



Research Institute for Fragrance Materials, Inc.

50 Tice Boulevard, Woodcliff Lake, New Jersey 07677
Phone: (201) 689-8089 Fax: (201) 689-8090

RIFM Response to BEUC Report: *"Emission of Chemicals by Air Fresheners: Tests on 74 consumer products sold in Europe"* January 2005

Executive Summary:

The fragrance industry has an historical and ongoing commitment to the safety of the ingredients used in fragrances provided to the consumer products industry. We openly support scientific research programs at universities throughout the world on many aspects of human health and environmental safety. It is because of this commitment that we seriously consider the validity of reported data on fragrance ingredients and their potential to impact the safe use of our ingredients.

The BEUC undertook a study that grouped a wide variety of fragranced products into the category "air fresheners," created exposure scenarios for these products, and collected data on the emissions from these products under the specified conditions of the tests. The fragrance industry has certain serious concerns and criticisms, detailed below, regarding the design and interpretation of this study.

The BEUC report does not live up to the standard of a scientific report. Rather, it is at best a mixture of incomplete data, inferences, and unsupportable conclusions derived from a limited review of the literature. In addition, the BEUC failed to critically review the articles they did cite. If they had done so, they would have realized that some of the work they cite has been criticized, questioned or even discredited by regulatory agencies and/or other scientific experts.

While there is certainly some focus on individual substances of concern, the main theme and conclusion of the report is that air fresheners release VOCs at "levels of concern." This is based on the assumption that all VOCs are pollutants and, therefore, bad. This is clearly not the case and is misleading to the consumer. There are many biogenic sources of VOCs; flowers and trees being two examples. Yet, flowers and trees are not considered to be sources of pollution. If this were not true, the BEUC should instead be lobbying for the destruction of all gardens and forests as these would be highly dangerous due to their emissions of VOCs. It therefore becomes irrelevant to focus on total levels of VOCs, because, simply put, not all VOCs are pollutants. This goes directly to the basis of the argument presented in this report.

While the report appears comprehensive in the level of detail presented on the various products and the measurement of the chemicals of concern, there are important pieces of data missing from this report:

- The background concentrations of each pollutant for each test
- Details regarding the construction of the rooms used for the study and their location(s)
- Steps taken to provide standard levels of quality assurance in the sampling and analytical program

In terms of the general product category of air fresheners, there is a particular concern in grouping incense with the other air care products. The incense products were frequently reported to have the highest emissions for a given chemical. This is without any consideration of the construction of incense and the combustion of all the materials of the product (including wood and glue) that can contribute to the reported concentrations. It is for this reason we do not believe that incense products should be considered collectively with the other air care products.

In general, this report is misleading to consumers, the media, and others who would read it. The data are unclear on background levels, especially in comparison to the consumer's daily exposure from multiple sources to the chemicals cited. A series of measurements, of unknown quality, are presented with no scientifically valid context of the potential risk, if any, to the consumer. The BEUC report is built upon the premise that presence equals risk. The products studied in this report have a long history of safe use by consumers throughout the world. This is supported by scientific data from studies that remain unrepresented in the BEUC report. It is disingenuous to imply that a risk exists for the consumer when such limited information is presented.

The fragrance industry's commentary on specific report sections follows. **BEUC Statements** are the verbatim text, including BEUC reference numbers from the report. **Responses** are the fragrance industry's comments on the immediately preceding statement and related text from the section under discussion. **General Comments** are responses to the basis of the entire section under discussion.

Summary (page 2)

BEUC Statement:

Among the substances emitted we find the presence of **allergens** in the majority of the products tested. (5th paragraph)

Response:

These are **dermal** allergens; they have never been shown to cause any allergic response via inhalation. In addition, the resulting skin level of these materials resulting from use of the air freshener products tested in the report would be orders of magnitude lower than any sensitizing dose.

BEUC Statement:

A more detailed analysis of the concentrations is proposed for several substances of interest on account of their known toxicity or impact on health:....diethyl phthalate.. (6th paragraph)

Response:

There has never been any clearly demonstrated toxicity (see, for example, Api, 2001) associated with diethyl phthalate (DEP) and, more importantly, the SCCNFP recently issued an opinion on DEP supporting its safety (see SCCNFP, 2003). BEUC fails to mention anywhere the SCCNFP opinion on DEP, while they clearly were aware of, and noted, the SCCNFP opinion on dermal allergens. If the BEUC were unaware of the SCCNFP's opinion on DEP, it demonstrates the incomplete nature of the research that the BEUC has done on the subject of the report. If, however, the BEUC has selectively cited the opinions of the SCCNFP they are:

1. tacitly avoiding an open discussion on the issue of DEP safety and implying that the SCCNFP is wrong on DEP (while right on dermal allergens), and
2. not providing the consumer with all available information on the subject.

Preface (page 7)

BEUC Statement:

Many scientific studies indicate actual and potential dangers to human health in the use of air fresheners in enclosed spaces - especially for vulnerable groups including pregnant women and children (and pets).

Response:

The absence of any **credible** scientific studies that were published in peer-reviewed scientific journals is demonstrated by the absence of references in this report. If the BEUC believes this statement to be true, it needs to be supported by appropriate references from sound, comprehensive studies reported in the peer-reviewed scientific literature.

Introduction (page 8)

BEUC Statement:

Despite being called fresheners, these products actually work thanks to the fact that they contain perfuming molecules capable of masking 'bad odours' by desensitizing our sensory system. (3rd paragraph)

Response:

Again, the BEUC needs to provide references that form the basis of their comment regarding "desensitizing our sensory system". The fragrance industry is unaware of any research that supports this

belief and the masking of odours, a desired outcome by the consumer using air fresheners, is not known to be accomplished via any desensitization process.

Section 1: Objectives of the Study (page 9)

BEUC Statement:

....the scientific literature on the subject mentions multiple pollution, liable to have an adverse effect on the health of the occupants of homes where these products are used. (paragraph 1)

Response:

Again, there is an absence of references that support these conclusions.

BEUC Statement:

Certain studies even show a link between various illnesses and consumers' exposure to air fresheners⁴. (paragraph 2)

Response:

The reference (4) in the BEUC report is to the Avon Longitudinal Study of Parents and Children (Avon study), with which the fragrance industry is quite familiar. The Avon study was based on VOC data collected in British homes by the Building Research Establishment (BRE). However, in 1999, the British Aerosol Manufacturers Association (BAMA) visited the BRE and learned that the high VOC levels were mainly due to smoking and painting (a fact omitted by the authors of the Avon study). In addition, the original reports of the Avon study were called into question by the British Medical Research Council's Institute for Environment and Health (IEH). Further, the BAMA commissioned an independent, critical review of the Avon study by the IEH. The IEH concluded that there were major concerns with both the methodology and conclusions of the Avon study. (See, for example, BAMA, 2004 and IEH, 1996)

BEUC Statement:

The term "Toxicological Reference Values (TRV's)" is noted in the bullet points referenced under EPA and ATSDR.

Response:

The fragrance industry is unfamiliar with either the USEPA or ATSDR ever having used the term "TRV's".

Section 2: Definitions of Volatile Organic Compounds (VOCs) - (pages 10-11)

Section 2.1: Sources of Pollution (page 10)

BEUC Statement:

According to the EPA, the principle sources of VOCs in indoor air are (aside from the sources of combustion) paints, aerosols such as disinfectants, insecticides and air fresheners⁷.

Response:

The reference (7) in the BEUC report is a link to the homepage of the USEPA. Searching this website does not produce the statement noted above. It is unclear exactly what USEPA document the BEUC is referring to, if any specific reference or references exist to support this conclusion. Furthermore, as mentioned above, the USEPA does not universally equate the term "VOC" with "pollutant" nor establish that all VOC's are indeed pollutants that are harmful to humans or the environment (e.g., plants and trees emit VOC's).

Section 2.2: Exposure inside buildings**BEUC Statement:**

In 1996, the UK Building Research Establishment⁸ (BRE), conducted a study into VOCs and other polluting substances present in indoor air in apartments. (1st paragraph)

Response:

This is another reference to the BRE data mentioned under **Objectives of the Study** noted above. It is important to note that the BRE concluded that the primary sources of VOC's in homes were from smoking, painting and cooking, and that VOC's were higher in homes with attached garages. Furthermore, the data demonstrates that normal, daily activities result in an informal baseline that can never be zero. Unstated, this sets the unrealistic goal for the consumer of the possibility that one can somehow achieve a zero-level exposure to specific chemicals.

Section 2.3: Impact of VOCs on health (page 11)**BEUC Statement:**

As long ago as 1997, an American animal experimental study, conducted by Anderson laboratories¹³ sought to denounce the toxic effects of emissions from air fresheners. (paragraph 2)

Response:

At best, the work of Anderson is controversial. This work has been criticized as irreproducible and the methods she has employed, in her carpet studies for example, are significant modifications of standard methodologies often resulting in skewed results. Furthermore, the evidence has been refuted in courts in the United States and, in the case of Anderson's carpet studies, by the Carpet Research Institute (See, for example, Stott et al., 1997 and USEPA, 1994). The fragrance industry strongly recommends a more thorough and critical review of her studies prior to using them as the basis for part of this report by the BEUC.

BEUC Statement:

Reference to the Avon study noted above. (3rd paragraph)

Response:

See the points raised above regarding the criticism of the Avon study under **Objectives of the Study**.

Section 3: The Test (page 12-13)**BEUC Statement:**

We did not choose to conduct the laboratory tests in emission chambers... (page 12, 1st paragraph)

Response:

The comment the BEUC makes regarding their decision not to use emission chambers reflects a **fatal flaw** in their study design. Their basis for not using these chambers is the speculation that droplets from aerosols may form on the chamber walls. However, the BEUC also goes on to state that the reliability for these chambers is indeed proven for specific air freshener products. This conflicting statement belies the lack of a standardized methodology for the BEUC's exposure scenario. The two questions that remain unanswered from the BEUC report are: a) what is the documented basis behind not using these emission chambers; and b) where is the quality assurance data that supports the exposure system used in their test design?

More specifically, there is an absence of reported quality assurance data to assist any reader in determining the reliability of the data presented. This is further extended to their continual discussion of “background” without ever giving any data whatsoever on the background levels measured. There is no way to determine if their reported values for the “chemicals of concern” are as little as 1 $\mu\text{g}/\text{m}^3$ above background or 1 order of magnitude higher (or more). There is no way for the reader to determine whether or not their “odour free” rooms were indeed analytically clean for measurement of either background levels or product emissions. The absence of this basic analytical information provides little confidence in the reported measurements and the ability to determine the accuracy of the reported levels above background and, therefore, to determine the relevance to human exposure.

Section 3.1 and 3.2: Methodology and Implementation of the products (page 12)

General Comments: There is no indication of the quantity of test product employed in this evaluation. It is unclear from the description presented in the BEUC report if there was one single product or a batch of products.

BEUC Statement:

The tests were conducted in several newly built rooms in the laboratory. (1st paragraph)

Response:

This statement is in clear contradiction to the second sentence of the very first paragraph on this page which states, “We staged tests in rooms located in an empty and unoccupied building.” The BEUC needs to clarify under what conditions the testing took place. Clearly sampling within an unoccupied building and an occupied laboratory would represent different conditions and, therefore, present different results. Also, details regarding the test setting are still relatively unknown from the information presented in this report. This section of the BEUC report raises many other questions as well, including:

- Was the building located near a busy street in an urban setting? If the samples were collected in a location external to the analytical laboratory, is there evidence that no contamination of the samples occurred during the transport of these samples?
- There is no mention of construction materials used. It is quite well known that common construction materials are rich sources for some of the contaminants cited in this report, particularly if the room is newly constructed.
- No sample volume is mentioned. How many products are being tested at one time to deliver necessary volume of fragrance to the air in the given sampling time and room volume?
- How is the rate of diffusion being either regulated or controlled? What is the air flow through the room or over the product? Most rooms where air freshener products are employed are not sealed and have a natural air ‘changeover’ during a normal day.
- Is there any evidence of the reservoir effects mentioned later in the document in the sampling technique of the room? This should be evident from the blank analyses.
- How are the samples placed in the room? The information provided in the report presents an incomplete picture of the sampling methodology. Were any measurements made of the air flow/current over the samples?
- How does the sampling method described differ from the instructions provided with the product? What formed the basis of the exposure methodology?

The information provided does not answer these and other critical questions that would help clarify the integrity of the data presented.

BEUC Statement:

Seven rooms were selected in regard to their low background levels (chemicals and odours). (paragraph 2)

Response:

This is a very important point. The concentration of the compounds of concern present in the background is unstated. If tests were conducted in rooms with typical background levels, they would be much less likely to see an increase above background when testing the air freshener products. These data need to be provided so that a thorough evaluation of the data can be made.

Section 3.3: Sampling Methods (pages 12-13)

General Comments: The comment made in the BEUC report regarding adsorption losses in the use of Tedlar bags is somewhat unusual as these bags are designed to be inert and neutral specifically due to their use in applications where trace level analyses are employed. Considerable reuse of Tenax traps may result in significant VOC levels retained on the traps and, therefore, generated in the instrumental analysis. This should be closely monitored by blanks assays and reported appropriately.

Sections 3.4 and 3.5 : VOC assay by TDS-GC-MS and C=O assay by HPLC-UV (page 13)**General Comments:**

The test methodology described, again, does not indicate the quality assurance measures taken, if any, for either method in this study. Were background measurements collected for carbonyl (C=O) species? Were background measures taken before each experiment in each room, or was it simply human judgment that the rooms were "clean and odorless" before they started a test? Many of the target species could easily be the result of fuel combustion (e.g., cars, buses, heating boilers) which would have created variable background concentrations.

The BEUC report states that the measurement of the VOC's is carried out by semi-quantification by external standard using peak height. **This is not an accepted MS measurement technique.** This approach means the data will be subject to a wide range of potential interferences and non-linear in its response to the wide range of analytes under consideration here. The term "semi-quantification" implies a degree of uncertainty in the reported measurements for the different analytes. Without any reported quality assurance data, this degree of uncertainty is unknown and can be very large. The techniques employed in this study are amenable to an **internal standard** methodology that may have improved the accuracy of the quantification.

Also, carbonyl determinations were made using a derivatization method. This method can be inaccurate for low molecular weight carbonyl species such as formaldehyde. Absent quality assurance information from the laboratory, the accuracy of these data are suspect.

Section 4: Total VOCs (pages 14-18)**Section 4.2: Secondary Pollutants (page 14-15)****BEUC Statement:**

A team of American researchers²⁹ has noted that a potentially harmful mini 'smog' can form inside homes as a result of reactions between air fresheners and ozone. (Last paragraph)

Response:

The reference (29) is to a paper by Liu et al. (2004) that described the interaction of ozone and emissions from plug-in air fresheners. This study was reported on the internet in *Nature News* by Mark Peplow (Peplow, 2004).

The USEPA has issued very specific statements concerning the purpose of this study and the extreme exaggeration factors employed. The USEPA has said the study was misrepresented in press reports and they stated that an ozone enriched room was used to study the effects of reactive materials as they proceeded to verify a new model. Such ozone levels would not be expected to be found in the home. They further stated that more modeling research needed to be done. The USEPA chose the plug-in air freshener because it contained reactive materials, specifically the terpenes. The USEPA's Michael Brown has reported, via the US broadcast media, the agency's disapproval of the Peplow report.

Section 4.3 Reservoir effect: adsorption (page 15)

General Comments: While the BEUC acknowledges that this effect has not been accounted for in their study, there is no explanation offered as to how it could affect the measured background concentrations or how to correct for this in the reported measurements.

Section 4.4: Results (pages 15 – 18)

General Comments:

Reporting on the "number of molecules" is a meaningless exercise. It would appear that this approach has been taken to lend an appearance of greater quantitation to the report. Which molecules (i.e., chemicals) have the BEUC identified? As stated earlier, the implication that every volatile compound is hazardous is very misleading to the consumer. The use of "number of molecules" further exacerbates this level of misinformation.

Section 4.5: Conclusion (page 18)

General Comments:

There exists no scientific basis to the claim that more volatile molecules equate to an increase in indoor air pollution, nor should "total levels" of anything in this study create a "cause for concern". While the BEUC notes that "a more detailed analysis of the results is called for", the data provided here and further on in the report does not represent that more detailed analysis. Simply put, presence does not equate to risk to the consumer (see, for example, Bickers et al., 2003). The products under study are highly regulated (see the US FD&C Act and the EU Cosmetics Directive) and safe for the consumer (see IFRA Standards at www.ifraorg.org).

Section 5: Allergens (pages 19-21)

Section 5.2: Respiratory allergies and skin allergies to perfumes (page 19)

BEUC Statement:

Allergy specialists in various countries in Europe are finding a significant increase in contact allergies to the fragrance mix, the blend of perfumes commonly used in skin reaction tests. (2nd paragraph)

Response:

There are no data to support the BEUC's claim of an increase in fragrance allergy. The paper cited in the BEUC report (Schafer et al., 2001) discusses the prevalence of contact dermatitis in the general population to a variety of potential allergens in a population cohort, but does not draw the conclusion that there is an increase in fragrance allergy. There are two true epidemiology studies (Meding and Swanbeck, 1990; Nielsen and Menne 1993) that investigate the prevalence of fragrance mix sensitization in the general population. The data available roughly suggest a prevalence of fragrance mix positive reactions in the general population of 1%. Neither of these studies report an increase in fragrance allergy. Furthermore, all of the studies can be criticized for evaluating too few individuals, being limited in geographic regions and, in the last two studies, the participation rate is less than 80%.

In fact in dermatitis patients, an analysis of the contact allergy to the fragrance mix was reported by the Information Network of Departments of Dermatology in Germany from 1996 to 2002 (Schnuch et al., 2004). The data show that from 1999, there is a significant *decrease* in allergy to the fragrance mix.

BEUC Statement:

Accordingly, the chemicals whose concentration is measured in the emissions from air fresheners are likely to provoke respiratory allergies. (4th paragraph)

Response:

In Section 5.1 the BEUC discusses the mechanistic differences between respiratory allergies and skin allergies to fragrance materials. Specifically, the BEUC states:

The compounds which cause allergies do so via mechanisms which are significantly different from the common allergies to pollens and other protein allergies.

By their own argument, this statement about being likely to provoke respiratory allergies does not fit with what we know about the mechanisms of dermal and respiratory allergy. Chemicals emitted by air fresheners are not known to provoke respiratory allergy, and there are no studies that would support the BEUC's contention in this regard.

Section 5.3: Results (pages 19-21)

General Comments: It is no surprise that these fragrance ingredients, used in compliance with the safety standards established by IFRA, are found in the products tested. However, as noted above, they will not cause respiratory allergy and are emitted at levels much too low to induce skin allergy.

Section 5.3.8: Conclusion (page 21)

BEUC Statement:

The nature of the emissions measured in our study shows that these products are likely to provoke reactions in the form of respiratory and skin allergies... (last paragraph)

Response:

For all the reasons discussed above, this statement, unsupported by any data, is clearly untrue and misleading to the consumer.

Section 6: First substance of interest: benzene (CAS 71-43-2) (pages 22-26)

General Comments:

Without knowing exactly the background concentrations, and with the exception of "incense sticks", all the products emitted levels of benzene which were the same as, or lower than, that found on average in UK bedrooms and lounges (Table 6.2 of the BEUC report), and lower than that found in sites close to traffic (the BEUC notes a value of 10 µg/m³).

This would support the fact that air fresheners are not a significant source of benzene.

Section 6: Second substance of interest: formaldehyde (CAS 50-00-0) (pages 29-31)

General Comments:

Again, as with benzene, without knowing exactly the background concentrations, and with the exception of "incense sticks", all the products emitted formaldehyde (13 µg/m³) at less than half the level found on average in French homes (24 µg/m³, OQAI study) as noted in the BEUC report.

As a secondary point it should be noted that here, and elsewhere in the report (see, for example, styrene), it is confusing to the reader when the BEUC changes between “mg” and “µg” units in their reported values and tables. Should the reviewer overlook this three order of magnitude difference between the units, there may appear to be significant concentrations of certain chemicals noted in the report.

The BEUC chose as their point of reference the 10 µg/m³ value of the WHO for "sensitized persons". This raises the question, how large a population sector does this represent? Is this a significant cohort of people that require a strict level of protection or does this simply put these data in the worst possible context? If one were to use the occupational health limits from across Europe (representing a typical 8 hour continuous exposure for a 5 day workweek), there is no potential to consider the formaldehyde emissions, even for incense, hazardous.

Lastly, it is interesting to note that in the BEUC report formaldehyde in unoccupied buildings is typically higher than that measured in occupied buildings. Again, what is the background level measured and how reliable are the measurements?

Section 8: Third subject of interest: terpenes (pp. 32-35)

Section 8.2: Exposure and impact on health (page 32)

General Comments:

The focus of this section is a specific terpene, limonene, and the exposure of humans measured in several different studies. Limonene, however, is a natural product and human exposure comes from a variety of sources. Some context needs to be placed around the values reported by the BEUC. For example, orange oil, a natural product found in orange peels, is approximately 85% limonene.

In addition, in contrast to the study by Wolkoff et al. (2000) cited in the BEUC report, Keinan et al. (2005) have recently reported on the beneficial scavenging effect of limonene in reducing asthma in sensitized animals.

Section 8.5: Conclusion (page 35)

General Comments:

The data provided by the BEUC demonstrate that exposure to limonene from consumer products is below any level of concern. Furthermore, these low levels do not support the contention that there is a risk to a consumer's health either with the oxidized or unoxidized forms. There is no scientific basis demonstrated by the highly subjective BEUC statement that the “concentrations appear excessive”. Also, as stated above, terpenes are natural products whose biogenic sources exceed their use in consumer products. The implication that consumer use of terpenes, particularly limonene, is a significant source of formaldehyde formed through atmospheric chemistry is misleading when one considers: 1) all sources of formaldehyde exposure to the consumer; and 2) all natural sources of terpene exposure.

Section 9: Fourth molecule of interest: styrene (CAS 100-42-5) (pages 36-40)

Section 9.3.5 Toxicology: Others

BEUC Statement:

In Germany, specifications of the GUT, a label applicable to floor coverings, fixes a limit for emissions of styrene at 5 µg/m³.

Response:

GUT is a German industry association for ecologically friendly floor coverings. The use of GUT as a reference point is completely misleading. The selection of various chemical limits in floor coverings is not

toxicologically based. Furthermore, their test methodology (e.g., continuous air refreshment over the sample being tested) is not compatible with the results reported in the BEUC study; therefore, the limits are not comparable. Should the BEUC want to completely report on data provided by GUT there is some interesting information reported by GUT on their website regarding benzene:

The information about average benzene concentrations in the air fluctuates between 1 and 160 µg/m³ of air. Concentrations of up to several hundred µg per cubic metre of air have been measured in densely populated areas with intense road traffic as well as in the neighbourhood of filling stations. Area-related annual mean values are around 5 µg/m³ in rural areas and 15 µg/m³ in metropolitan areas. (http://193.201.162.104/en/frames_ProductTesting.htm)

Using the GUT measurements as background concentrations supports the conclusion that air fresheners are not a significant source of benzene.

Section 10: Fifth molecule of interest: Diethylphthalate (CAS 84-66-5) - (pages 41-43)

Section 10.3: Toxicology (page 41)

General Comments:

The comment made above bears repeating regarding the toxicity of DEP and the SCCNFP's opinion on the use of this chemical (See the section **Summary** above):

There has never been any clearly demonstrated toxicity associated with diethyl phthalate (DEP) and, more importantly, the SCCNFP recently issued an opinion on DEP supporting its safety. BEUC fails to mention anywhere the SCCNFP opinion on DEP, while they clearly were aware of and noted the SCCNFP opinion on dermal allergens. If the BEUC was unaware of the SCCNFP's opinion on DEP, it demonstrates the incomplete nature of the research that the BEUC has done on the subject of the report. If, however, the BEUC has selectively cited the opinions of the SCCNFP they are:

- 1. tacitly avoiding an open discussion on the issue of DEP safety and implying that the SCCNFP is wrong on DEP (while right on dermal allergens), and*
- 2. not providing the consumer with all available information on the subject.*

Section 10.6: Conclusion

General Comment:

While the BEUC correctly points out that DEP "is not among the most worrying substances", their continued emphasis on the absence of regulatory criteria belies the following points:

1. Scientific studies with DEP demonstrate its safety to consumers as currently used and
2. The lack of a regulatory value supports the safety of DEP (i.e., it is not regulated because there is no health hazard; again we must emphasize the SCCNFP opinion not cited in this report).

Therefore, there is no credible scientific basis for BEUC's conclusion.

Section 12: Conclusion (pages 48-49)

BEUC Statement:

Total VOC emissions from virtually all of the products tested occur at a concentration higher than 200 µg/m³ after 2 hours of use. This represents a substantial increase in indoor air pollution. (First bullet, page 48)

Response:

As stated earlier, the implication that total VOCs is a measure of pollution (i.e., each VOC is a harmful pollutant) is misleading. Not all VOCs are pollutants.

BEUC Statement:

Under certain circumstances, these adsorption phenomena may lead to skin allergies as a result of contact between the skin and objects or materials. (Second bullet, page 48)

Response:

As stated in our response under **Section 5.2: Respiratory allergies and skin allergies to perfumes**, this conclusion is based on assumptions for which there are no supporting data.

BEUC Statement:

Emissions of allergens from perfumes at often high concentrations are a matter for concern, and need to be looked at in the context of the increase in allergies to perfumes in various countries in Europe. (Fourth bullet, page 48)

Response:

As stated in our response under **Section 5.2: Respiratory allergies and skin allergies to perfumes**, this conclusion is based on assumptions for which there are no supporting data.

BEUC Statement (both from the fifth bullet):

Among the substances emitted, the presence of several carcinogens, benzene and formaldehyde, is a matter for concern.

Three candles tested and one electric diffuser returned a high concentration of formaldehyde.

Response:

The BEUC has failed to demonstrate this "matter for concern". As stated in our response earlier, presence does not equate with risk. The flaws present in the BEUC study and the incomplete review of existing data on the substances noted in BEUC's report does not lead one to the conclusion, with any level of confidence, that there is a cause for concern for the consumer.

Without clear data provided on background levels, room construction, and analytical quality assurance, a statement regarding high concentrations is meaningless. High relative to what background and what is the level of sample contamination?

BEUC Statement:

Another molecule like DEP does not have a guideline value and studies are awaited into its health impact. (Sixth bullet, page 48)

Response:

This contradicts the opening sentence of BEUC's statement which states that, "...the health impact is amply described in the literature." The BEUC is correct in the first instance, yet incorrect and contradictory in the second. The health impacts of DEP **are** well documented, resulting in the SCCNFP opinion permitting its continued use.



BEUC Statement:

We have not manipulated our interpretation and conclusions. (1st paragraph, page 49)

Response:

The BEUC in this report has omitted or ignored pertinent, relevant studies and reports (e.g., SCCNFP opinion on DEP) and has failed to critically evaluate other studies that have been discounted by various regulatory authorities (e.g., the Avon study and the work by Rosalind Anderson).

References

- Api, A.M. (2001) Toxicological profile of diethyl phthalate: A vehicle for fragrance and cosmetic ingredients. *Food and Chemical Toxicology*, **39**, 97-108.
- Bickers, D.R., Calow, P., Greim, H.A., Hanifin, J.M., Rogers, A.E., Saurat, J.-H., Sipes, I.G., Smith, R.L., and Tagami, H. (2003) The safety assessment of fragrance materials. *Regulatory Toxicology and Pharmacology*, **37**, 218-273.
- British Aerosols Manufacturers' Association (BAMA) (2004). In conjunction with UK Cleaning Products Industry Association and the Cosmetic, Toiletry and Perfumery Association. ALSPAC Study Team Paper: Symptoms of Mothers and Infants Related to Total Volatile Organic Compounds in Household Products.
- Keinan, E., Alt, A., Amir, G., Bentur, L., Bibi, H., and Shoseyov, D. (2005) Natural ozone scavenger prevents asthma in sensitized rats. *Bioorganic and medicinal Chemistry* **13**, 557-562
Statement: 27 Oct 2004
- Medical Research Council Institute on Environment and Health (IEH) (1996). IEH Assessment on Indoor Air Quality in the Home: Nitrogen Dioxide, Formaldehyde, Volatile Organic Compounds, House Dust Mites, Fungi, and Bacteria (Assessment A2).
- Meding, B. and Swanbeck, G. (1990) Occupational hand eczema in an industrial city. *Contact Dermatitis*, **22** 13-23.
- Nielsen, N.H. and Menne, T. (1993) Contact sensitization to cosmetic ingredients in an unselected Danish population. The Glostrup Study, Denmark. *Annales Dermatologie Venereologie*, **120**, 33-36.
- Peplow, M. (2004) Air fresheners cause a stink. *Nature News Service* 10 May 2004. www.nature.com
- Scientific Committee on Cosmetic Products and Non-Food Products Intended for Consumers (SCCNFP) (2003). Opinion Concerning Diethyl Phthalate. SCCNFP Reference Number SCCNFP/0767/03
- Schnuch, A., Lessman, H., Geier, J., Frosch, P.J., and Uter, W. (2004) Contact allergy to fragrances: Frequencies of sensitization from 1996 to 2002. Results of the IVDK. *Contact Dermatitis*, **50**, 65-76.
- Stott, W.T., Beekman, M.J., Johnson, K.A., and Spencer, P.J. (1997) Evaluation of a Novel Assay of Potential Toxicity/Neurotoxicity of Carpet Emissions (VOCs) in Mice. *Food and Chemical Toxicology* **35**, 241-254.
- USEPA (1994) Project Summary: Characterization of Emissions from Carpet Samples Using a 10-Gallon Aquarium as the Source Chamber USEPA Reference Number 600/SR-94/141.