5 USA: 0.3	NR	NR	See note 9	
Butyl cinnamate	663	538-65-8 	No Europe: 0.4 USA: 0.2	NR	NR	See note 9	
Isobutyl cinnamate	664	122-67-8 	No Europe: 1 USA: 3	NR	NR	See note 9	
Isoamyl cinnamate (isopentyl cinnamate)	665	7779-65-9 	No Europe: 8 USA: 6	NR	NR	See note 9	
Heptyl cinnamate	666	10032-08-3 	No Europe: 2 USA: 52	NR	NR	See note 9	

Table 1 (*continued*)

Flavouring agent[b]	No.	CAS no. and structure	*Step A3*[c] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Comments	Conclusion based on current intake
Cyclohexyl cinnamate	667	7779-17-1 	No Europe: 0.4 USA: 0.04	NR	NR	Cyclohexyl cinnamate is hydrolysed to cinnamic acid (see note 8) and cyclohexanol. Cyclohexanol is mainly conjugated with glucuronic acid and excreted	No safety concern
Linalyl cinnamate	668	78-37-5 	No Europe: 7 USA: 3	NR	NR	Linalyl cinnamate is hydrolysed to cinnamic acid (see note 8) and linalool. Linalool undergoes ω- and ω-1-oxidation to yield polar metabolites which are excreted	
Terpinyl cinnamate ((*Z*)-1-methyl-1-(4-methyl-3-cyclohexen-1-yl)ethyl cinnamate)	669	10024-56-3 	No Europe: 0.01 USA: 0.5	NR	NR	Terpinyl cinnamate is hydrolysed to cinnamic acid (see note 8) and terpineol. Terpineol undergoes ω- and ω-1-oxidation to yield polar metabolites which are excreted	

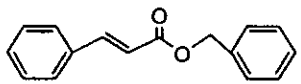
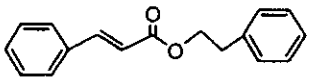
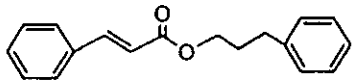
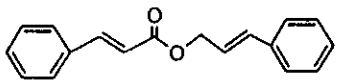
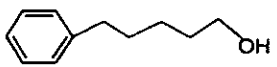
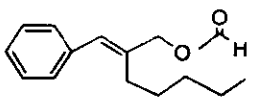
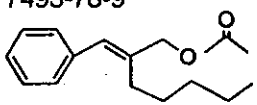
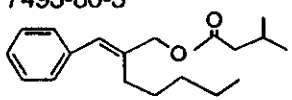
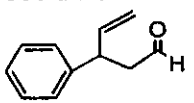
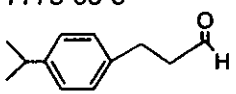
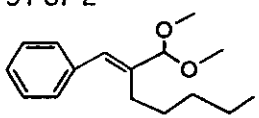
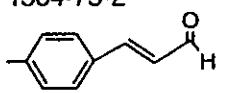
Benzyl cinnamate	670	103-41-3 	No Europe: 44 USA: 69	NR	NR	Benzyl cinnamate is hydrolysed to cinnamic acid (see note 8) and benzyl alcohol. Benzyl alcohol is oxidized to benzoic acid and excreted as hippuric acid	No safety concern
Phenethyl cinnamate	671	103-53-7 	No Europe: 6 USA: 50	NR	NR	Phenethyl cinnamate is hydrolysed to cinnamic acid (see note 8) and phenethyl alcohol. Phenethyl alcohol is oxidized to phenylacetic acid and excreted as the glucuronic acid conjugate	
3-Phenylpropyl cinnamate	672	122-68-9 	No Europe: 0.6 USA: 37	NR	NR	See notes 1 and 8	
Cinnamyl cinnamate	673	122-69-0 	No Europe: 2 USA: 36	NR	NR	See notes 4 and 8	
5-Phenylpentanol (benzenepentan-1-ol)	675	10521-91-2 	No Europe: ND USA: 0.1	NR	NR	See note 1	
α-Amylcinnamyl formate (2-(phenylmethylene)heptyl formate)	676	7493-79-0 	No Europe: 1.4 USA: 0.5	NR	NR	See note 10	

Table 1 (*continued*)

Flavouring agent[b]	No.	CAS no. and structure	*Step A3*[c] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Comments	Conclusion based on current intake
α-Amylcinnamyl acetate (2-(phenylmethylene)heptyl acetate)	677	7493-78-9 	No Europe: 3 USA: 260	NR	NR	See note 10	No safety concern
α-Amylcinnamyl isovalerate (2-(phenylmethylene)heptyl isovalerate)	678	7493-80-3 	No Europe: 0.01 USA: 0.5	NR	NR	See note 10	
3-Phenyl-4-pentenal (3-phenylpent-4-enal)	679	939-21-9 	No Europe: 1 USA: 2	NR	NR	See note 11	
3-(*p*-Isopropylphenyl) propionaldehyde (3-(*p*-cumenyl)propion-aldehyde)	680	7775-00-0 	No Europe: ND USA: 0.1	NR	NR	See note 1	
α-Amylcinnamaldehyde dimethyl acetal ((2-(dimethoxymethyl)-1-heptenyl)benzene)	681	91-87-2 	No Europe: 0.01 USA: 0.007	NR	NR	See note 10	
p-Methylcinnamaldehyde (3-(4-methylphenyl)-2-propenal)	682	1504-75-2 	No Europe: 0.01 USA: 0.9	NR	NR	See note 4	

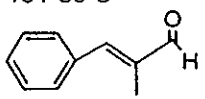
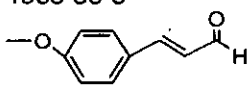
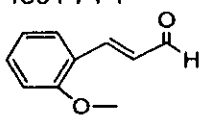
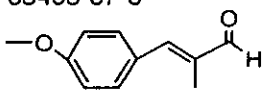
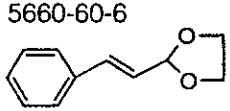
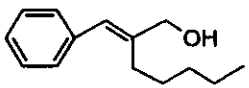
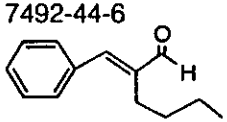
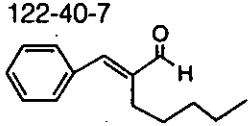
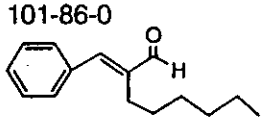
α-Methylcinnamaldehyde	683	101-39-3 	No Europe: 3 USA: 390	NR	NR	See note 4	No safety concern
p-Methoxycinnamaldehyde	687	1963-36-6 	No Europe: 0.04 USA: 0.01	NR	NR	See note 4	
o-Methoxycinnamaldehyde	688	1504-74-1 	No Europe: 0.6 USA: 71	NR	NR	*o*-Methoxycinnamaldehyde is oxidized to the corresponding acid, conjugated with glycine, and excreted. Alternatively, the acid may undergo β-oxidation to yield the β-hydroxycarboxylic acid derivative, which is also excreted	
p-Methoxy-α-methylcinnamaldehyde (4′-methoxy-2-methylcinnamaldehyde)	689	65405-67-6 	No Europe: 0.3 USA: 0.05	NR	NR	See note 4	
Structural class II							
Cinnamaldehyde ethylene glycol acetal (2-styryl-1,3-dioxolane)	648	5660-60-6 	Yes Europe: 690 USA: 0.007	No	Yes[9]	Hydrolysed to the corresponding alcohol and aldehyde	

Table 1 (*continued*)

Flavouring agent[b]	No.	CAS no. and structure	*Step A3*[c] Does intake exceed the threshold for human intake?	*Step A4* Is the substance or are its metabolites endogenous?	*Step A5* Adequate NOEL for substance or related substance?	Comments	Conclusion based on current intake
α-Amylcinnamyl alcohol (2-pentyl-3-phenylprop-2-en-1-ol)	674	101-85-9 	No Europe: 4 USA: 1	NR	NR	α-Amylcinnamyl alcohol is oxidized to the corresponding aldehyde, which is further oxidized to α-amylcinnamic acid and excreted	No safety concern
α-Butylcinnamaldehyde	684	7492-44-6 	No Europe: 0.01 USA: 0.07	NR	NR	See note 11	
α-Amylcinnamaldehyde (α-pentylcinnamaldehyde)	685	122-40-7 	No Europe: 25 USA: 23	NR	NR	See note 11	
α-Hexylcinnamaldehyde	686	101-86-0 	No Europe: 87 USA: 11	NR	NR	See note 11	

CAS: Chemical Abstracts Service; ND: no intake data reported; NR: not required for evaluation because consumption of the substance was determined to be of no safety concern at step A3 of the Procedure.

[a] *Step 2*: All of the substances in this group are expected to be metabolized to innocuous products.

[b] The names of the flavouring agents are given as they appear in the specifications monograph (FAO Food and Nutrition Paper, No. 52, Add. 8, 2000). In cases where flavouring agents were evaluated under their trivial name, the systematic name is given in parentheses.

[c] The thresholds for human intake for structural classes I and II are 1800 µg per day and 540 µg per day, respectively. All intake values are expressed in µg per day.

[d] The NOEL of 54 mg/kg of body weight per day in a 4-month toxicity study in rats is >1000 times the estimated intake of cinnamyl alcohol when used as a flavouring agent.

[e] The NOEL of 620 mg/kg of body weight per day in a 13-week toxicity study in rats is >600 times the estimated intake of cinnamaldehyde when used as a flavouring agent.

[f] The NOELs of 54 mg/kg of body weight per day for related substance No. 647 and 80 mg/kg of body weight per day for related substance No. 659 are >1000 times the estimated intake of methyl cinnamate when used as a flavouring agent.

[g] The NOEL of 620 mg/kg of body weight per day for related substance No. 656 is >10 000 times the estimated intake of cinnamaldehyde ethylene glycol acetal when used as a flavouring agent.

Notes to Table 1

1. Oxidized to yield the corresponding acid, which undergoes further β-oxidation of the side-chains and cleavage to yield the benzoic acid derivative. It then conjugates with glycine and/or glucuronic acid, and is excreted in the urine.
2. Hydrolysed to the corresponding acid and alcohol. The acid is completely oxidized and the alcohol, 3-phenyl-1-propanol, is further metabolized and excreted (see note 1).
3. Undergoes β-oxidation of the side-chains and cleavage to yield the corresponding benzoic acid derivative. It then conjugates with glycine and/or glucuronic acid and is excreted in the urine.
4. Oxidized to cinnamic acid (or its corresponding derivative), which is further oxidized to benzoic acid (or its corresponding derivative). The latter substance is excreted as hippuric acid (or its corresponding derivative).
5. Hydrolysed to cinnamyl alcohol and the corresponding carboxylic acid. Cinnamyl alcohol is oxidized and excreted (see note 4); the carboxylic acid is either completely oxidized or conjugated and excreted primarily in the urine.
6. Hydrolysed to cinnamyl alcohol and benzoic acid. Cinnamyl alcohol is oxidized to cinnamic acid, which is further oxidized to benzoic acid (see note 4).
7. Hydrolysed to cinnamyl alcohol and phenylacetic acid. Cinnamyl alcohol is oxidized to cinnamic acid, which is further oxidized to benzoic acid (see note 4). Phenylacetic acid is excreted as the glucuronic acid conjugate.
8. Undergoes β-oxidation and is excreted as hippuric acid.
9. Rapidly hydrolysed to cinnamic acid (see note 8) and the corresponding alcohol. The corresponding alcohol is completely oxidized.
10. Hydrolysed to α-amylcinnamyl alcohol (No. 674) and the corresponding acid, which is excreted. α-Amylcinnamyl alcohol is oxidized to α-amylcinnamaldehyde, which is further oxidized to α-amylcinnamic acid and excreted.
11. Oxidized to the corresponding acid and excreted.