EUROPEAN COMMISSION

Health & Consumer Protection
Directorate-General

Scientific Committee on Consumer Products

SCCP

OPINION ON

PHTHALATES IN COSMETIC PRODUCTS

Scientific Committees
on consumer products
on emerging and newly identified health risks
on health and environmental risk

The SCCP adopted this opinion at its 11th plenary meeting of 21 March 2007

About the Scientific Committees
Three independent non-food Scientific Committees provide the Commission with the scientific advice it needs when preparing policy and proposals relating to consumer safety, public health and the environment. The Committees also draw the Commission's attention to the new or emerging problems which may pose an actual or potential threat.

They are: the Scientific Committee on Consumer Products (SCCP), the Scientific Committee on Health and Environmental Risks (SCHER) and the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) and are made up of external experts.

In addition, the Commission relies upon the work of the European Food Safety Authority (EFSA), the European Medicines Evaluation Agency (EMEA), the European Centre for Disease prevention and Control (ECDC) and the European Chemicals Agency (ECHA).

SCCP
Questions concerning the safety of consumer products (non-food products intended for the consumer).
In particular, the Committee addresses questions related to the safety and allergenic properties of cosmetic products and ingredients with respect to their impact on consumer health, toys, textiles, clothing, personal care products, domestic products such as detergents and consumer services such as tattooing.

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1. BACKGROUND

1.1 Greenpeace investigation

In February 2005 Greenpeace released *An Investigation of Chemicals in Perfumes*.

In the investigation *inter alia* the presence of 10 different phthalates were examined.

Phthalates were found in 35 out of 36 investigated perfumes.

One phthalate (DOP) out of the ten analysed for was not found in any of the products.

For 7 out of the ten phthalates that were analysed for, they were found, when present at all, in such small amounts that they probably are not used intentionally as ingredients in the perfumes, but rather are present as traces and/or impurities.

One phthalate, dimethyl phthalate (DMP), out of the ten analysed for, was measured in a concentration as high as 2982 mg/kg or 0.3% DMP. COLIPA has formerly in a letter dated the 29th November 2002 stated that "*since there is no intentional use of DMP, BBzP (Butyl benzyl phthalate) and DEHP (diethylhexyl phthalate) as cosmetic ingredients, COLIPA is not in a position to provide detailed safety dossier on theses substances*." Names in brackets have been added. Whether dimethyl phthalate found in the investigation actually is used as a cosmetic ingredient, a fragrance ingredient or is present as an impurity is questionable.

And finally for the last phthalate (DEP) out of the ten analysed for, the Scientific Committee on Cosmetics and Non-Food Products (SCCNFP) has expressed on its 20th plenary meeting the 4th June 2002 a positive opinion (SCCNFP/411/01) on the safe use of diethyl phthalate (DEP) in Cosmetics. This positive opinion was confirmed by the SCCNFP at its 26th plenary meeting the 9th December 2003. This phthalate is normally used either as a denaturant for ethanol or as a solvent in perfumes. It was present at the highest concentrations and in most of the perfumes. The highest measured concentration for this phthalate was 22.299 mg/kg or 2.23%.

An overview of the phthalates analysed for, their status and the highest measured concentration are given in the table below:

Name	Status	Highest concentration in mg/kg
di-methyl phthalate (DMP)	No safety dossier submitted. So far not evaluated at EU level	2982
di-ethyl phthalate (DEP)	Positive opinion SCCNFP. CICADS 52, 2003 (WHO)*	22299
di-isobutyl phthalate (DIBP)	So far not evaluated at EU level (IUCLID Chemical Data Sheet exists)	38
di-n-butyl phthalate (DBP)	Banned under the Cosmetics Directive as CMR-substance. EFSA Scientific opinion. Evaluated under the Existing Chemicals Legislation, Council Regulation 793/93/EEC. RAR and Opinion by the CSTEE available.	14
benzylbutyl phthalate (BBP)	Banned under the Cosmetics Directive as CMR-substance. EFSA Scientific opinion. Evaluated under the Existing Chemicals Legislation, Council Regulation 793/93/EEC. RAR and Opinion by the SCHER available.	110
di-cyclohexyl phthalate (DCHP)	So far not evaluated at EU level (IUCLID Chemical Data Sheet exists)	3

Name	Status	Highest concentration in mg/kg
di-(2-ethylhexyl) phthalate (DEHP)	Banned under the Cosmetics Directive as CMR-substance. EFSA Scientific opinion. Evaluated under the Existing Chemicals Legislation, Council Regulation 793/93/EEC. RAR and Opinion by the CSTEE available.	167
di-n-octyl phthalate (DOP)	Under risk assessment in chemical legislation Council Regulation 793/93/EEC.	Not found in the study
di-iso-nonyl phthalate (DINP)	EFSA Scientific opinion. Evaluated under the Existing Chemicals Legislation, Council Regulation 793/93/EEC. RAR available	26
di-iso-decyl phthalate (DIDP)	EFSA Scientific opinion. Evaluated under the Existing Chemicals Legislation, Council Regulation 793/93/EEC, RAR and Opinion by the CSTEE available	37

* Risk Assessment of DEP, December 2005 by Norwegian Scientific Committee for Food Safety enclosed.

The Greenpeace investigation raises a general health and environmental concern about chemicals in perfumes, points out limits in the existing legislation against e.g. endocrine disruptors and states that, "traditional narrow risk assessment techniques are unlikely to provide adequate protection".

It should be noted that the measurements carried out by Greenpeace were carried out on products prior to the effective date of the ban of certain phthalates in cosmetics and may thus necessarily not reflect current levels.

1.2 Traces and impurities COLIPA request

The Cosmetic Directive (76/768/EC) provides:

In article 4 paragraph 2 it is said for traces "*The presence of traces of the substances listed in Annex II shall be allowed provided that such presence is technically unavoidable in good manufacturing practice and that it conforms with Article 2*" (~ must not cause damage to human health).

And in article 6.1(g), it is stated that "*impurities in the raw materials used*" should not be regarded as ingredients.

According to COLIPA, traces of phthalates may leach unintentionally into cosmetic products through contact of the finished products or raw materials with plastic material (containers, pipes, pumps) during production or storage. In this context COLIPA (The European Cosmetic Toiletry and Perfumery Association) has asked the Commission to evaluate whether the presence of such trace levels would constitute a risk to consumers.

The problem about traces of phthalates in cosmetic products has been discussed at the cosmetic working group meetings and France has submitted a paper proposing a limit of 60 ppm of DEHP in cosmetic products.

1.3 Scientific data from the open literature submitted with the mandate

The study by Swan et al. "Decrease in anogenital distance among male infants with prenatal phthalate exposure" published May 2005, as well as scientific comments from COLIPA on this study has been received by the European Commission.

A second study by Duty et al. "Personal Care Product Use predicts Urinary Concentrations of some Phthalate Monoesters" published November 2005 has also been received.
A third study by Main et al. "Human Breast Milk Contamination with Phthalates and Alterations of Endogenous Reproductive Hormones in Three Months Old Infants" published in September 2005 has also been received.

2. TERMS OF REFERENCE

1. *Does the SCCP see any need to update its opinion on the safe use of diethyl phthalate (DEP) in cosmetics with the new scientific data provided?*

   If so, do the data provided by Greenpeace allow an assessment of the level of risk from current use and the determination of a safe consumer exposure from the scientific data provided?

2. *Do the data provided by Greenpeace, the literature and where available, CSTEE/SCHER and EFSA indicate a risk for the consumers from the presence of the following phthalates, (which have so far not been evaluated or regulated under the cosmetics directive), when present at the levels found by Greenpeace in cosmetic products: DMP, DIBP, DCHP, DINP and DIDP?*

   If so, do the data allow an assessment of the level of risk from current levels and the determination of a safe consumer exposure?

3. *Do the data provided support the safety of traces of up to 100 ppm total or per substance in cosmetics products of those phthalates (DEHP, DBP and BBP), which are banned in cosmetics products?*

3. OPINION

Question 1 *Does the SCCP see any need to update its opinion on the safe use of diethyl phthalate (DEP) in cosmetics with the new scientific data provided?*

If so, do the data provided by Greenpeace allow an assessment of the level of risk from current use and the determination of a safe consumer exposure from the scientific data provided?

In the TNO report (2005) that formed the basis of the Greenpeace report, the range of diethyl phthalate (DEP) in perfume was from 0.4 to 22299 mg/kg or 2.23% with a median concentration of 1073 mg/kg. These concentrations are within the range allowed for DEP use in perfumes.

The SCCP does not see any need to update its previous opinions (SCCNFP/411/01 adopted during the 20th plenary meeting of 4 June 2002 and reiterated in opinion n° SCCNFP/0767/03, adopted during the 26th plenary meeting of 9 December 2003). DEP may be used as fragrance solvent at a maximum concentration of 50% (hypothetical usage volume of 1 ml). This results in a potential exposure of 28 mg/d giving a Margin of Safety (MoS) of 321 or as an ethanol denaturant at a maximum concentration of 1% (hypothetical usage volume of 10 ml), from which it results a 5.6 mg/d potential exposure giving a MoS of 1607. The worst case MOS calculation made by SCCNFP for all cosmetics was 161, assuming 10% of diethyl phthalate in all cosmetic products.

This view was supported by the Panel on Food Additives, Flavourings, Processing Aids, Materials in Contact with Food and Cosmetics of the Norwegian Scientific Committee for Food Safety (05/406-8 final, 2005**)**. They were of the opinion that new studies on DEP published later than 2003 and reviewed in their assessment, did not provide sufficient new information to change the conclusions given in the safety assessments of the use of DEP in cosmetics adopted by SCCNFP.

Question 2 *Do the data provided by Greenpeace, the literature and where available, CSTEE/SCHER and EFSA indicate a risk for the consumers from the presence of the following phthalates, (which have so far not been evaluated or regulated under the cosmetics directive), when present at the levels found by Greenpeace in cosmetic products: DMP, DIBP, DCHP, DINP and DIDP?*

Di-methyl phthalate (DMP), Di-isobutyl phthalate (DIBP), Di-cyclohexyl phthalate (DCHP)

There is little data up to modern standards on the phthalates listed in the table below. The only data available was from the respective IUCLID Chemical Data Sheets and EFSA (2004). EFSA categorised DMP and DCHP as List 7 'Substances for which some toxicological data exist, but for which an Acceptable Daily Intake (ADI) or a Tolerable Daily Intake (TDI) could not be established. Required additional information should be furnished.' No dermal absorption data was found. DIBP was categorised as List 8 'Substances for which no or only scanty and inadequate data were available'.

Name	EINECS / CAS	Maximum perfume concentration (mg/kg)	NOAEL mg/kg/day Critical effect
Di-methyl phthalate (DMP)	205-011-6 / 131-11-3	2982	600 Maternal toxicity
Di-isobutyl phthalate (DIBP)	201-553-2 / 84-69-5	38	50 effects on liver
Di-cyclohexyl phthalate (DCHP)	201-545-9 / 84-61-7	3	-

DMP was found at a concentration as high as 2982 mg/kg or 0.3% in one perfume, in the other 15 perfumes the concentration was between 0.1 and 1.9 mg/kg.
COLIPA has stated (letter of 29 November 2002) that "*there is no intentional use of DMP…as a cosmetic ingredient'.* Consequently, the presence and purpose of dimethyl phthalate at the maximum concentration found is unclear.

The NOAEL for maternal toxicity was 600 mg/kg bw/day DMP. In contrast to the observed maternal toxicity, there was no effect of DMP treatment on any parameter of embryo/foetal development (IUCLID, 2000).

Dermal absorption of DMP was not reported but described as less than that of DEP (5%). (Elsisi et al, 1989)

DMP and its metabolite monomethyl phthalate (MMP) have been investigated in several studies. In rats, exposure to DMP did not alter sexual differentiation of the male rat. Initially it seemed that in man, there was a possible association of abnormal sperm morphology in the presence of MMP. Interestingly, Hauser et al (2006) found no dose response link with sperm concentration, motility or morphology due to MMP, monoethyl phthalate and the DEHP metabolites. (Duty et al, 2003; Gray et al, 2000; Hauser et al, 2006)

Margin of Safety (MoS) Calculation for Traces of DMP in cosmetics

A Margin of Safety, using the highest concentration (2982 mg/kg or 0.3%) found, can be calculated, based on NOAEL and dermal absorption less than 5% reported as a percentage in the literature (Elsisi et al, 1989).
Only dermal exposure will be considered in the safety calculation.

Maximum dermal absorption: < 5%
Exposure to all cosmetic products: 17.79 g/d
Default human body weight: 60 kg

Systemic Exposure Dose (SED) 17.79 x 1000 x 0.3% x 5% / 60 = 0.0445 mg/kg

No observed adverse effect level (NOAEL) = 600 mg/kg bw/day
(maternal toxicity in rats)

DMP Margin of Safety NOAEL / SED = 13500

Conclusion
DMP was found at concentration of 2982 mg/kg or 0.3% in one perfume, in the other 15 perfumes the concentration was between 0.1 and 1.9 mg/kg. Using a worst case scenario, the Margin of Safety was found to be high. This suggests that unintentional exposure from perfume and other cosmetics at the levels found in this study would have no measurable risk for the consumer.

DCHP was found in only 1/36 perfume samples at a concentration of 3 mg/kg.
There appears to be no recent work on DCHP. The 90-day studies reported in the IUCLID data sheet (IUCLID, 2000) do not seem to be according to modern standards. No NOAEL was derived from these studies. EFSA (2004) requested additional data: reproduction and teratogenicity studies, test for gene mutation and *in vitro* mammalian cell chromosome aberration tests.

Conclusion
Despite the lack of adequate toxicological data, the low concentration (3 mg/kg) of DCHP found in only one sample of perfume, suggest unintentional exposure from perfume and other cosmetics would have no measurable risk for the consumer.

DIBP was found in 20/36 perfumes with concentrations ranging from 0.2 - 38 mg/kg. It is considered a possible substitute for DBP. The NOAEL for oral toxicity was 50 mg/kg DIBP, based on liver effects. There was no data on skin absorption. (IUCLID, 2000)

If dosed at 600 mg/kg bw/day to pregnant rats on gestation days 7 –21, male offspring showed similar testicular and developmental effects as found with DBP and DEHP. Further developmental and postnatal studies are needed to identify the reproductive effects of DIBP. (Borch, 2006)

DIBP is classified by ECB as toxic to reproduction category 2, R61 (may cause harm to the unborn child) and category 3, R62 (possible risk of impaired fertility). It is therefore prohibited from use in cosmetic products.

Conclusion
The low concentrations of DIBP (0.2 - 38 mg/kg) found in samples of perfume suggest unintentional exposure from perfume and other cosmetics would pose no measurable risk for the consumer.

Di-iso-nonyl phthalate (DINP) and di-iso-decyl phthalate (DIDP)

Name	EINECS / CAS	Highest perfume concentration in mg/kg	NOAEL mg/kg/day	Status
di-iso-nonyl phthalate (DINP)	271-090-9 & 249-079-5 / 68515-48-0 & 28553-12-0	26	15 (rat) Increased liver and kidney weight 5% response BMD of 12* 15 -1000 increased liver and kidney weight, testes RAR Conclusion (ii)**	EFSA (2005a) CSTEE (2001a) Evaluated under the Existing Chemicals Legislation, Council Regulation 793/93/EEC. RAR available
di-iso-decyl phthalate (DIDP)	271-090-4 & 247-977-1/ 68515-49-1 & 26761-40-0	37	15 13-week oral study in dogs 25 50 –600 increased liver and thyroid weight RAR Conclusion (iii) and (ii)**	EFSA (2005b) CSTEE (2001b) Evaluated under the Existing Chemicals Legislation, Council Regulation 793/93/EEC, RAR available

* BMD benchmark dose
** RAR Conclusion (ii) There is at present no need for further information and/or testing and for risk reduction measures beyond those which are being applied already
Conclusion (iii) There is a need for limiting the risks; risk reduction measures which are already being applied shall be taken into account

DINP

DINP was found in only 1/36 perfume samples at a concentration of 26 mg/kg.
The toxicological effects for DINP were an increased incidence of spongiosis hepatis, accompanied by increased serum levels of liver enzymes in males and increases in absolute and relative liver and kidney weights in both sexes. EFSA (2005a) used a NOAEL of 15 mg/kg bw/day for non-peroxisomal proliferation-related chronic hepatic and renal effects derived from a combined chronic/carcinogenicity study in rats. From the same data, CSTEE (2001) calculated a 5% response benchmark dose of 12 mg/kg/d using spongiosis hepatis as the critical endpoint of the risk characterization. This will not alter the Margin of Safety from perfume use.
EFSA derived a TDI for DINP of 0.15 mg/kg bw, using the NOAEL of 15 mg/kg bw/day and an uncertainty factor of 100.

Margin of Safety (MoS) Calculation for Traces of DINP in cosmetics

A Margin of Safety can be calculated, using the highest concentration (0.003%) found, based on NOAELs and dermal absorption of 4 % for DINP reported as a percentage in the literature (Elsisi et al, 1989).
Only dermal exposure will be considered in the safety calculation.

Exposure to all cosmetic products:	17.79 g/d	
Default human body weight:	60 kg	
Maximum dermal absorption:	4 %	
Systemic Exposure Dose (SED)	17.79 x 1000 x 0.003% x 4% / 60	= 0.00036 mg/kg/d
No observed adverse effect level (NOAEL) (oral toxicity in liver in rats)		= 15 mg/kg bw/d
DINP Margin of Safety	**NOAEL / SED**	**= 41666**

Systemic exposure of DINP from cosmetics is 0.24% of the TDI for DINP of 0.15 mg/kg/d derived by EFSA, (2005a)
Exposure to DINP from cosmetics is extremely low compared with exposure from other sources, such as food and non-food products (EFSA, 2005a; CSTEE, 2004, RAR, 2003). Thus the inadvertent occurrence of DINP in cosmetics does not seem to be a concern for consumer health.

DIDP

DIDP was found in 5/36 perfume samples at concentrations ranging from 1.5 - 37 mg/kg. The EFSA Panel concluded that a NOAEL of 15 mg/kg bw/day for DIDP from a 13-week oral study in dogs (a non-sensitive species to peroxisome proliferation) should be used in the risk assessment and in a 2-year rat study where there was a decrease of F2 offspring survival with a NOAEL of 33 mg/kg bw/day. From the same data, CSTEE (2001b) calculated a NOAEL of 25 mg/kg/d based on the lowest observed adverse effect level (LOAEL). Liver changes were seen at higher dose levels with a lowest observed adverse effect level LOAEL of 77 mg/kg bw/day and 88 mg/kg bw/day for male and female dogs respectively. Using the NOAEL of 15 mg/kg bw/day and of an uncertainty factor of 100, a TDI for DIDP of 0.15 mg/kg bw was derived (EFSA 2005b).

Margin of Safety (MoS) Calculation for Traces of DIDP in cosmetics
A Margin of Safety can be calculated, using the highest concentration (0.0037 %) based on NOAELs and dermal absorption of <1 % for DIDP reported as a percentage in the literature (Elsisi et al, 1989) though due to low recovery this may be underestimated. Only dermal exposure will be considered in the safety calculation. Exposure to all cosmetic products: 17.79 g/d Default human body weight: 60 kg Maximum dermal absorption: 1 % DIDP Systemic Exposure Dose (SED) 17.79 x 1000 x 0.0037% x 1% / 60 = 0.000009 mg/kg/d No observed adverse effect level (NOAEL) = 15 mg/kg bw/d (oral toxicity in liver in dogs) **DIDP Margin of Safety NOAEL / SED = 1666666**

Systemic exposure from cosmetics is 0.006% of the TDI of 0.15 mg/kg/d defined by EFSA (2005b). Exposure to DIDP from cosmetics is extremely low compared with exposure from other sources, such as food and non-food products (EFSA, 2005b; CSTEE, 2004, DIDP RAR, 2003). Thus the inadvertent occurrence of DIDP in cosmetics does not seem to be a concern for consumer health.

It was also noted that in 5/36 perfumes, DIDP and DINP were found below 'reporting limit'. Although not specified, this suggests a mixture of DINP/DIDP. The EFSA AFC Panel noted also that DIDP and DINP (phthalic acid, diester with primary saturated C8-C10 branched alcohols, C9 rich, CAS n° 28553-12-0 and 68515-48-0, PM/REF 75100) are mixtures that overlap chemically with each other and cannot analytically be distinguished clearly if present in a mixture. For this reason, a group restriction for migration from food contact materials for DINP and DIDP was considered and rejected, as though both primarily affect the liver but the end-points indicate that different mechanisms are involved (EFSA, 2005c).

Question 3: *Do the data provided support the safety of traces of up to 100 ppm total or per substance in cosmetics products of those phthalates (DEHP, DBP and BBP), which are banned in cosmetics products?*

Name	**EINECS / CAS**	**Highest concentration in mg/kg**	**NOAEL mg/kg bw/day Critical effect**	**Status**
di-(2-ethylhexyl) phthalate (DEHP)	204-211-0/ 117-81-7	167	4.8 testicular and developmental toxicity 88-1000 increased liver and kidney weight, testes RAR Conclusion (ii) and (iii)*	CSTEE (2004b) EFSA (2005d) Evaluated under the Existing Chemicals Legislation, Council Regulation 793/93/EEC. RAR Annex 1 607-317-00-9 Repr. Cat. 2; R60-61 (fertility;development)

Name	EINECS / CAS	Highest concentration in mg/kg	NOAEL mg/kg bw/day Critical effect	Status
di-n-butyl phthalate (DBP)	201-557-4/ 84-74-2.	14	NOAEL 50 reproductive effects LOAEL 2 NOAEL 62.5 -152 increased peroxisomal proliferation RAR Conclusion (ii)*	CSTEE (2001c) EFSA (2005e) Evaluated under the Existing Chemicals Legislation, Council Regulation 793/93/EEC, RAR Annex 1 607-318-00-4 Repr. Cat. 2; R61 (development), Repr. Cat. 3; R62 (fertility) - N; R50
Benzylbutyl phthalate (BBP)	201-622-7 / 85-68-7	110	NOAEL 50 reproductive effects NOAEL 50 reproductive effects RAR Draft Conclusion (ii)*	SCHER (2005) EFSA (2005f) Annex 1 607-430-00-3 Repr. Cat. 2; R61 (development), Repr. Cat. 3; R62 (fertility) - N; R50-53

* RAR Conclusion (ii): There is at present no need for further information and/or testing and for risk reduction measures beyond those which are being applied already.
Conclusion (iii): There is a need for limiting the risks; risk reduction measures which are already being applied shall be taken into account.

The main concerns relating to these substances are the reproductive effects. In adult rats, the testis is the target. DBP and DEHP have effects on germ cell development/depletion, BBP affects epididymal spermatozoa concentration. Anti-androgenic effects have also been noted in foetal rats. The human epidemiological evidence is equivocal. In rats, the phthalate syndrome of effects on reproductive development has parallels with the reported human testicular dysgenesis syndrome, although no cause/effect relationship has been established after exposure of humans to phthalate esters.
Swan et al. (2005) suggested in humans that there was a relationship between the concentration of phthalate metabolites in maternal prenatal urine and the anogenital distance (AGD) and anogenital index (AGI: AGD/weight) in male offspring similar to that found in rats. The maternal urinary phthalate levels were very low (ng/ml) compared with the rat studies (effects at ≥100mg//kg bw/day). However, since all boys were considered normal (no malformation) and with no historical data on AGD in boys, extrapolation to solely phthalate effects is difficult.
More recent studies examining the wider concept of testicular dysgenesis syndrome (TDS) and phthalate effects are equivocal. The TDS hypothesis argues that any factor that causes mal-development is likely to result in TDS disorders, and this includes well-established genetic disorders (Skakkebaek et al. 2001); it is also likely to be affected by maternal lifestyle (Scott et al, 2007). Thus phthalates may be a contributory factor in a complex chain of TDS, but not the only cause of TDS.

The target organ for oral sub-acute and sub-chronic toxicity in rats for these phthalates was the liver (increased liver weights and significant changes in liver peroxisome enzyme activities) that are generally considered to be species-specific. Human liver appears to show slight or no response to peroxisome proliferation, possibly explained by a low level of PPARα found in human livers (1-10% of the level found in rat and mouse liver).

Diethylhexyl Phthalate (DEHP) was found in 14/36 perfume samples at concentrations ranging from 1 - 167 mg/kg.

Margin of Safety (MoS) Calculation of DEHP in cosmetics

A Margin of Safety can be calculated, using the highest concentration (0.0167 %), based on NOAEL and worst-case estimate of 5 % dermal absorption for DEHP reported in the literature (EU Risk Assessment DEHP, 2003). There are no adequate human studies, but rat skin has dermal absorption of 20% DEHP and has been shown to be 4-times more permeable than human skin. This would seem to be an overestimate as Elsisi et al (1989) showed that less than 15% of the applied dose was absorbed through rat skin.

Only dermal exposure will be considered in the safety calculation.

Exposure to all cosmetic products 17.79 g/d
Default human body weight: 60 kg

NOAEL: 4.8 mg/kg/d based on testicular effects in a three generation guideline study (Wolfe et al, 2003, cited in DEHP RAR, 2003). The NOAEL has been confirmed in the opinions of the CSTEE 2004b and EFSA 2005d.

Maximum dermal absorption 5 % estimated worst-case

MoS for maximum traces of DEHP found in one perfume (167 ppm)
Systemic Exposure Dose (SED) = 17.79 x 1000 x 0.0167% x 5% / 60 = 0.00247 mg/kg/d
MoS (NOAEL / SED) = 4.8 / 0.00247 = 1920

Based on the highest level found in one perfume, the systemic exposure from cosmetics would be 5% of the TDI of 0.05 mg/kg/d derived by EFSA, (EFSA 2005d; EU Risk Assessment DEHP, 2003; CSTEE, DEHP, 2004b).
In light of the MoS based on 167ppm DEHP, the Member State proposal of a 60 ppm DEHP limit in cosmetic products may not be required.
Exposure to DEHP from cosmetics is low compared with exposure from other sources, such as food and non-food products. Thus the inadvertent occurrence of DEHP at trace levels in cosmetics does not seem to be a concern for consumer health.

Dibutyl Phthalate (DBP) was found in 20/36 perfume samples at concentrations ranging from 0.1 – 14 mg/kg.

Margin of Safety (MoS) Calculation for Traces of DBP in cosmetics

A Margin of Safety was calculated based on the LOAEL as no NOAEL could be established and on dermal absorption of 5 % for DBP as reported in the literature (Bronaugh et al. 1982, Elsisi et al. 1989 cited in RAR and an *in vitro* study (Scott et al. cited in RAR).

Only dermal exposure will be considered in the safety calculation.

LOAEL: A developmental toxicity study in the rat (Lee et al., 2004 cited by EFSA 2005e) with dietary exposure to DBP from gestation day 15 to the end of lactation (postnatal day 21), showed effects on the development of male and female offspring at lower doses than found previously. A NOAEL could not be established. A LOAEL of 2 mg/kg bw/d feed was derived, since the effects were reversible at all dose levels, particularly the lowest dose level (20 mg/kg feed, equivalent to 1.5 to 3 mg/kg bw/day) combined with other reproductive toxicity studies, with longer

exposure periods, approximately 30-fold higher NOAELs or LOAELs were determined (RAR).
Exposure to all cosmetic products: 17.79 g/d
Default human body weight: 60 kg

MoS at highest concentration, 14ppm, found in perfume
SED with 14 ppm (.0014%) = 17.79 x 1000 x 0.0014% x 5% / 60 = 0.0002 mg/kg/d
DBP = LOAEL / SED = 2 / 0.0002 = 10000

MoS if technically unavoidable traces up to 100 ppm DEHP found in all cosmetic products
Systemic Exposure Dose (SED) = 17.79 x 1000 x 0.01% x 5% / 60 = 0.00148 mg/kg/d
DBP MoS (traces 100ppm) = LOAEL / SED = 2 / 0.00148 = 1350

If systemic exposure of DBP from cosmetics was up to 100 ppm, this would be 15% of the TDI for DBP of 0.01 mg/kg bw/day defined by EFSA who used an uncertainty factor of 200 (EFSA, 2005e; EU Risk Assessment DBP, 2003; CSTEE, DBP, 2001c).
Exposure to DBP from cosmetics is extremely low compared with exposure from other sources, such as food and non-food products (EFSA, 2005e; CSTEE 2004, RAR 2003). Thus the inadvertent occurrence of DINP in cosmetics at trace levels does not seem to be a concern for consumer health.

Benzyl Butyl Phthalate (BBP) was found in 9/36 perfume samples at concentrations ranging from 0.1 – 110 mg/kg

Margin of Safety (MoS) Calculation for Traces of BBP in cosmetics

A Margin of Safety can be calculated, based on NOAELs and dermal absorption **5 %** based on the available data, dermal absorption is considered to be 5% as a worst case estimate (RAR)

Only dermal exposure will be considered in the safety calculation.

Assuming a worst case of 110ppm (0.011%) BBP in all cosmetic products

NOAEL: 50 mg/kg/d (Tyl et al. 2004, cited in RAR) based on a two generation study in SD rats
Exposure to all cosmetic products: 17.79 g/d
Default human body weight: 60 kg

Systemic Exposure Dose (SED) = 17.79 x 1000 x 0.011% x 5% / 60 = 0.00163 mg/kg/d

BBP MoS = NOAEL / SED = 50 / 0.00163 = 31250

Systemic exposure of BBP from cosmetics is 3.26% of the 0.5 mg/kg/d TDI defined by EFSA (2005f).
SCHER (2005) characterized the risk for consumers by using the NOAEL for developmental toxicity as a starting point and found the MoS-values derived are >> 1000. (EFSA 2005f; EU Risk Assessment BBP, 2004; SCHER, BBP, 2005)
Exposure to BBP from cosmetics is extremely low compared with exposure from other sources, such as food and non-food products (EFSA 2005f; CSTEE 2004, RAR 2003). Thus the inadvertent occurrence of BBP in cosmetics at trace levels does not seem to be a concern for consumer health.

3.3. Possible source of phthalates occurring in perfumes

Two perfumes that had low concentrations of DEP (37 and 27 mg/kg) and also measurable levels of DIBP (5.5 and 1.9 mg/kg), DBP (2.9 and 1.8 mg/kg) and DEHP (25 and 0 mg/kg) were used to check the hypothesis that the DEP could have leached from the polymers of the container. The results showed that the ratio of all the four phthalates was similar between the perfumes, the leaching fluid and the polymer tubing, but the levels in the perfume were 100 fold higher. The study authors suggested that the migration of the phthalates was from the perfume into the tubing of the final packaging.
There was no consideration that the phthalates found in the 2 perfumes could have leached unintentionally through contact of the raw materials with plastic material (containers, pipes, pumps) during an earlier stage of production.

Ref.: TNO, 2005

3.4. Discussion

The Cosmetic Directive (76/768/EC) states in article 4 paragraph 2: "*The presence of traces of the substances listed in Annex II shall be allowed provided that such presence is technically unavoidable in good manufacturing practice and that it conforms with Article 2*" and in article 6.1(g), it is stated that "*impurities in the raw materials used*" should not be regarded as ingredients.

COLIPA has pointed out that traces of phthalates may leach into cosmetic products. DMP, DBP, BBP and DEHP are not cosmetic ingredients. DBP, BBP and DEHP are used extensively as plastic softeners and may be found in cosmetics as leachates from contact with plastic materials either during the processing of the raw materials or from the packaging of the finished product.

Thirty-six perfumes were analysed for ten phthalates. One perfume sample was free of any phthalates and one phthalate, di-n-octyl phthalate was not found in any of the perfume samples.

Range and ranking of phthalates found in the perfumes (taken from TNO, 2005).

Name	N/36	Range mg/kg	Reporting limit mg/kg
di-n-octyl phthalate (DOP)	0	0	0.1
di-cyclohexyl phthalate (DCHP)	1	3	0.1
di-n-butyl phthalate (DBP)	21	0.1 - 14	0.1
di-iso-nonyl phthalate (DINP)	1 (5*)	26	1
di-iso-decyl phthalate (DIDP)	5 (5*)	1.5 - 37	1
di-isobutyl phthalate (DIBP)	20	0.2 - 38	0.1
benzylbutyl phthalate (BBP)	9	0.1 - 110	0.1
di-(2-ethylhexyl) phthalate (DEHP)	14	1 - 167	1
di-methyl phthalate (DMP)	16	0.1 - 2982	0.1
di-ethyl phthalate (DEP)	34	0.4 - 22299	1

* found below reporting limit, not specified but suggesting a mixture of DINP/DIDP

Seven phthalates were found at low concentrations and were not found in all perfume samples. Ranked from lowest to highest maximum concentration (3 - 167mg/kg), DCHP,

DBP, DINP, DIDP, DIBP, BBP, DEHP. This suggests that they were present as traces and/or impurities, not used intentionally in the perfumes.

DMP and DEP were found at higher concentrations, 0.3% and 2.23% respectively in the perfumes. DEP is permitted in perfume and has low toxicity. DMP is not used in cosmetics according to COLIPA. Toxicity data for DMP is sparse and not to modern standards. The Margin of Safety for DMP was large. There is some equivocal epidemiological evidence for both DMP and DEP of impairment of some reproductive function markers (sperm motility, concentration, morphology, DNA damage) in the human male, but the results are not consistent. Neither appears to be linked with perinatal alteration of sexual differentiation in rats.

Greenpeace raised a general health and environmental concern about chemicals in perfume. It should be noted that the studies carried out on products prior to the effective date of the ban of certain phthalates in cosmetics and thus may not reflect current levels. Greenpeace points out limits in the existing legislation against e.g. endocrine disruptors and states that, "traditional narrow risk assessment techniques are unlikely to provide adequate protection".

In the case of the phthalates described in this document, the calculated Margins of Safety for the phthalates where there is adequate toxicological data suggest that there are very wide margins of safety. It must also be stressed in calculating the MoS, the worst-case scenario was used: the SCCNFP-value of 17.79 g/day exposure, with total skin surface coverage >15000cm^2, for the consumer using a set of cosmetic products containing the same ingredient. RIVM (2005) estimated that the skin surface exposed would be only 100 cm^2 for perfume and 200 cm^2 for eau de toilette.

The toxicity of those phthalates, where data is sparse, is low. The toxicological effects appear to target liver or testis but the effects are less than for other phthalates.

The levels of phthalates found in perfumes, either as impurities, technically unavoidable during manufacturing or as a fragrance ingredient would be a minor contribution to the global exposure from other sources.

Exposure via inhalation of phthalate impurities (< 100 ppm in cosmetic products) from spray cosmetic products is considered to be insignificant and has not been taken into account in the safety evaluation

4. CONCLUSION

Question 1: Does the SCCP see any need to update its opinion on the safe use of diethyl phthalate (DEP) in cosmetics with the new scientific data provided?

In response to the question 1, the SCCP is of the opinion that there is no need to update its opinion on the safe use of diethyl phthalate (DEP) (doc. n° SCCNFP/0441/01) in cosmetics on the basis of the new scientific data provided

Question 2: Do the data provided by Greenpeace, the literature and where available, CSTEE/SCHER and EFSA indicate a risk for the consumers from the presence of the following phthalates, (which have so far not been evaluated or regulated under the cosmetics directive), when present at the levels found by Greenpeace in cosmetic products: DMP, DIBP, DCHP, DINP and DIDP?

If so, do the data allow an assessment of the level of risk from current levels and the determination of a safe consumer exposure?

Despite there being a lack of adequate toxicological data for some of this group of phthalates, and in view of the low concentrations found in the samples of perfume analysed, there would be no quantifiable risk for the consumer.

Question 3: Do the data provided support the safety of traces of up to 100 ppm total or per substance in cosmetics products of those phthalates (DEHP, DBP and BBP), which are banned in cosmetics products?

In view of the high Margin of Safety (MoS) determined for these three phthalates, the SCCP is of the opinion that traces of up to 100 ppm total or per substance do not indicate a risk to the health of the consumer.

5. MINORITY OPINION

Not applicable

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