

**Opinion of the Scientific Panel on food additives, flavourings, processing aids and materials in contact with food (AFC)
on a request related to**

a 15th list of substances for food contact materials

Question N° EFSA-Q-2005-253, EFSA-Q-2003-208, EFSA-Q-2006-049

Adopted on 3 July 2007

SUMMARY

Within the general task of evaluating substances intended for use in materials in contact with food according to the Regulation (EC) No.1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with foodstuffs, the AFC Panel evaluated the following substances:

Ref. No.: 15404
Name of the substance: 1,4:3,6-Dianhydrosorbitol
CAS number: 652-67-5
Classified in list: 3
Restriction: 5 mg/kg food
Only for use as a co-monomer in PEIT

Ref. No.: 62280
Name of the substance: Isobutylene-butene copolymer
CAS number: 9044-17-1
Classified in list: 3
Restriction: None

Ref. No.: 77897
Name of the substance: Polyethyleneglycol (EO =1-50) monoalkylether (linear and branched, C8-C20) sulphate, sodium salt
CAS number: -
Classified in list: 3
Restriction: 5 mg/kg food

KEYWORDS

Food Contact Materials, Plastics, Monomers, Additives, REF. No 15404, CAS No. 652-67-5, 1,4:3,6-Dianhydrosorbitol, REF. No 62280, CAS No. 9044-17-1, Isobutylene-butene copolymer, REF. No 77897, Polyethyleneglycol (EO=1-50) monoalkylether (linear and branched, C8-C20) sulphate, sodium salt.

BACKGROUND

Before a substance is authorised to be used in food contact materials and is included in a positive list EFSA's opinion on its safety is required. This procedure has been established in Articles 8 and 9 of the Regulation (EC) No. 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food¹.

TERMS OF REFERENCE

The EFSA is required by Article 10 of Regulation (EC) No. 1935/2004 of the European Parliament and of the Council on materials and articles intended to come into contact with food to carry out risk assessments on the risks originating from the migration of substances from food contact materials into food and deliver a scientific opinion on:

1. new substances intended to be used in food contact materials before their authorisation and inclusion in a positive list;
2. substances which are already authorised in the framework of Regulation (EC) No. 1935/2004 but need to be re-evaluated.

ASSESSMENT

Within this general task the Scientific Panel on food additives, flavourings, processing aids and materials in contact with food (AFC) evaluated the following substances used in food contact materials.

The substances examined are listed in ascending order of their Reference Number (REF No.), with their chemical name, Chemical Abstract Number (CAS No.) and classification according to the "SCF list". (Since in the past the evaluation of substances used in food contact materials was undertaken by the Scientific Committee on Food (SCF), the same system of classification into a "SCF list" is retained for uniformity purposes). The definitions of the various SCF lists and the abbreviations used are given in the appendix.

The studies submitted for evaluation followed the SCF guidelines for the presentation of an application for safety assessment of a substance to be used in food contact materials prior to its authorisation (http://ec.europa.eu/food/fs/sc/scf/out82_en.pdf)

¹ This Regulation replaces Directive 89/109/EEC of 21 December 1988, OJ L 40, 11.2.1989, P.38

Ref. No.:	15404
Name of the substance:	1,4:3,6-Dianhydrosorbitol

CAS number: 652-67-5

Document reference: EFSA/AFC/FCM/643-Rev.IA/15404 of February 2007

General information: According to the petitioner 1,4:3,6-dianhydrosorbitol (isosorbide) is intended to be used as a co-monomer in the production of poly(ethylene-co-isosorbide terephthalate) (PEIT). The material is intended for applications in food and beverage rigid containers, where 1,4:3,6-dianhydrosorbitol gives enhanced thermal stability to the new copolymer compared to the commonly used copolymers, poly(ethylene terephthalate-co-isophthalate) and poly(ethylene-co-1,4-cyclohexanedimethanol terephthalate).

Previous evaluations (by SCF or AFC): None (new substance)

Available data used for this evaluation:

Non-toxicity data:

- Data on identity
- Data on physical and chemical properties
- Data on use
- Data on authorisation
- Data on migrating substances like oligomers, reaction and degradation products from PEIT bottles
- Data on migration

Toxicity data:

- Gene mutation in bacteria
- *In vitro* mammalian cell gene mutation test
- *In vitro* mammalian chromosome aberration test
- Subchronic (90-d) oral toxicity study
- Excretion study

Evaluation: Specific migration of 1,4:3,6-dianhydrosorbitol from PEIT bottles into 3% acetic acid and 10% ethanol food simulants after 10 days at 40°C was found to be non detectable (limit of detection: 7 µg/kg in food). From the combined information from gas chromatographic and liquid chromatographic analyses of the migration extracts and based on the information on the overall migration in 95% ethanol, it was concluded that no oligomers and/or reaction or degradation products were detected. Data on co-monomers and reaction products were submitted for a sample of PEIT. Size exclusion chromatography (SEC) analysis of the polymer demonstrates that the fraction with molecular weight < 1000 Da is 0.4% of the polymer.

Ref. No.:	15404
Name of the substance:	1,4:3,6-Dianhydrosorbitol

Isosorbide did not show mutagenic potential in bacteria and in mammalian cells *in vitro* and it did not induce chromosome aberrations *in vitro*. Therefore, based on the three adequately performed tests there is no evidence for a genotoxic potential of isosorbide *in vitro*.

Isosorbide was tested in a 90-day oral toxicity study. The no observed adverse effect level (NOAEL) was the highest concentration tested: 50,000 mg/kg diet corresponding to a dose of 3,347 mg/kg b.w./day in males and 3,970 mg/kg b.w./day in females. Slight differences in several blood chemistry parameters and increased urinary gravidity were observed that were not considered toxicologically relevant.

The Log Po/w of isosorbide is -1.39 ± -0.38 . Furthermore, in an excretion study isosorbide was almost completely recovered in the 48 hours urine. Therefore, isosorbide is not considered to have bioaccumulative potential in man.

Conclusion: Based on the above-mentioned data the substance is classified:

SCF_List: 3

Restriction: 5 mg/kg food

Only for use as a co-monomer in PEIT

Remark for Commission: Only an analytical method for the determination of the specific migration in aqueous food simulants is available.

Needed data or information None

References: – Unpublished data submitted by the petitioner in October 2005 and November 2006

Ref. No.:	62280
Name of the substance:	Isobutylene-butene copolymer

CAS number: 9044-17-1

Document reference: EFSA/AFC/FCM/33-Rev.IB/62280 of April 2007

General information: According to the petitioner isobutylene-butene copolymer (IBC) is a copolymer of mainly isobutene and 1-butene and 2-butene. It is used as a polymeric additive to plasticize and to increase the impact strength of polyolefins and polystyrene, and to improve adhesion properties in linear low density polyethylene (LLDPE) cling films. IBCs are available in a wide range of weight average molecular weight (Mw). Typical concentrations of use are in the 2-8% range, but could possibly be higher. The grade of IBC and its Mw used in a polymer will depend on the application of the final product. Products containing IBC are intended for use with all types of foods.

Previous evaluations (by SCF or AFC): None

Available data used for this evaluation:

Non-toxicity data:

- Data on identity
- Data on physical and chemical properties,
- Data on the intended use and authorisation,
- Data on migration
- Data on residual content of the substance

Toxicity data:

- 90-day oral toxicity in rats
- reproduction/developmental toxicity study
- absorption, distribution, biotransformation and excretion (ADME) study

Evaluation: The polymeric additive is formed from the monomers isobutene and 1-butene and 2-butene which are all listed in the Commission Directive 2002/72/EC (Commission, 2002) with no restriction. For commercially available IBC products used in food contact materials the Mw lies between 1400 and 10000 Da approximately. In a published study (Castle et al, 1992) submitted by the petitioner the migration of IBC was tested in foodstuffs wrapped with polyethylene cling films under time and temperature conditions representative of the real use conditions. In cheese, after 5 days at 4 °C or 6 h at 20°C the migration was 8 and 10 mg/kg, respectively. In sandwiches kept for 1 night at 4°C + 5 h at 20°C the migration

Ref. No.:	62280
Name of the substance:	Isobutylene-butene copolymer

ranged from <1 to 4 mg/kg. In cream filled cake, after 5 days at 4 °C the migration was approximately 1 mg/kg. In microwave re-heated pizza the migration was 4 mg/kg. In microwave re-heated covered baby food and soup the migration ranged from <0.01 to 0.5 mg/kg. Overall migration from a polyethylene cling film into olive oil after 10 days at 40°C was 1 mg/dm². Overall migration from polystyrene plaques and moulded forms into food simulants (3% acetic acid, 10% ethanol, 95% ethanol, olive oil) after 10 days at 40°C ranged from 0.2 to 3.1 mg/dm²

A commercial product containing the highest fraction with molecular weight below 1000 Da, and therefore considered as a worst-case model compound, did not induce toxic effects in rats in a 90-day oral toxicity studies even at the highest daily dose applied. Therefore, a NOAEL of > 3000 mg/kg bw/day can be derived. In a developmental toxicity study the model compound did not induce developmental toxicity or teratogenicity after daily administration (GD0 – GD21) of doses up to > 3 000 mg/kg bw/day giving also a NOAEL of > 3 000 mg/kg bw/day for this endpoint. The results of a study on the absorption, distribution and excretion of the compound did not indicate a potential for bioaccumulation in humans. Based on the available studies the use of the substance does not pose any toxicological concern.

Conclusion: Based on the above-mentioned data the substance is classified:
SCF_List: 3
Restriction: None
 Remark for Commission: None
 Needed data or information: None

References:

- Castle, L., Nichol, J., and Gilbert, J.,1992, Migration of polyisobutene from polyethylene / polyisobutylene films into foods during domestic and microwave oven use, Food Additives and Contaminants, 9, 315- 330
- Commission Directive 2002/72/EC, relating to plastic materials and articles intended to come into contact with foodstuffs http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/l_220/l_22020020815en00180058.pdf
- Unpublished data submitted by the petitioner in June 2003 and December 2006.

Ref. No.:	77897
Name of the substance:	Polyethyleneglycol (EO =1-50) monoalkylether (linear and branched, C8-C20) sulphate, sodium salt

CAS number:

Document reference: EFSA/AFC/FCM/703-Rev.IA/77897 of April 2007

General information:

According to the petitioner polyethyleneglycol alkylether sulphate, salts are intended to be used in the manufacture of finely dispersed emulsion polymers *e.g.* polymerisation of PVC. Polyethyleneglycol alkylether sulphate, salts are available as aqueous liquid or pasty solutions and are widely used in the detergent industry, *e.g.* in liquid dishwashing agents, in hair care products and as wetting agents and emulsifiers in plastics manufacturing.

Finished products are intended to come in contact with all types of foodstuffs.

Previous evaluations (by SCF or AFC):

None (new substance)

Available data

used for this evaluation:

- Non-toxicity data:
- Data on identity
 - Data on physical/chemical properties
 - Data on use
 - Data on authorisation
 - Data on migration
 - Data on residual content of the substance

- Toxicity data:
- Gene mutation in bacteria
 - *In vitro* mammalian cell gene mutation test
 - *In vitro* mammalian chromosome aberration test
 - subchronic (90 day) oral toxicity studies in rats
 - chronic toxicity/carcinogenicity studies in rats
 - reproduction and developmental toxicity studies in rats
 - absorption, distribution, metabolism and excretion

Evaluation:

Migration experiments were conducted on 2 representative reference substances. Reference substance 1 was an aqueous solution of sodium, polyethyleneglycol (2 EO) alkyl (linear C12/14) ether sulphate and reference substance 2 was an aqueous solution of sodium, polyethyleneglycol (30 EO) alkyl (linear C12/14) ether sulphate. The first reference substance had a weight average molecular weight (Mw) of 393 Da and the second a Mw of 1000-2000 Da (polymeric additive).

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PVC was selected as the major polymerisation application for the reference substances and was used for the migration experiments. The PVC samples contained different amount of plasticizers (0, 10 and 30%) and approximately 0.5% of one of the polyethyleneglycol alkylether sulphate.

Migration into isooctane after 2 days at 20 °C was not detectable (detection limit of 0.2 mg/kg for reference substance 1 and 0.13 mg/kg for reference substance 2). After 10 days at 40 °C in 10 % ethanol, migration ranged from 0.43 to 3.21 mg/kg for reference substance 1 and from <0.13-0.25 mg/kg for reference substance 2 depending on the content of added plasticizer.

The toxicity testing of the polyethyleneglycol ether sulphates covered by the application was performed on representative model compounds with linear alkyl chains of 12 to 16 carbon atoms and 1 to 3 ethylene oxide units. Toxicity testing of long chain polyethyleneglycol ether sulphates is not considered necessary due to the expected poor absorption of such compounds from the gastrointestinal tract.

Based on the absence of bacterial and mammalian cell mutagenicity, the model compounds tested are not considered as genotoxic. An *in vitro* chromosomal aberration assay has not been provided but one of the model compounds was negative in a chromosome aberration assay in bone marrow in mice after oral dosing (up to 2000 mg/kg bw, single dose) and other model compounds tested were negative in several other assays results investigating the endpoint “genotoxicity”.

In a limited study polyethyleneglycol ether sulphates did not induce increased incidences of tumours in rats after application for 2 years with drinking water.

After repeated dose administration, lesions in the forestomach of rats were seen after oral administration of polyethyleneglycol ether sulphates in water down to a daily dose of 25 mg/kg bw/day. No systemic effects were seen at all doses in this study. Forestomach lesions were not observed after dietary administration of polyethyleneglycol ether sulphates for 90 days at a maximum daily dose of 250 mg/kg bw suggesting that the forestomach lesions are due to the irritant properties of polyethyleneglycol ether sulphates administered by gavage. Systemic effects of polyethyleneglycol ether sulphates after dietary administration were restricted to small changes in liver weights without histological and clinical chemical correlates (after approximate daily doses of 250 mg/kg bw). A

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NOAEL of 86 mg/kg bw/ day was observed in a 2-generation reproductive toxicity study on sodium, polyethyleneglycol (2 EO) alkyl (linear C12/14) ether sulphate based on changes in the time required to reach developmental landmarks in the female F1 generation. Small effects on absolute or relative liver weights without changes in clinical chemistry or liver pathology were also noted in some of the groups. Sodium, polyethyleneglycol (2 EO) alkyl (linear C12/14) ether sulphate did not cause embryotoxic effects or changes in foetal development when given during pregnancy by gavage in doses of up to 1 000 mg/kg bw (dose corresponding to the dose causing maternal toxicity).

Studies provided on the toxicokinetics of polyethyleneglycol ether sulphates show that these compounds are rapidly metabolized in the organism and do not suggest the potential of accumulation in man.

Conclusion: Based on the above-mentioned data the substance is classified:
SCF_List: 3
Restriction: 5 mg/kg food
 Remark for Commission: This evaluation covers also the salts of aluminium, ammonium, calcium, iron, magnesium, potassium and zinc.
 Needed data or information: None

References: Unpublished data submitted by the petitioner in July 2006 and November 2006.

SCIENTIFIC PANEL MEMBERS

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APPENDIX

DEFINITION OF THE SCF LISTS

The classification into a SCF_List is a tool used for tackling authorisation dossiers and do not prejudice the management decisions that will be taken on the basis of the scientific opinions of the AFC Panel and in the framework of the applicable legislation

- 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.
Depending on the available toxicological studies a restriction of migration into food of 0.05 mg/kg of food (3 mutagenicity studies only) or 5 mg/kg of food (3 mutagenicity studies plus 90-day oral toxicity study and data to demonstrate the absence of potential for bio-accumulation in man) may be allocated.
- List 4 (for monomers)**
- 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.
- 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.
- 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.
- 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.

Terms used relevant to migration:

Overall migration (OM): The sum of the amounts of volatile and non volatile substances, except water, released from a food contact material or article into food or food simulant

Specific migration: The amount of a specific substance released from a food contact material or article into food or food stimulant

List of abbreviations:

IBC	Isobutylene-butene copolymer
LLDPE	Linear low density polyethylene
LOD	Limit of detection
NOAEL	No observed adverse effect level
PEIT	poly(ethylene-co-isosorbide terephthalate)
PVC	Polyvinyl chloride
SEC	Size exclusion chromatography