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SCIENTIFIC COMMITTEE ON FOOD

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Opinion of the Scientific Committee on Food on the 19th additional list of monomers and additives for food contact materials

- **PM/REF No. 13317 (4,4'(1,3,6,8-tetrahydro-1,3,6,8-tetraoxobenzo [lmn] [3,8]phenanthroline-2,7-diyl)bisbenzoic acid, diethyl ester) ; CAS No. 132459-54-2**
- **PM/REF No. 14800 (crotonic acid) ; CAS No. 3724-65-0**
- **PM/REF No. 16955 (ethylene carbonate) ; CAS No. 96-49-1**

(Opinion expressed by the SCF on 26 September 2002)

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Opinion of the Scientific Committee on Food on the 19th additional list of monomers and additives for food contact materials

(Opinion expressed by the SCF on 26 September 2002)

The Committee (re)evaluated a number of monomers and additives for food contact materials. The substances examined are listed in alphabetical order in the Table, with their Reference Number (REF No.), Chemical Abstract Number (CAS No.) and classification in a SCF list. The definition of the SCF lists is given in the Appendix 1. The opinion of the Committee on each of the substances is shown in the same table. Where appropriate, quantitative restrictions (R) on migration in foodstuffs or in the residual quantity in finished products appear in the Table.

Assessment Tables

Identification of substance/ compound	Assessment
PM/REF_n.: 13317 Name of the substance: 4,4'-(1,3,6,8-tetrahydro-1, 3,6,8-tetraoxobenzo [lmn][3,8] phenanthroline-2, 7-diyl) bisbenzoic acid, diethyl ester CAS number: 132459-54-2	SDS CS/PM/3933 REV. I/13317. February 2002 General information According to the petitioner, the substance (NTCA-PABAE-DI) is a co-monomer to manufacture polyester articles. It provides the plastic with UV shielding properties. Previous evaluations (by SCF) None (new substance). The present evaluation is based on a gene-mutation assay in bacteria, a chromosomal aberration test in cultured mammalian cells, a gene-mutation assay in cultured mammalian cells, a micronucleus assay and a 28-day oral study in male and female rats (Sprague Dawley). An acute toxicity assay was also performed. Evaluation NTCA-PABAE-DI is a stable molecule; no reaction or degradation products in food are expected. The maximum possible migration was calculated to be 15µg/kg of food by determining the residual amount of the substance in the plastic, and assuming a 100 % migration.-Two impurities in the compound have been identified. However, in an extract of poly (butylene terephthalate) (PBT) prepared with NTCA-PABAE-DI, a small peak was co-eluted with NTCA-PABAE-DI. NTCA-PABAE-DI was tested under *in vitro* conditions in an Ames test, chromosomal aberration assay and mouse lymphoma assay. In the chromosome aberration assay, the incidence of cells with numerical aberrant chromosomes increased significantly (up to 11 fold) and it was dose-dependent in both 48-hour continuous treatment and in the pulse treatment when S9 mix was added. However, in a bone marrow micronucleus test with NTCA-PABAE-DI, the rate of micronuclei was in the same range than negative controls and the ratio PCE/NCE was significantly affected only in males with 24h sampling time, indicating that the substance did reach the target organ. From these *in-vitro* and *in-vivo* assays, it was concluded that the substance has no genotoxic potency. In an acute oral toxicity study, the LD50 was greater than 2000-mg/kg b.w. NTCA-PABAE-DI was administered, via the diet, to Sprague-Dawley rats, at different doses (dose range: 0 to 1000 mg/kg b.w.) for 28 days. A 14-day recovery period experiment was performed for control and high dose. No examined parameter was significantly modified. The NOEL is 1000 mg/kg b.w., based on the highest dose tested. According to the nature and quantity of the co-eluted compound (see above), additional toxicological data may be required. Conclusion

Identification of substance/ compound	Assessment
	Based on the above mentioned data the substance is classified: SCF_list: 7 Restriction: none. Remark for Commission: Maximum intended use in the formulation 4%. Surface volume ratio < 10 dm²/kg food Needed data or information: – Analytical information on the unidentified co-eluted peak in extracts of the PBT sample – Fate and likely migration levels of the 2 identified impurities – Information on the toxicity of the impurities, if available References: Unpublished data submitted by the petitioner (Opinion expressed by the SCF on 25 September 2002, 134th meeting of the SCF)

Identification of substance/ compound	Assessment
PM/REF_n.: 14800 Name of the substance: 2-butenoic acid (crotonic acid) CAS number: 3724-65-0	CS/PM/3357 REV IV/14800. Dated February 2002 General information According to the petitioner, crotonic acid is used as a co-monomer with vinyl acetate to produce a modified polyvinyl alcohol used as a secondary stabiliser for suspension polymerisation of vinyl chloride into PVC. Previous evaluations (by SCF) This substance has been considered several times by the SCF (SCF 1986, SCF 1995). The last previous evaluation was in 2000 (SCF, 2000). The compound was classified in SCF_List 7 at this last evaluation based on incomplete data on genotoxicity (needed bacterial mutation assay). The petitioner now provides this assay. Evaluation Specific migration data are not provided but the worst-case calculation (based on total crotonic acid migration in the food and 6 dm^2 per kg of food) is correctly assessed. A corresponding value of 0.83 µg per kilogram of food was found. The whole worst-case exposure relies on a specific use of the monomer, as a minor co-monomer of an additive, which itself is used in very low amounts. The residual level of crotonic acid in the additive being very low. Crotonic acid was clearly found to be not mutagenic in the requested gene mutation assay in *Salmonella typhimurium* strains TA 1535, TA 1537, TA 98 and TA 100 and in *Escherichia coli* strain WP2uvrA. On the basis of the now available bacterial mutagenicity data and of the previous chromosomal aberration and gene mutation on mammalian cell assays, it is concluded that the substance is not genotoxic. Conclusion Based on the abovementioned data the substance is classified: SCF_list: 3 Restriction: 0.05 mg/kg of food. Based on the reduced core set of toxicological data according to the migration level. Remark for Commission: A QMA is proposed (QMA = 0.05 mg/6 dm2), because only a method for the residual content is available. Needed data or information: None. References: - Unpublished data submitted by the petitioner.

Identification of substance/ compound	Assessment
	- Scientific Committee for Food, 1986. 17th Series of Reports of the SCF. Certain monomers and other starting substances to be used in the manufacture of plastic materials and articles intended to come into contact with foodstuffs (Opinion expressed on 14 December 1984). (Cat. N° EUR 10778 -DA-DE-EN-GR-FR-IT-NL) - Scientific Committee for Food, 1995. In "Compilation of the evaluations of the Scientific Committee for Food on certain monomers and additives used in the manufacture of plastic materials intended to come into contact with foodstuffs until the 21 March 1997". 42nd Series of Reports of the Scientific Committee for Food. Office of Official Publications of the European Communities, Luxembourg, 2000 - Scientific Committee on Food, 2000. Opinion on the 11th additional list of monomers and additives for food contact materials (adopted by the SCF on 19 October 2000). CS/PM/GEN/M83 final. http://europa.eu.int/comm/food/fs/sc/scf/out76_en.pdf (Opinion expressed by the SCF on 25 September 2002, 134th meeting of the SCF)

Identification of substance/ compound	Assessment
PM/REF_n.: 16955 Name of the substance: Ethylene carbonate CAS number: 96-49-1	SDS CS/PM/3935/ 16955 January 2002 General information According to the petitioner, ethylene carbonate is a monomer intended to be used in hydrogels consisting of partially neutralised polyacrylates (superabsorbent polymers) Previous evaluations (by SCF) None (new substance). The present evaluation is based on a gene-mutation assay in bacteria, a chromosomal aberration test in cultured mammalian cells, a gene-mutation assay in cultured mammalian cells, an 18 weeks oral carcinogenicity study in male and female rats (Charles River CD), a teratogenicity study in female rats (Sprague Dawley) and a metabolism study by gavage in male rats (Fisher 344). Evaluation Hydrolysis of ethylene carbonate yields pure ethylene glycol and carbon dioxide. Specific migration has not been determined. Residual content of ethylene carbonate and ethylene glycol was determined in Super Absorbent polymer granules. Residual content of ethylene carbonate was found to be below the quantitation limit, i.e. < 10-mg/kg polymer. Residual content of ethylene glycol was found to be <0.942-mg/kg polymer. In the determination of ethylene glycol it is demonstrated that the extraction of ethylene glycol increases, when the cross-linked gel is in contact with methanol, due to hydrolysis. Adequate genotoxicity studies indicate that ethylene carbonate is not mutagenic in bacteria and in mammalian cells in vitro, and does not induce chromosomal aberrations in vitro. On the basis of the data available, it is concluded that ethylene carbonate is not genotoxic. Toxicity data indicate low toxicity and mild/moderate irritating properties. Following oral administration, ethylene carbonate is rapidly metabolised to ethylene glycol. When rats were administered a very high dose ((3000 mg/kg b.w.), which was maternally toxic, a small increase in teratogenic effects has been reported. No excess of tumours was observed in a limited oral carcinogenicity study in the rat. Conclusion Based on the above mentioned data the substance is classified: SCF_list: 7 Restriction: none. Remark for Commission: no method available for specific migration; only a QM method for the monomer and ethylene glycol (hydrolysis product) Needed data or information: - For the determination of residual ethylene carbonate, details on the analytical method (conditions of recovery, detailed GC

Identification of substance/ compound	Assessment
	conditions, representative chromatograms of standard, sample and recovery solutions) should be provided. - Data on the residual content of ethylene glycol after extraction with a representative aqueous solvent (e.g. 3% acetic acid), in order to exclude the possible generation of ethylene glycol from the cross-linked polyacrylate in the presence of water, should also be provided References: - Unpublished data submitted by the petitioner (Opinion expressed by the SCF on 25 September 2002, 134th meeting of the SCF)

Previous opinions adopted by the SCF in the area of Food Contact Materials (status up to August 2002)

1) Evaluations of individual substances

The 42nd Series of Reports of the SCF (Compilation of the evaluations of the Scientific Committee for Food on certain monomers and additives used in the manufacture of plastics materials intended to come into contact with foodstuffs expressed until 21st March 1997, 2000) contains the compilation of the SCF opinions on Food Contact Materials for the period 1974 (the beginning of the existence of the Committee) to May 1997.

Following this compilation, the Committee has evaluated or re-evaluated a number of substances. All these opinions have been published on the Internet (at the webpages of the Committee, in the Europa server, www.europa.eu.int):

- Opinion on the 17th additional list of monomers and additives for food contact materials (expressed on 27 February 2002)
- Opinion on the 16th additional list of monomers and additives for food contact materials (expressed on 13th December 2001)
- Opinion on the 15th additional list of monomers and additives for food contact materials (expressed on 13th December 2001)
- Statement on a recent report on primary aromatic amines in food and packaging samples in a Danish magazine (expressed on 26 September 2001)
- Opinion on the 14th additional list of monomers and additives for food contact materials (expressed on 30th May 2001)
- Opinion on the 13th additional list of monomers and additives for food contact materials (expressed on 30th May 2001)
- Opinion on the 12th additional list of monomers and additives for food contact materials (expressed on 28th February 2001)
- Opinion on the 11th additional list of monomers and additives for food contact materials (expressed on 19 October 2000)
- Opinion on the 10th additional list of monomers and additives for food contact materials (expressed on 22 June 2000)
- Opinion on the 9th additional list of monomers and additives for food contact materials (expressed on 22 June 2000)
- Opinion on an additional list of monomers and additives intended to be used for food contact materials (10 compounds) (expressed on 2 December 1999)
- Statement on the use of Novolac glycidyl ethers (NOGE) as additives in food contact materials. Minutes of the 119th meeting of the SCF (1st/2nd December 1999)
- Statements on a recent survey on Bisphenol A diglycidyl ether (BADGE) and Bisphenol F diglycidyl ether (BFDGE) in canned food. Minutes of the 119th meeting of the SCF (1st/2nd December 1999)
- Opinion on an additional list of monomers and additives intended to be used for food contact materials (9 compounds) (expressed on 23 September 1999)
- Opinion on an additional list of monomers and additives intended to be used for food contact materials (11 compounds) (expressed on 17 June 1999)

- Opinion on an additional list of monomers and additives intended to be used for food contact materials (6 compounds) (expressed on 24 March 1999)
- Opinion on Bisphenol A diglycidyl ether (expressed on 24 March 1999)
- Opinion on an additional list of monomers and additives intended to be used for food contact materials (23 compounds) (expressed on 10 December 98)
- Opinion on an additional list of monomers and additives intended to be used for food contact materials (13 compounds) (expressed on 17 September 1998)
- Opinion on an additional list of monomers and additives intended to be used for food contact materials (37 compounds) (expressed on 19 March 1998)
- Additional list of monomers and additives evaluated by the WG "Food Contact Materials" of the SCF during the 69th-70th meetings. (16 compounds) (adopted during the SCF meeting of 12 and 13 June 1997). Also appearing in the Forty-third series of Reports of the Scientific Committee for Food, ISBN 92-828-5887-1)

2) Guidelines

The Committee has adopted also "**Guidelines of the Scientific Committee on Food for the presentation of an application for safety assessment of a substance to be used in food contact materials prior to its authorisation**". These guidelines have been modified for the last time on 13 December 2001. (Document SCF/CS/PLEN/GEN/100 Final).

APPENDIX 1

DEFINITION OF THE SCF LISTS

List 0
Substances, e.g. foods, which may be used in the production of plastic materials and articles, e.g. food ingredients and certain substances known from the intermediate metabolism in man and for which an ADI need not be established for this purpose.

List 1
Substances, e.g. food additives, for which an ADI (=Acceptable Daily Intake), a t-ADI (=temporary ADI), a MTDI (=Maximum Tolerable Daily Intake), a PMTDI (=Provisional Maximum Tolerable Daily Intake), a PTWI (=Provisional Tolerable Weekly Intake) or the classification "acceptable" has been established by this Committee or by JECFA.

List 2
Substances for which this Committee has established a TDI or a t-TDI.

List 3
Substances for which an ADI or a TDI could not be established, but where the present use could be accepted.
Some of these substances are self-limiting because of their organoleptic properties or are volatile and therefore unlikely to be present in the finished product. For other substances with very low migration, a TDI has not been set but the maximum level to be used in any packaging material or a specific limit of migration is stated. This is because the available toxicological data would give a TDI, which allows that a specific limit of migration or a composition limit could be fixed at levels very much higher than the maximum likely intakes arising from present uses of the additive.

LIST 4 (for monomers)

Section 4A
Substances for which an ADI or TDI could not be established, but which could be used if the substance migrating into foods or in food simulants is not detectable by an agreed sensitive method.

Section 4B
Substances for which an ADI or TDI could not be established, but which could be used if the levels of monomer residues in materials and articles intended to come into contact with foodstuffs are reduced as much as possible.

LIST 4 (for additives)
Substances for which an ADI or TDI could not be established, but which could be used if the substance migrating into foods or in food simulants is not detectable by an agreed sensitive method.

List 5
Substances that should not be used.

List 6
Substances for which there exist suspicions about their toxicity and for which data are lacking or are insufficient.
The allocation of substances to this list is mainly based upon similarity of structure with that of chemical substances already evaluated or known to have functional groups that indicate carcinogenic or other severe toxic properties.

> **Section 6A**: Substances suspected to have carcinogenic properties. These substances should not be detectable in foods or in food simulants by an appropriate sensitive method for each substance.
>
> **Section 6B:** Substances suspected to have toxic properties (other than carcinogenic). Restrictions may be indicated.

List 7
Substances for which some toxicological data exist, but for which an ADI or a TDI could not be established. The required additional information should be furnished.

List 8
Substances for which no or only scanty and inadequate data were available.

List 9
Substances and groups of substances which could not be evaluated due to lack of specifications (substances) or to lack of adequate description (groups of substances).
Groups of substances should be replaced, where possible, by individual substances actually in use. Polymers for which the data on identity specified in "SCF Guidelines" are not available.

List W
"Waiting list". Substances not yet included in the Community lists, as they should be considered "new" substances, i.e. substances never approved at national level. These substances cannot be included in the Community lists, lacking the data requested by the Committee.

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APPENDIX 2

Extract of the "Guidelines of the Scientific Committee on Food for the presentation of an application for safety assessment of a substance to be used in food contact materials prior to its authorisation"

These guidelines establish the general requirements of data to be submitted. As a general principle, the greater the exposure through migration, the more toxicological information will be required. In case of high migration (i.e.5 - 60 mg/kg/food) an extensive data set is needed to establish the safety. In case of migration between 0.05 – 5 mg/kg food a reduced data set may suffice. If the data are appropriate, a restriction of 5 mg/kg of food is attributed to the substance In case of low migration (i.e. <0.05 mg/kg food) only a limited data set is needed. If the data are appropriate, also in this case a restriction of 0.05 mg/kg of food is attributed to the substance. The full text of the guidelines provides a more detailed explanation. The guidelines are available at the web pages of the Committee.