



**accord**  
hygiene, cosmetic & specialty products industry



**furphies**  
.org.au  
an initiative of accord



# *Estimating the Relative Contribution of Major Categories of Formulated Household & Personal Care Products to Tropospheric VOC Emissions*

*An industry report completed as part of a collaborative engagement with the NSW EPA in order to provide Australian environmental policy makers with reliable baseline data on locally relevant consumer product volatile organic compound (VOC) emission estimates*

Combining consolidated sales volume data from across the Australian-based personal care & cleaning products industry and applying a representative 'frame formulation' approach, this Accord report aims to provide a reliable assessment of relative VOCs emissions across 53 key product categories.

July 2014

# Estimating the Relative Contribution of Major Categories of Formulated Household & Personal Care Products to Tropospheric VOC Emissions

## Executive Summary

Accord ([www.accord.asn.au](http://www.accord.asn.au)) is the industry body for the Australian hygiene, cosmetic and specialty products industry and an active contributor to policy programs and initiatives aimed at improving the environmental and safety profile of industry products. In 2012, Accord engaged with the New South Wales Environment Protection Authority (NSW EPA) in reviewing a desktop literature survey on solvents in consumer products commissioned by the EPA. That survey was completed by SLR Consulting with a goal of providing baseline data on possible tropospheric volatile organic compound (VOC) emissions. From an air pollution perspective, VOC emissions play a key role in the formation of tropospheric ozone (an indicator of photochemical smog).

Arising from the review, which identified some data gaps and possible methodological issues associated with the initial desktop survey, Accord gave a commitment to the NSW EPA to conduct a further, more comprehensive survey drawing on a more complete sample of the Australian industry and tapping into reliable industry sales volumes and representative product formulation data. In order to avoid the survey results being skewed by VOC definitions that included inbuilt exclusions of potentially highly relevant chemical ingredients, Accord's survey instead used a broad definition for "VOC of interest" of:

- a chemical substance containing 12 carbon atoms or less; or
- having a vapour pressure of 2mm Hg or higher.

Also, to address confidentiality concerns which had previously discouraged company participation in the SLR survey, we developed and used 53 representative 'frame formulations' for household & personal care products. At the NSW EPA's suggestion, the survey methodology also used maximum incremental reactivity (MIR) values provided by the agency, which gave a proxy measure of ozone formation potential. This allowed direct ranking of product categories via the calculation of a 'median' product MIR value.

Factoring in the annual sales volumes for each product, our report found that the following six product categories (in order) contributed most to emissions of potentially ozone forming VOCs: alcohol-based mouthwash, toothpaste, antiperspirants/deodorants (EU)\*, alcohol-free mouthwash, water-based soaps and aerosol body spray. In total, these six categories contributed around 65% of 'estimated tropospheric ozone creation potential' for products in our sector.

The earlier SLR report, which relied on a different industry cohort, different product categorisations and fairly incomplete use volume data obtained mainly from third-party market data firms, ranked the following six categories (in order) as most significant: finishing hair sprays, underarm deodorants, windshield washer fluids, non-flat enamels, other repair products and glass cleaners. The SLR report estimated that 41% of total emissions were attributable to these categories across the industry cohort SLR had targeted.

## CONTENTS

Executive Summary	1
Glossary	4
Background	5
Summary of key findings	6
Methodology	15
Calculations	17
Discussion	24
Considerations for any future policy development	27
Appendixes	36

However, drawing meaningful comparisons between the SLR report and this survey is difficult.

For our survey, calculated product median MIRs spanned the range of <0.2 for liquid detergent to 1.6 for solid air fresheners. Sales volumes spanned the range of >10 million kg for water-based soaps to <100,000 kg for nail polish and <10,000 kg for shaving cream. Our survey's finding that those products used by consumers every day, in the largest quantities, were the most significant VOC emission contributors is unsurprising.

From an Australian policy perspective, any potential for VOC emissions from common household and personal care products to be of environmental significance needs to be investigated in more detail.

Estimated VOC emissions from these products have to be properly considered in comparison with the many other man-made and natural VOC emission sources relevant to the Australian context. There are many natural sources of VOCs which can also lead to ozone formation. For example, naturally occurring VOC emissions from plants, which for eucalypts can include isoprene (MIR – 10.6) and terpene (MIR – 3.9) can contribute to ozone formation, especially in summer, as can bushfire smoke. Additionally, other sources and industry sectors outside of the scope of this survey, such as dry cleaning, the automotive after-market and the building and construction sectors, may be more significant.

It needs to also be noted that not all the VOC content of formulated products used in either households or industry will necessarily end up being emitted into the atmosphere. In assessing the environmental fate of chemicals in depth it is important to also consider their likely partition coefficients between air/water/soil.

In the formation of smog, VOCs react with nitrogen oxides (NO<sub>x</sub>) emitted from cars, trucks, industry and other combustion sources to form ozone and petrochemical smog. Reducing NO<sub>x</sub> emissions from mobile and point sources is also often an effective way to address this problem and, via NSW EPA initiatives for air quality in the greater metropolitan area, Accord notes progress being made on this front. For example, there have been reductions in mobile source emissions of NO<sub>x</sub>.

It is critical that this overall context be taken into account in any policy considerations, especially if any proposals for VOC emission reductions for common household and personal care are either 'at the margins' in terms of their quantitative significance or are inherently costly to achieve. Proper cost-benefit approaches need to be followed in this regard and likewise any potential regulatory options would need to be substantiated by a comprehensive regulatory impact statement.

Across the 53 product categories we surveyed, the following 11 'volatile organic compounds of interest' (in order) were the most significant in terms of their presence in surveyed product categories, their median usage volumes and their MIR values: glycerol, ethanol, propylene glycol, n-butane, isobutane, dimethyl ether, 2-(2-ethoxyethoxy) ethanol, propane, acetone, ethylene glycol and isopropyl alcohol. These are mainly solvent or aerosol propellant

ingredients.

In comparison, the SLR report did not identify individual VOC contributing compounds and instead presumed that product formulations available within the Australian market would mirror US data and VOC content and emission estimates published by the California Air Resource Bureau (CARB).

Data used in this report is instead based on extensive input and sales volume data from frame formulations that reflect the products available to and used by Australian consumers. A total of 23 companies within our sector provided sales volume data for our survey. It is estimated that these companies cover (by sales volume) an estimated:

- 65-80% of the colour cosmetic market,
- 50-85% of the home care market, and
- 65-90% of the personal care products market,

depending on the specific product.

In comparison the SLR report received just 12 responses from 37 targeted “Australian manufacturers”; of which only seven of the 37 were either Accord members or engaged in the personal care and common use household products market. It is not known to the authors of this report what proportion of the 12 respondents to the SLR report were from amongst our industry sector.

In discussing broader policy implications, we also comment on the considerable environmental trade-offs that exist for any targeted efforts to reduce VOCs in household and personal care products. For example, efforts to target propellant gas use, such as those undertaken in California, have resulted in substitution with chemicals like hydrofluorocarbons (HFCs), which are greenhouse gases. For example, HFC-152a, which is used as an aerosol propellant in the US, has 460 times the global warming potential of carbon dioxide over 20 years.<sup>1</sup>

Through Accord, the industry commits to ongoing dialogue on the potential air pollution implications of VOCs in everyday household and personal care products.

*\* EU-based aerosol antiperspirants/deodorants use hydrocarbon propellants. US-based aerosol antiperspirants/ deodorants limit the use of hydrocarbon propellants and typically use hydrofluorocarbon propellants*

**Accord survey & report team** – Catherine Oh BSc/BA (Hons), Craig Brock BSc DipEnvSt MPA, Dr Jennifer Semple PhD BSc (Adv/Hons) GradDipEd

**Acknowledgements** – Dr Graeme Haley (Engel Hellyer & Partners) for consultancy advice on frame formulations; Nick Agapides and Aleksandra Young (NSW EPA Air Policy) for project oversight and helpful advice on the survey and the report; all company member representatives on the Accord Technical Working Group who helped with the design of the survey and the data collection and in particular John Graham (Unilever) and Ian Gamble (Amway) for expert input in the early stages of this project; all companies which responded to the survey.

**Disclaimers** – The MIR values (Carter values) have been used to provide a way of ranking the relative significance of product categories. The authors recognise that MIR values vary from location to location and that the values used in this report are derived for southern California. Additionally, we caution against attempts to use the absolute values estimated in this survey. While the desktop methodology used provides a consistent base for comparisons between product categories, it would be unscientific to use the “Sales Volume × MIR” values as definitive values of VOC emissions arising from the product categories surveyed.

---

<sup>1</sup> Climate Change 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, page 22.

## Glossary

<i>Accord</i>	The national industry body for the Australian hygiene, cosmetic and specialty products industry – see <a href="http://www.accord.asn.au">www.accord.asn.au</a>
<i>CARB</i>	California Air Resources Board is an agency responsible for addressing air pollution, in particular the notorious smog and air pollution events which characterise the Los Angeles region. The Board gives its name to the extensive set of regulations referred to as the ‘CARB regulations’.
<i>EU</i>	European Union
<i>Frame formulation</i>	‘Frame formulation’ is a generic formula for a specific category of product type that lists the most typical ingredients and their concentrations. For this survey, 53 product types that are significant on the Australian market were identified. Generic frame formulations were developed for those product types which had 5% or more of VOCs of interest.
<i>MIR value</i>	The Maximum Incremental Reactivity value (MIR value) is a measure of the increase in ozone formation per unit weight of a hydrocarbon compound when added to the atmosphere. These values were first published in the mid-1990s by Dr William Carter, a US chemistry researcher specialising in atmospheric chemistry. MIRs are often therefore referred to as CMRIs or Carter Maximum Incremental Reactivity values. The values used in this report are the revised MIRs published by Carter in 2009. <sup>2</sup>
<i>NO<sub>x</sub></i>	NO <sub>x</sub> is a generic term for mono-nitrogen oxides NO and NO <sub>2</sub> (nitric oxide and nitrogen dioxide). These compounds are produced from the reaction of nitrogen and oxygen gases in the air during combustion. NO <sub>x</sub> are environmentally significant via a number of potentially detrimental mechanisms, including: nitric acid formation leading to acid rain (when reacting with ammonia and moisture); ozone/smog formation (when reacting with VOCs).
<i>Ozone</i>	Ozone is tri-oxygen, consisting of three oxygen atoms (O <sub>3</sub> ) in comparison to oxygen gas (O <sub>2</sub> ). Ozone in the lower atmosphere (aka. tropospheric ozone) is a pollutant. It is formed by the reaction of sunlight with air containing VOCs and nitrogen oxides (NO <sub>x</sub> ).
<i>Photochemical smog</i>	<i>Photochemical smog</i> results from the atmospheric chemical reaction of nitrogen oxides (NO <sub>x</sub> ) and VOCs in the presence of sunlight. Smog is highly reactive and can contain a noxious mix of particles, tropospheric ozone, nitrogen oxides, peroxyacyl nitrates (PAN), VOCs and aldehydes. Smog is linked to public health problems.
<i>Tropospheric</i>	The troposphere is the lowest portion of the atmosphere (from the Earth’s surface to between about 20 kilometres at the tropics and 7 km at the poles). Tropospheric refers to compounds that exist or are formed in this lowest portion of the atmosphere.
<i>VOC</i>	Volatile organic compound
<i>“VOC of interest”</i>	For the purposes of this survey, the following ‘catch-all’ definition has been used for “VOC of interest”: <ul style="list-style-type: none"><li>• a chemical substance containing 12 carbon atoms or less; or</li><li>• having a vapour pressure of 2mg Hg or higher.</li></ul>

## Background

<sup>2</sup> “Updated maximum incremental reactivity scale and hydrocarbon bin reactivities for regulatory applications” Prepared for California Air Resources Board Contract 07-339 by William P.L. Carter, College of Engineering, Center for Environmental Research and Technology, University of California, June 22, 2009.

## About Accord and the Australian formulated household and personal care products industry

Accord Australasia ([www.accord.asn.au](http://www.accord.asn.au)) is the national industry body for the Australian hygiene, cosmetic and specialty products industry, representing around 100 companies (see attachment 1).

This industry sector provides products and technology solutions essential to the wellbeing of the Australian community and Accord's total estimated coverage (on a total sales basis) of the Australian market for the product sectors covered in this survey is:

- 85% for common use household products; and,
- 90% for personal care products.

In terms of product distribution channels, Accord's membership also covers supply of products to Australian consumers via all of the following:

- supermarkets (apart from their private label product and the Aldi chain);
- mass market retailers;
- department stores;
- pharmacy; and,
- direct selling.

Membership also includes the major manufacturers and importers involved in the Australian market.

A raft of our industry products help protect public health – sunscreens; oral hygiene products; household, commercial & medical disinfectants; food industry sanitisers; and personal & professional hygiene products.

As a solutions-oriented industry, a variety of consumer, social and environmental programs have been proactively introduced through Accord, including:

- the national scheme for capping phosphorus levels in household laundry detergents (& labelling), which has been in place since the mid-1990s and which was introduced under an MOU with the NSW EPA;
- Look Good...Feel Better program for Australian women facing cancer treatment, which is now in its 23rd year and reaches close to 10,000 women annually across all states and territories;
- WashWise consumer website ([www.washwise.org.au](http://www.washwise.org.au)) for more sustainable household laundry practices
- "What's in it?" initiative ([www.accord.asn.au/whats\\_in\\_it](http://www.accord.asn.au/whats_in_it)) which voluntarily discloses to Australian consumers the ingredients in household cleaning products,
- Accord Sustainability Charter, which encourages industry members to commit to sustainability improvement,
- Recognised® Enviro-labelling scheme for commercial and industrial cleaning products, which identifies and accredits those products presenting a lower risk to the environment; and,
- Hygiene for Health website ([www.hygieneforhealth.org.au](http://www.hygieneforhealth.org.au)) which promotes the role of good hygiene in combatting the spread of socially and economically costly infectious diseases.

Accord is also an active participant in evidence-based policy development and welcomed the opportunity to liaise with NSW EPA on the issue of the potential air pollution impacts of VOCs in household and personal care products.

## Liaison with NSW EPA on the SLR Report and subsequent agreement to initiate this survey

In 2010 the NSW Department of Environment Climate Change and Water (now NSW EPA) commissioned the environmental consultancy Heggies (now SLR Consulting) to undertake a project to survey emissions of VOCs from aerosols and solvents used in Australia.

During the course of the SLR project, a number of industry groups including Accord expressed reservations about the:

- practicality of the methodology being used;



- very significant transaction costs individual companies would incur in completing a complex 42-page questionnaire and in providing details for every SKU (stock-keeping unit) in their range; and,
- the confidentiality problems arising from asking for full formulation disclosures and sales volume data for each SKU.

The final draft SLR report for this project, titled “*Desktop Literature Review of Aerosols and Solvents Emission Source Category*” was subject to extensive stakeholder review with industry groups, including Accord, and a number of critical issues and perceived limitations relating to its methodology, VOC definition, limited industry coverage, use of US rather than Australia-oriented product categories and incomplete product usage volume data were discussed.

Industry groups, including Accord, provided NSW EPA with detailed submissions outlining issues which would either need to be considered in the SLR report or addressed through further work.

Acknowledging the need to provide environmental policymakers with a reliable picture of VOCs in relation to our industry’s products, Accord’s submission offered to collaborate with NSW EPA to undertake a more complete survey.

Following discussions with NSW EPA, including their suggestions about refining the proposed survey methodology, Accord commenced this survey in late October 2012, concluding the collection of survey data from industry members at the end of March 2013.

## Summary of key findings

### Major results from the Accord survey

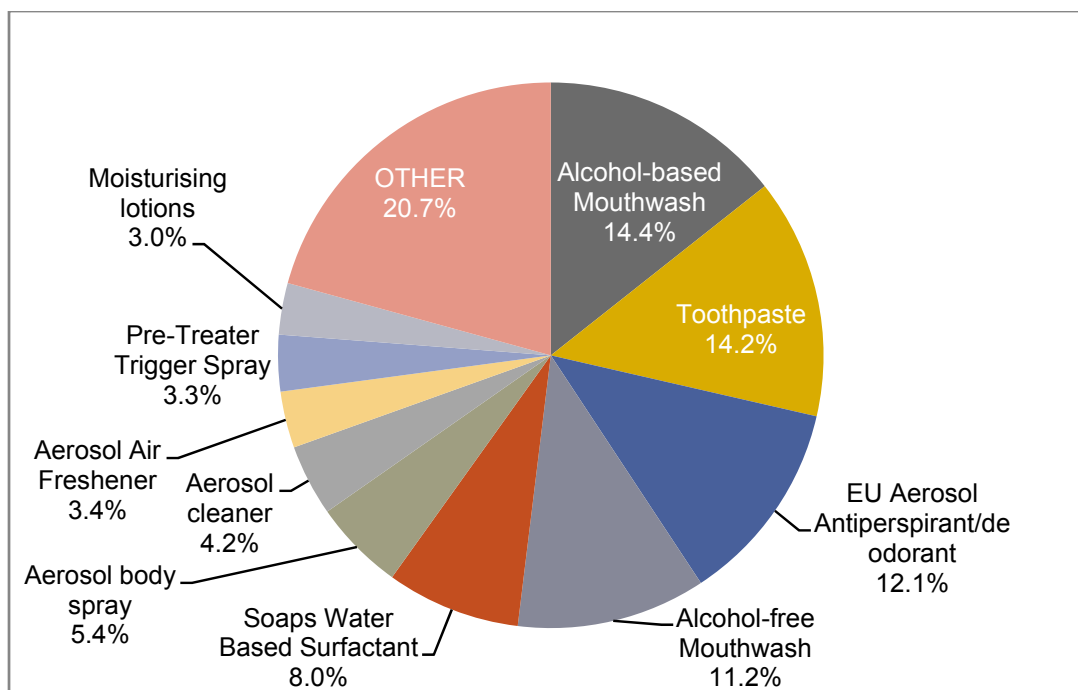
The methodology employed in the Accord survey is outlined in detail in the next section of this report.

Using our method of estimating product MIRs based on representative frame formulations and multiplying these values by the use volume data collated from our member companies, the top 10 product categories are:

	Product category (using <i>median</i> MIR)	Product class	Product type/use	Vol x <u>Median</u> MIR*	‘% contribution’ to total Vol x MIR value across all categories
#1	Alcohol-based mouthwash	Personal care	Oral care/hygiene	3435464	14.4%
#2	Toothpaste	Personal care	Oral care/hygiene	3405721	14.2%
#3	Aerosol antiperspirant/deodorant (EU)	Personal care	Antiperspirant/deodorant	2902913	12.1%
#4	Alcohol-free mouthwash	Personal care	Oral care/hygiene	2684743	11.2%
#5	Soaps water-based surfactant	Personal care	Skin care/hygiene	1902783	8.0%
#6	Aerosol body spray	Personal care	Body spray	1292367	5.4%
#7	Aerosol cleaner	Home care	Hard surface cleaner/disinfectant	1011978	4.2%
#8	Aerosol air freshener	Home care	Air freshener	802400	3.4%
#9	Pre-treater trigger spray	Home care	Laundry	800548	3.3%
#10	Moisturing lotions	Personal care	Skin care	729421	3.0%
	<b>OTHER</b>				<b>20.7%</b>

The top 5 product categories listed above contributed almost 60% of the overall calculated use volume *multiplied* by median MIR values, which is adopted in this report as a measure of relative ‘VOC significance’.

The following pie chart provides a visual depiction of these ‘% contribution’ values:



**‘Percentage contribution’ of most significant product categories in terms of estimated VOC contribution (Vol x Median MIR)**

Via our use of representative frame formulations, we were also able to identify and rank specific ingredients commonly used in household and personal care products according to their specific Carter MIR values and estimations of their relative use volumes.

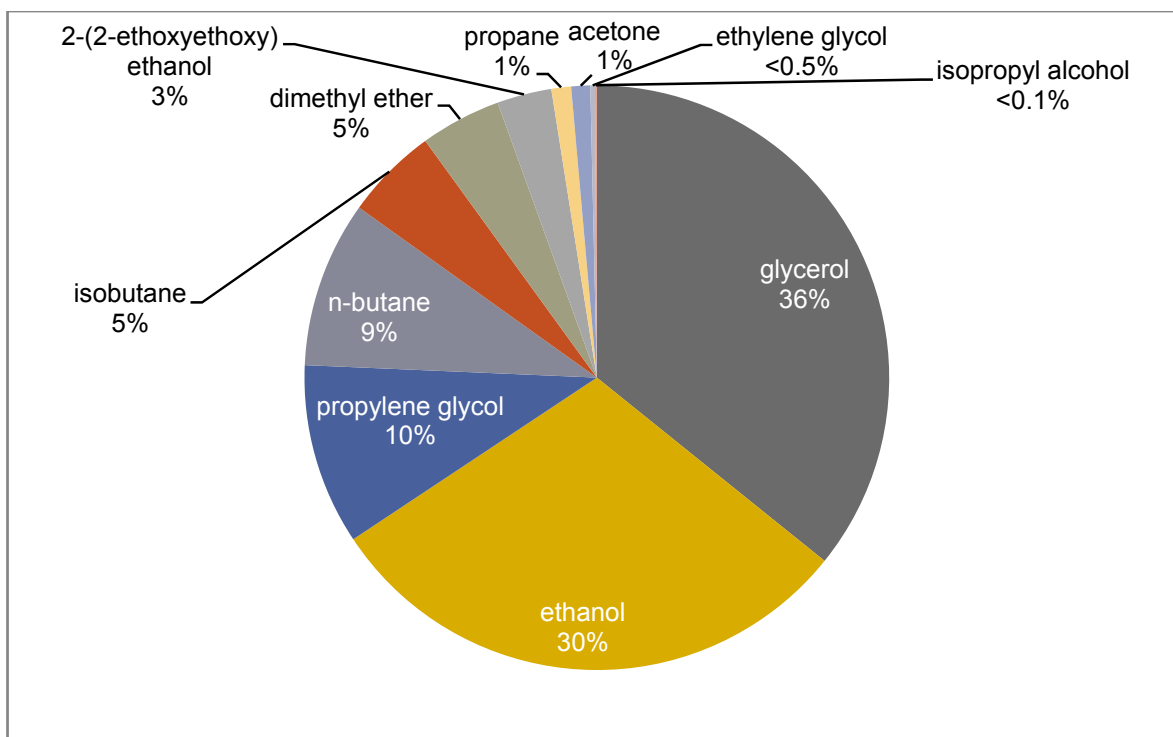
For VOC ingredients, the top 11 are as follows (although caution is needed in seeing these figures as any more than a rough indication of VOC ingredient significance):

	VOC ingredients	Calculated Volumes (kg or L) x MIR (in millions)*	‘Percent contribution’ of VOC ingredients
		Median Vol	(using median)
#1	glycerol	16.791 M	36%
#2	ethanol	14.029 M	30%
#3	propylene glycol	4.697 M	10%
#4	n-butane	4.314 M	9%
#5	isobutane	2.414 M	5%
#6	dimethyl ether	2.097 M	5%
#7	2-(2-ethoxyethoxy) ethanol	1.417 M	3%
#8	propane	0.512 M	ca. 1%
#9	acetone	0.49 M	ca. 1%
#10	ethylene glycol	0.122 M	<0.5%
#11	isopropyl alcohol	0.045 M	<0.1%

*\* These calculated values allow for a ranking on the basis of the two critical variables - use volume and VOC reactivity (as measured by the Carter MIR value) - but are not ‘meaningful’ values for other purposes.*

The following pie chart provides a visual depiction of these values:





**'Percentage contribution' of the most significant VOC ingredients (using Median MIR)**

### Comparison of our key findings with the earlier SLR report

Comparing the results of this survey with the previous SLR report is not a straightforward matter. Aside from industry reservations about the methodology used in the SLR report as well as the incompleteness of the use volume data it obtained from actual firms, the targeted industry cohort of both studies is quite different.

Results for the 'top ten' products based on their relative 'VOC emission significance' from the SLR survey compared to our survey are as follows (our figures are based on 'median' values):

	SLR survey report	% contribution**	Accord survey***	% contribution**
#1	Finishing hair sprays	13%	Alcohol-based mouthwash	14%
#2	Underarm deodorants	12%	Toothpaste	14%
#3	Windshield washer fluids*	6%	Aerosol antiperspirant/deodorant (EU formulation)	12%
#4	Non-flat enamels*	4%	Alcohol-free mouthwash	11%
#5	Other repair products*	3%	Soaps water-based surfactant	8%
#6	Glass cleaners	3%	Aerosol body spray	5%
#7	Herbicides, defoliants*	3%	Aerosol cleaner	4%
#8	Packaged solvents	3%	Aerosol air freshener	3%
#9	Construction adhesives*	3%	Pre-treater trigger spray (laundry)	3%
#10	Underarm antiperspirants	3%	Moisturising lotion	3%

\* These product types are not covered in the sector Accord represents and were not part of our survey.

\*\* % of the total 'VOC emission' value which the product accounts for. (Direct comparison is difficult as each survey uses different baselines.)

\*\*\* This Accord survey list is based on the median product category MIR value.

However, it is important not to simply take these comparisons at face value or to read too much into their respective differences and commonalities.

The following table highlights critical differences between the two surveys, their methodologies, industry cohorts, data completeness and VOC definitions.

	SLR survey report	Accord survey
<b>Targeted industry</b>	<p><b>‘Aerosols and Solvents’</b></p> <ul style="list-style-type: none"> <li>Sectors covered included: household cleaning products, paints and surface treatments, adhesives, household insecticides, herbicides, garden chemicals, automotive care products, personal care products, hardware products and construction products.</li> <li>37 companies contacted for survey including: 6 everyday household product firms, 3 paint firms, 7 garden chemical firms, 4 toll manufacturing/ aerosol filling firms, 17 specialty chemical and/ or raw material firms.</li> </ul> <p><i>Comments:</i></p> <ul style="list-style-type: none"> <li><i>It is unclear what proportion of the total for the targeted sectors these 37 companies comprised.</i></li> <li><i>Only 12 responses were received by SLR to their 42-page survey form, which included requests for companies to provide full formulation details for their products.</i></li> </ul>	<p><b>Everyday household &amp; personal care products</b></p> <ul style="list-style-type: none"> <li>Our industry cohort comprised member companies of Accord covering the household cleaning products and personal care products sectors.</li> <li>Accord membership makes up just over 85% of the household cleaning products market and over 90% of the personal care products market in Australia.</li> <li>23 member companies provided sales volume data for those product categories determined as being of ‘VOC significance’. Company input on product composition meant representative ‘frame formulations’ could be created for categories of ‘VOC significance’.</li> </ul> <p><i>Comments:</i></p> <ul style="list-style-type: none"> <li><i>It is estimated that these companies cover (by sales volume) an estimated:</i> <ul style="list-style-type: none"> <li><i>-65-80% of the colour cosmetic market,</i></li> <li><i>-50-85% of the home care market, and</i></li> <li><i>-65-90% of the personal care products market.</i></li> </ul> </li> <li><i>Accord’s membership does not cover the following sectors included in the SLR report: garden chemicals and herbicides, paints, construction products, veterinary products &amp; certain specialty chemical firms<sup>3</sup></i></li> </ul>
<b>‘VOC’ definition</b>	<ul style="list-style-type: none"> <li>HVOC – “High Volatility Organic Compounds – defined as any organic compound that exerts a vapour pressure greater than 80mm Hg at 20C”</li> <li>MVOC – “Medium Volatility Organic Compounds – defined as any organic compound that exerts a vapour pressure greater than 2mm Hg and less than or equal to 80mm Hg when measured at 20C”</li> </ul> <p><i>Comments:</i></p> <ul style="list-style-type: none"> <li><i>USEPA’s SPECIATE v4.2 database and a USEPA 1995<sup>4</sup> study were used to derive composition and VOC content of products</i></li> </ul>	<ul style="list-style-type: none"> <li>Survey used a broad definition for “VOC of interest” of: <ul style="list-style-type: none"> <li>a chemical substance containing 12 carbon atoms or less; or</li> <li>having a vapour pressure of 2mm Hg or higher.</li> </ul> </li> </ul> <p><i>Comments:</i></p> <ul style="list-style-type: none"> <li><i>Our survey introduced VOC reactivity ranking factors via use of MIR values and calculation of estimated MIRs for frame formulations</i></li> </ul>
<b>Product categories</b>	<ul style="list-style-type: none"> <li>Product descriptors based on US regulator lists (e.g. CARB) were used. Table 31 on page 112 of the SLR report lists 245 different product types, some of which are either unclearly defined, of dubious relevance to the Australian market or seemingly over-lapping in their definitional coverage. The ‘top 50’ products were reported as: finishing hair sprays, herbicides/defoliant, other miscellaneous herbicides/insecticides, windshield washer fluid, non-flat enamels, construction adhesives, residual insecticides, insect repellents, other adhesives, other repair products, other fungicides/nematicides,</li> </ul>	<ul style="list-style-type: none"> <li>Product descriptors based on knowledge of actual consumer products on the Australian market, derived from input from the Australian industry. For our survey we started with an initial list of 106 product categories, but focused on 53 products determined to have &gt;5% VOC content and based on both use and formulation format: nail polish, nail polish remover (acetone), nail polish remover (acetone free), aerosol air freshener, aerosol area insect repellent, aerosol cleaner, aerosol deodorizer (carpet/furnishings), aerosol mousse/spray (carpet/furnishings), dishwashing liquid (manual), DIY pesticide trigger pack, impregnated wipes (wet), liquid</li> </ul>

<sup>3</sup> The following firms listed in the SLR report are not members of Accord nor would be considered engaged primarily in the product sectors we represent: **CRC Industries, Multi-fill, Pax Australia, Selleys, Carlton Chemicals, Stalcyce Holdings, Wattyl, Dulux, Sumitomo Chemical Australia, Ecofertiliser, Scotts Australia, PPG Industries, Pascoes, Searle, Aaron Laboratories, Signet, Brunnings, Dymark, Ensign, Bayer, MMP, ITW Polymers and Fluids, Ultracolour, David Gray, Thorely, Richgro.**

<sup>4</sup> ‘Study of Volatile organic Compound Emissions from Consumer and Commercial Products, Comprehensive Emissions Inventory’, EPA-453/R-94-066-B, USEAP, Research Triangle Park, NC, USA, 1995

	SLR survey report	Accord survey
	<p>packaged solvents, underarm antiperspirants, other insecticides, lawn &amp; garden insecticides, disinfectants, other herbicides, glass cleaners, room air fresheners, flying insect sprays, flat enamels, paint thinners (no auto), non-flat lacquers, other misc HH products, pipe cements/primers, paint removers, rubbing alcohol, underarm deodorants, space insecticides/foggers, carpet/tile adhesives, charcoal lighters, colognes, metallic pigment coatings, starches/sizings, automotive lubricants (excl engine oil), household lubricants, flea/tick products, styling spritzes, traffic marking coatings, astringents, carburetor/choke cleaners, floor waxes/polishes, engine enamels, caulking compounds, waxes/polishes/sealers, and automotive sanding primers.</p>	<p>detergent, liquid gel air freshener (inc plug ins), liquid/gel area insect repellent/pesticide/herbicide, machine cleanser, machine freshener/deodorizer, metal polish, pre-treater aerosol laundry spray, pre-treater laundry trigger spray, slow release generator area insect repellent/pesticide (e.g. electrical), solid air freshener, solid area insect repellent/insecticide, whitening powder (stain remover), aerosol body spray, aerosol personal insect repellent, aerosol shampoo, aerosol sunscreen, alcohol-based cleanser, alcohol-based mouthwash, alcohol-based toner, alcohol-free mouthwash, antiperspirant/deodorant stick, depilatory aerosol, depilatory cream, depilatory finishing wipe, depilatory wax, 'EU market' aerosol antiperspirant/deodorant, hair aerosol mousse, hair aerosol spray, hair styling gel, liquid shampoo/ conditioner, moisturizing cream, moisturizing lotion, pimple cream/lotion, perfume, pump spray personal insect repellent, rubbing alcohol/sanitizer, soaps solid, soaps water-based surfactant, shaving cream, shaving foam/aerosol, toothpaste, and water-based toner.</p>
Methodology	<p>The SLR report attempted to establish an emissions inventory for Australia that could identify priority products via the following steps:</p> <ol style="list-style-type: none"> <li>1) Review of overseas regulations relating to VOCs (esp. US CARB)</li> <li>2) Refinement of a 'national emissions inventory' data set provided by NSW EPA via use of a scoring system that rated each product type according to "...their estimated magnitude of emissions, their potential to generate ozone, their potential human health toxicity and whether or not they were regulated overseas"</li> <li>3) A survey to collect and collate Australian manufacturing data. This was the survey of 37 targeted firms referred to above which only received responses from 12 firms and which SLR noted "...for the responses received, the completeness of the data varied...Data collected from the survey on the quantities of each product type produced in Australia and the typical formulations are therefore patchy and incomplete."</li> <li>4) Use of other commercially available indicative sales data, such as IBIS World and Retail World, in lieu of reliable survey data.</li> <li>5) Ranking of priority products based on estimated emissions and score data.</li> <li>6) Review of possible policy options.</li> </ol> <p>Comments – the valid concerns raised about the SLR report by a number of industry body stakeholders, including Accord, relate to:</p> <ul style="list-style-type: none"> <li>• the incompleteness or inaccuracy of the use data information relied on for calculations,</li> <li>• the 'biasing' of product rankings caused by use of factors not inherently relevant to actual likely emissions (or their impacts) in the Australian context – in this case:</li> </ul>	<p>Our survey methodology is outlined in detail in the next section of this report. In summary it entailed the following steps:</p> <ol style="list-style-type: none"> <li>1) Establishing an Accord Technical Working Group (TWG) of member company experts to oversight the survey</li> <li>2) Using a broad definition for "VOC of interest" – see above</li> <li>3) A scoping survey sent TWG members on the VOC content of an initial list of 106 product categories in order to identify those product categories with VOC content &gt;5% (i.e. products of 'VOC interest')</li> <li>4) Development of representative 'frame formulations' in terms of products offered for sale in Australia for the 53 product categories determined to be of "VOC interest" via: <ol style="list-style-type: none"> <li>a. Initial reference to reliable 'frame formulation' data sources (e.g. the EU Colipa list<sup>5</sup>)</li> <li>b. A further survey of relevant Accord member companies to refine and finalise the frame formulations based on their feedback on concentration ranges of ingredients</li> <li>c. Appointment of an independent cosmetic product regulatory consultant, Dr Graeme Haley, to assist with frame formulations for specific personal care product categories dominated by imports and/or small-to-medium enterprises</li> </ol> </li> <li>5) Survey to collect sales volume data (in mass or volume) from relevant Accord members for the 53 product categories – 23 member companies responded in full to this survey.</li> <li>6) Collation of overall 'industry' results for each product category.</li> <li>7) Calculation of product MIR values using Carter MIR values for the frame formulation component ingredients.</li> </ol>

<sup>5</sup> Colipa Guidelines 'Cosmetic Frame Formulations', Guidelines released in collaboration with the European Association of Poison Centres and Clinical Toxicologists, Jan 2000

	SLR survey report	Accord survey
	<ul style="list-style-type: none"> <li>○ weightings for products that are regulated overseas, and;</li> <li>○ weightings for product toxicity (a potential local effect) rather than ozone potential (the air pollution health effect of interest to this investigation) – asterixed point above</li> <li>• the presumptive use of US CARB exclusions and definitions in selecting product and ingredient targets, rather than starting with a 'blank sheet' looking more closely at what products are actually within the Australian market.</li> </ul>	<p>8) Ranking of product categories by multiplying their respective Sales Volume value by the Product MIR value.</p> <p><i>Comments – the primary goal of our survey was to develop a more robust and accurate relative ranking for the 'VOC significance' of everyday household and personal care products as sold to (and used by) Australian consumers. Recognising inherent limitations with the baseline data, we have been careful to avoid overextending the analysis to attempt to derive absolute VOC emission values for each product category. Neither our data set, nor that used in the SLR report, is sufficiently complete to be used in this manner.</i></p>
Use volume data sources	<ul style="list-style-type: none"> <li>• A survey of 37 targeted companies (see list above) was commenced, but only 12 responses received and SLR noted that the use data contained in these responses was “<i>patchy and incomplete</i>”.</li> <li>• This resulted in reliance on commercially available data sources not considered suitable for providing a reliable estimate of product volume usage for the sectors targeted: <ul style="list-style-type: none"> <li>○ IBISWorld data,</li> <li>○ Retail World data, plus;</li> </ul> certain Australian Customs import data.</li> </ul> <p><i>Comments –</i></p> <ul style="list-style-type: none"> <li>• While IBISWorld is a leading market data company based out of the USA, UK and Australia, its reports generally provide market overviews rather than accurate product-by-product sales or use data information. SLR notes that “...limited information is available on the individual product types of interest in this study”.</li> <li>• Retail World data only covers the grocery supply chain (mainly supermarkets) and additionally does not report sales volume in either kilograms or litres of product. Instead as SLR notes “...data are reported in terms of the number of units of product sold and sales volume (\$), with no data available on the quantities sold as mass or volume”.</li> <li>• On this basis, it is difficult to fully understand how the use volume data reported in the SLR report and used in that report's emissions calculations was actually derived.</li> </ul>	<ul style="list-style-type: none"> <li>• Relevant Accord member companies were surveyed and asked to provide sales volume data for all of the 53 product categories that they were selling into the Australian market, whether manufactured locally or imported.</li> <li>• Individual company data was collected on a commercial-in-confidence basis in order to encourage industry participation.</li> <li>• The individual company data was collated and our survey reports the consolidated sales volume in kilograms or litres for each of the 53 product categories.</li> <li>• 23 Accord member companies responded to the survey. This survey cohort included: <ul style="list-style-type: none"> <li>○ 15 cosmetic product companies (covering colour cosmetic, fragrances, skin care, hair care and toiletry products); 8 fast-moving consumer goods companies (covering household cleaning products and personal care products)</li> <li>○ the following distribution channels: <ul style="list-style-type: none"> <li>▪ supermarkets (~9 companies)</li> <li>▪ department stores (~10 companies)</li> <li>▪ mass-market retailers (~7 companies)</li> <li>▪ pharmacy (~12 companies)</li> <li>▪ direct selling (~3 companies)</li> <li>▪ own stores (~2 companies)</li> </ul> </li> </ul> </li> </ul> <p><i>Comments –</i></p> <ul style="list-style-type: none"> <li>• Accord's membership does not include retailer private label product. It is acknowledged that our survey of 23 member companies would not represent the entirety of the Australian household and personal care products market. (See page 9 'Targeted Industry' for estimated market coverage.) However, this is only a limitation if the goal is to generate estimates of absolute VOC emission values.</li> <li>• Our survey's goal was instead to estimate the <u>relative</u> contribution of major categories of formulated household &amp; personal care products to tropospheric VOC emissions. And to do this is more accurate fashion than the SLR report.</li> <li>• The 23 responding companies are a robust representative sample of the Australian market. On this basis, our sales volume data provides a sound platform for assessing the relative contribution of the 53 product categories within our industry sector determined to be of 'VOC interest'.</li> </ul>

While noting the significant differences in methodology and scope outlined above, it is still worth highlighting the magnitude of the quantitative difference in product volume use data between the SLR survey and this survey. To

attempt a comparison between the use volume data, we reviewed the SLR data (provided to by NSW EPA as a database) and tried to best match its data to the 53 product categories investigated in this survey (see attachment 2).

The following table summarises the quantitative differences between the two sets of product volume use data:

<b>SLR survey report</b> <i>(Note – data was reported for 245 product categories)</i>	<b>Reported quantity (kg)</b>	<b>Accord survey</b> <i>(Note – survey focused exclusively on 53 product categories with VOC content &gt;5%)</i>	<b>Reported quantity (kg)</b>
Insect repellents		Aerosol personal insect repellent	261,500
		Pump spray personal insect repellent	93,981
		Roll-on insect repellent	20,100
		Liquid/Gel area insect repellent/pesticide/herbicide	4,198
		Solid area insect repellent/insecticide	3,600
	<b>790,616</b>		<b>383,379</b>
Insecticides (includes lawn and garden insecticides, space insecticides/foggers, flying insect sprays, residual insecticides, hornet and wasp sprays, flea and tick products, other insecticides)	<b>24,872,053</b>	DIY pesticide trigger pack	<b>626,800</b>
Air fresheners (includes room air fresheners, toilet deodorant blocks, other air fresheners)	<b>10,860,852</b>	Aerosol air freshener	794,456
		Liquid/Gel air freshener including plug-ins	34,508
		Solid air freshener	0
			<b>828,964</b>
Waxes and polishes (includes furniture waxes and polishes, floor waxes and polishes, dusting aids, other waxes and polishes)	<b>16,957,062</b>	Metal polish	<b>98,181</b>
Dishwashing products (includes dish detergents (manual), dish detergents (machine), rinse aids, film and spot removers, other dishwashing products)	<b>79,509,961</b>	Dishwashing liquid	6,436,164
		Machine cleanser	0
		Machine freshener/deodoriser	0
			<b>6,436,164</b>
Fabric and carpet care products (includes carpet cleaners, carper deodorisers, upholstery cleaners, spot removers, fabric stain repellents, water repellents, fabric dyes, antistatic sprays, dry cleaning fluids, other fabric/carpet care products)	<b>6,299,505</b>	Soft furnishing/fabric/carpet cleaners – aerosol deodoriser	<b>522,000</b>
		Soft furnishing/fabric/carpet cleaners – aerosol mousse	<b>0</b>
			<b>522,000</b>
Laundry products (includes detergents, soaps, presoaks, prewash spot removers, bleaches and lighteners, whiteners/brighteners, bluing, fabric softeners, water conditionings, starches/sizings, other laundry products)	<b>396,545,207</b>	Pre-treater trigger spray	1,404,470
		Pre-treater aerosol spray	193,700
		Whitening powder (stain removal)	7,640
			<b>1,605,810</b>
Hard surface cleaners (includes general purpose cleaners, glass cleaners, oven cleaners, tub/tile/sink cleaners, mildew		Hard surface cleaners/disinfectant – liquid detergent	5,218,449
		Hard surface cleaners/disinfectant –	1,775,400



<b>SLR survey report</b> <i>(Note – data was reported for 245 product categories)</i>	<b>Reported quantity (kg)</b>	<b>Accord survey</b> <i>(Note – survey focused exclusively on 53 product categories with VOC content &gt;5%)</i>	<b>Reported quantity (kg)</b>
removers, toilet bowl cleaners, rust stain removers, metal cleansers, soap scouring pads, other hard surface cleaners)	<b>89,839,011</b>	aerosol cleaner Hard surface cleaners/disinfectant – impregnated wipes (wet)	9,824 <b>7,003,673</b>
Miscellaneous personal care products (includes hand cleaners and soaps, rubbing alcohol, shaving creams/gels, other misc. personal care)	<b>62,712,118</b>	Soaps solid Soaps water based surfactants Rubbing alcohol/sanitising hand rub Shaving cream Shaving foam aerosol	901,139 10,014,648 322,221 5,679 795,346 <b>12,039,033</b>
Oral care products (includes mouthwashes, breath fresheners, plaque removal solutions, fluoride rinses, dental care products, other oral care products)	<b>22,834,889</b>	Alcohol-based mouthwash Alcohol-free mouthwash Toothpaste	4,771,478 2,509,106 5,974,949 <b>13,255,533</b>
Facial and body treatments (includes astringents, creams/scrubs/cleaners, rouges/blushes, foundations/fixatives, lipsticks, moisturisers, skin lighteners, facial masques, mascara, eyeliner, eye shadow, eye makeup remover, eyebrow pencil, hand/body lotions, skin protectants, depilatories, self-tanning preparations, suntan oil/lotions, sunscreens, other facial/body treatments)	<b>11,290,237</b>	Alcohol-based toner Water-based toner Alcohol-based cleanser Moisturising lotions Moisturising creams Depilatory wax Depilatory cream Depilatory aerosol Pimple cream/lotion	47,877 75,572 7,800 2,917,685 699,946 78,726 14,048 14,400 6,833 <b>3,862,887</b>
Nail care products (includes polishes, base/undercoats, polish removers, nail extenders, cuticle softeners, manicure preparations, other nail care products)	<b>979,656</b>	Nail polish Nail Polish Remover Acetone based Nail Polish Remover Acetone free	79,466 180,172 13,147 <b>272,785</b>
Fragrance products (includes colognes/perfumes, toilet waters, after shave treatments, body fragrance sprays, bath oils/beads/capsules, other fragrance products)	<b>2,983,226</b>	Perfume (includes all key categories of pump and/or dab-on/splash-on perfumes/fragrances/colognes/ aftershave) Aerosol body sprays	604,952 1,435,963 <b>2,040,915</b>
Deodorants/Antiperspirants (includes underarm deodorants, underarm antiperspirants, foot deodorant sprays, feminine hygiene deodorants, other deodorants/antiperspirants)	<b>16,249,507</b>	EU aerosol antiperspirant/deodorant Antiperspirant/deodorant stick	4,207,120 304,985 <b>4,512,105</b>
Haircare products (Bleaches/lighteners,		Hair aerosol mousse	143,337



SLR survey report (Note – data was reported for 245 product categories)	Reported quantity (kg)	Accord survey (Note – survey focused exclusively on 53 product categories with VOC content >5%)	Reported quantity (kg)
brilliantines, conditioners, conditioning sprays, curl activators, curl revitalisers, dyes – permanent, dyes – semi-permanent, dyes – temporary, finishing hair sprays, grooming creams, mousses, permanent wave treatments, pomades, rinses, setting lotions, shampoos, spray shines, straighteners, styling gels, styling sprays, styling spritzes, thickeners, tonics, other hair care products)	57,863,263	Aerosol shampoo Liquid shampoo/conditioner Hair styling gel Hair aerosol spray	44,024 5,904,786 171,542 703,179
			6,966,868

Additional to the above, the SLR report also presented ‘product sales’ volume data for the following product categories which are not covered to any major extent by Accord:

*Office supplies (pens, ink etc...) – 2,721,920 kg; Pressurized food products – 1,357,240 kg; Non-pesticidal veterinary products – 26,320,780 kg; Art/craft supplies – 422,241 kg; Coating-related products (paint thinners, paint removers, etc...) – 7,914,805 kg; Aerosol spray paints – 10,095,438 kg; Dog/cat repellents & rodent baits – 343,660 kg; Herbicides – 33,871,420 kg; Fungicides/nematicides – 5,878,071 kg; Certain insecticides (e.g. flea/tick treatments, lawn products) – 24,872,053 kg; Sealants (hardware) – 15,370,218 kg; Adhesives – 35,267,746 kg; Maintenance/repair products – 54,007,341 kg; Automotive detailing products – 4,088,922 kg; Shoe/leather care products – 83,500 kg; Misc household products (e.g. charcoal lighters, driveway cleaners) – 12,278,556 kg.*

There is not a great deal of insight that can be gained from a direct comparison of the SLR data set to Accord’s. Such an exercise is to a large extent the equivalent of ‘comparing apples to oranges’. But it should be noted that, for every category of product, the SLR report contains a higher sales volume than the Accord report with the difference ranging from a factor of 1.5 for fragrances to 245 for laundry.

We are confident that the Accord data obtained from the 23 responding companies provides a robust representative sample of the Australian market. Whilst not purporting to represent the entirety of the Australian household and personal care products market, our survey was able to obtain reliable sales volume data from Australian companies for product categories determined to be of ‘VOC interest’.

Mouthwash is one category worth considering as an indicator of the reliability of Accord’s data. The latest edition of *Retail World* (covering sales for 2013) reports 14,400,000 units of mouthwash sold through the grocery channels it covers. While container size can vary, the standard size for these products is 500mL. This would infer a figure in the order of 7,200,000 kg through these grocery channels. While *Retail World* does not cover the pharmacy channel, its figures are still ‘within the ballpark’ of the figures obtained by our survey, which gave a combined mouthwash figure of 7,280,584 kg. The comparability of use data here is unsurprising, as our survey cohort included three of the most significant suppliers of mouthwash products and *Retail World* market share data shows that they make up 94% of the market by volume.

In contrast, and as noted previously, it is unclear to us exactly how the volume figures quoted in the SLR report were ultimately derived. SLR acknowledge that the 12 company responses to the SLR survey contain “patchy and incomplete” data. Limitations associated with its major other sources IBISWorld and Retail World are also acknowledged:

- IBISWorld – “...limited information is available on the individual product types of interest in this study”
- Retail World – “...data are reported in terms of the number of units of product sold and sales volume (\$), with no data available on the quantities sold as mass or volume”. (Furthermore, Retail World data only covers the grocery supply chain, with the level of category segmentation and categorization at the discretion of the companies supplying the data.)

Additionally, as the goal of the Accord survey was to consider only those product categories determined to be of ‘VOC interest’, the Accord data set only includes those products determined to contain >5% ‘VOC of interest’. This has led to significant discrepancies with some volumes reported in the SLR report. For example, SLR reports laundry products (including detergents, soaps, presoaks, prewash spot removers, bleaches and lighteners, whiteners/brighteners, bluing, fabric softeners, water conditionings, starches/sizings, and other laundry products)

at 396,545,207 kg, nearly 250 times the volume indicated by Accord's data (1,605,810 kg) – largely due to the fact that laundry detergent powder, detergent liquid, fabric softener and bleach contain <5% 'VOC of interest' and were therefore excluded from the Accord data set. This is also the case for categories such as dishwashing products, where powders, tablets and rinse aids were determined to contain <5% 'VOC of interest' and were not considered further.

Obtaining consistently reliable sales volume data for product categories determined to be of 'VOC interest' was an objective of our survey in order to support of goal of reliably ranking the relative VOC significance of major categories of formulated household & personal care products used in Australia.

In order to improve the comparability of the two reports, we compared the total estimated National VOC emissions from the SLR report with the total estimated National VOC emissions from our survey. Both the SLR report and Accord survey estimated the percentage of products represented by the survey results in order to reach the estimated National VOC emission level. Accord estimate was based on market share percentages available from Retail World sales volume data and Accord knowledge of the industry sector we represent. We do not have information on how the SLR estimate was reached.

There are some significant differences in the results of comparing the reported volumes with the estimated VOC emissions. In some cases, the SLR report estimate values become close to the Accord survey estimates e.g. fabric and carpet care products, hard surface cleaners and facial and body treatments, or the gap between the two results become less prominent e.g. air fresheners, laundry products, miscellaneous personal care products and deodorants and antiperspirants. In other cases, the gap remains significant e.g. insecticides, waxes and polishes, dishwashing products, oral care products, nail care products and hair care products.

Interestingly, while the SLR survey report records a significantly higher use volume of antiperspirants and deodorants than the Accord survey, the VOC contribution is higher from the Accord survey. This is potentially due to the differences in user preferences in Australia to those of USA – Accord survey results were based on Australian use and formulation and we understand that the SLR report utilized the USA figures and formulations.

These differences could be the result of differences in formulations of products considered, the percentage of market share captured by the survey and the definition of VOC contributing products used, including the difference in the definition of VOC. This once again highlights the difficulty of directly comparing the results of the SLR survey report with the Accord survey.

<b>SLR survey report</b> <i>(Note – data was reported for 245 product categories)</i>	<b>Estimated VOC Emissions (National) (kg/annum)</b>	<b>Accord survey</b> <i>(Note – survey focused exclusively on 53 product categories with VOC content &gt;5%)</i>	<b>Estimated VOC Emissions (National) (kg/annum)</b>
Insect repellents		Aerosol personal insect repellent	253,065
		Pump spray personal insect repellent	54,570
		Roll-on insect repellent	11,412
		Liquid/Gel area insect repellent/pesticide/herbicide	3,234
		Solid area insect repellent/insecticide	533
	<b>617,394</b>		<b>322,814</b>
Insecticides (includes lawn and garden insecticides, space insecticides/foggers, flying insect sprays, residual insecticides, hornet and wasp sprays, flea and tick products, other insecticides)	<b>4,400,676</b>	DIY pesticide trigger pack	<b>473,582</b>

<b>SLR survey report</b> <i>(Note – data was reported for 245 product categories)</i>	<b>Estimated VOC Emissions (National) (kg/annum)</b>	<b>Accord survey</b> <i>(Note – survey focused exclusively on 53 product categories with VOC content &gt;5%)</i>	<b>Estimated VOC Emissions (National) (kg/annum)</b>
Air fresheners (includes room air fresheners, toilet deodorant blocks, other air fresheners)	<b>2,560,260</b>	Aerosol air freshener Liquid/Gel air freshener including plug-ins Solid air freshener	1,000,426 22,494 0 <b>1,022,920</b>
Waxes and polishes (includes furniture waxes and polishes, floor waxes and polishes, dusting aids, other waxes and polishes)	<b>662,815</b>	Metal polish	<b>36,363</b>
Dishwashing products (includes dish detergents (manual), dish detergents (machine), rinse aids, film and spot removers, other dishwashing products)	<b>118,545</b>	Dishwashing liquid Machine cleanser Machine freshener/deodoriser	0 0 0 <b>0</b>
Fabric and carpet care products (includes carpet cleaners, carper deodorisers, upholstery cleaners, spot removers, fabric stain repellents, water repellents, fabric dyes, antistatic sprays, dry cleaning fluids, other fabric/carpet care products)	<b>566,147</b>	Soft furnishing/fabric/carpet cleaners – aerosol deodoriser Soft furnishing/fabric/carpet cleaners – aerosol mousse	526,068 0 <b>526,068</b>
Laundry products (includes detergents, soaps, presoaks, prewash spot removers, bleaches and lighteners, whiteners/brighteners, bluing, fabric softeners, water conditionings, starches/sizings, other laundry products)	<b>577,690</b>	Pre-treater trigger spray Pre-treater aerosol spray Whitening powder (stain removal)	790,655 140,612 0 <b>931,267</b>
Hard surface cleaners (includes general purpose cleaners, glass cleaners, oven cleaners, tub/tile/sink cleaners, mildew removers, toilet bowl cleaners, rust stain removers, metal cleansers, soap scouring pads, other hard surface cleaners)	<b>1,689,483</b>	Hard surface cleaners/disinfectant – liquid detergent Hard surface cleaners/disinfectant – aerosol cleaner Hard surface cleaners/disinfectant – impregnated wipes (wet)	278,312 1,088,912 10,770 <b>1,377,994</b>
Miscellaneous personal care products (includes hand cleaners and soaps, rubbing alcohol, shaving creams/gels, other misc. personal care)	<b>2,250,350</b>	Soaps solid Soaps water based surfactants Rubbing alcohol/sanitising hand rub Shaving cream Shaving foam aerosol	139,531 934,700 303,512 879 153,938 <b>1,532,560</b>
Oral care products (includes mouthwashes, breath fresheners, plaque removal solutions, fluoride rinses, dental		Alcohol-based mouthwash Alcohol-free mouthwash	1,537,476 1,424,525

<b>SLR survey report</b> <i>(Note – data was reported for 245 product categories)</i>	<b>Estimated VOC Emissions (National) (kg/annum)</b>	<b>Accord survey</b> <i>(Note – survey focused exclusively on 53 product categories with VOC content &gt;5%)</i>	<b>Estimated VOC Emissions (National) (kg/annum)</b>
care products, other oral care products)	<b>136,443</b>	Toothpaste	1,832,318
			<b>4,794,319</b>
Facial and body treatments (includes astringents, creams/scrubs/cleaners, rouges/blushes, foundations/fixatives, lipsticks, moisturisers, skin lighteners, facial masques, mascara, eyeliner, eye shadow, eye makeup remover, eyebrow pencil, hand/body lotions, skin protectants, depilatories, self-tanning preparations, suntan oil/lotions, sunscreens, other facial/body treatments)	<b>546,470</b>	Alcohol-based toner Water-based toner Alcohol-based cleanser Moisturising lotions Moisturising creams Depilatory wax Depilatory cream Depilatory aerosol Pimple cream/lotion	34,595 6,826 4,126 350,122 81,284 9,142 2,538 2,415 1,058
			<b>492,106</b>
Nail care products (includes polishes, base/undercoats, polish removers, nail extenders, cuticle softeners, manicure preparations, other nail care products)	<b>1,358,482</b>	Nail polish Nail Polish Remover Acetone based Nail Polish Remover Acetone free	108,513 146,622 11,424
			<b>266,559</b>
Fragrance products (includes colognes/perfumes, toilet waters, after shave treatments, body fragrance sprays, bath oils/beads/capsules, other fragrance products)	<b>1,433,637</b>	Perfume (includes all key categories of pump and/or dab-on/splash-on perfumes/fragrances/colognes/ aftershave) Aerosol body sprays	374,680 1,426,699
			<b>1,801,379</b>
Deodorants/Antiperspirants (includes underarm deodorants, underarm antiperspirants, foot deodorant sprays, feminine hygiene deodorants, other deodorants/antiperspirants)	<b>2,301,567</b>	EU aerosol antiperspirant/deodorant Antiperspirant/deodorant stick	3,038,476 177,088
			<b>3,215,564</b>
Haircare products (Bleaches/lighteners, brilliantines, conditioners, conditioning sprays, curl activators, curl revitalisers, dyes – permanent, dyes – semi-permanent, dyes – temporary, finishing hair sprays, grooming creams, mousses, permanent wave treatments, pomades, rinses, setting lotions, shampoos, spray shines, straighteners, styling gels, styling sprays, styling spritzes, thickeners, tonics, other hair care products)	<b>14,182,977</b>	Hair aerosol mousse Aerosol shampoo Liquid shampoo/conditioner Hair styling gel Hair aerosol spray	90,626 49,421 0 104,032 390,151
			<b>634,230</b>

## Methodology

### Obtaining input from industry experts

Accord established a Technical Working Group from amongst our member companies, drawing on technical and regulatory compliance experts. This group assisted in developing frame formulations and finalising a survey design that would help to maximise participation by leading companies supplying the Australian market.

Accord also arranged opportunities for NSW EPA staff to present to the industry in order to explain the policy background, the potential significance of VOC emissions and their contribution to smog formation. This helped build support for the project.

To overcome some capacity issues with SME companies in the cosmetics sector, in early 2013 Accord commissioned leading regulatory consultant Dr Graeme Haley (Engel Hellyer & Partners) to provide expert input on the frame formulations for personal care products.

### VOC definition

For the purposes of this project, “VOC of interest” was defined as:

- a chemical substance containing 12 carbon atoms or less; or
- having a vapour pressure of 2 mm Hg or higher.

Information collected was based on a “worst case scenario”.

For example, where a substance contains a mixture of carbon chain lengths (such as C8-C16 alkyl esters), this substance was categorised as a ‘VOC of interest’.

### Identification and categorisation of relevant consumer products

Accord Australasia represents manufacturers and suppliers of a broad range of formulated chemical consumer products.

To facilitate data collection, these products were categorised into groups across the following three broad categories:

- colour cosmetics,
- home care, and;
- personal care products.

It should be noted, as mentioned earlier, that a number of specific product categories of potential relevance to this issue, such as automotive after-care products, are not extensively covered within Accord’s membership.

The product categories featured in this report are those for which Accord members represent significant shares of the overall market, often >80%.

With input from industry, product groups supplied by Accord members and containing greater than 5% VOC of interest were identified.

A final list comprising 53 product groupings assessed as containing greater than 5% VOCs of concern was developed as follows:

Colour cosmetics	Home care		Personal care	
Nail polish	Aerosol air freshener	Machine	Aerosol body spray	Hair styling gel
Nail polish remover (acetone based)	Aerosol area insect repellent	freshener/deodorizer	Aerosol personal insect repellent	Liquid shampoo/conditioner
Nail polish remover (acetone free)	Aerosol cleaner (carpet/furnishings)	Metal polish	Aerosol shampoo	Moisturising cream
	Aerosol deodorizer (carpet/furnishings)	Pre-treater aerosol laundry spray	Aerosol sunscreen	Moisturising lotion
	Aerosol mousse or spray (carpet/furnishings)	Pre-treater laundry trigger spray	Alcohol-based cleanser	Pimple cream/lotion
	Dishwashing liquid (manual)	Slow release generator area insect repellent/pesticide (e.g electrical)	Alcohol-based mouthwash	Perfume
	DIY pesticide trigger pack	Solid air freshener	Alcohol-free mouthwash	Pump spray personal insect repellent
	Impregnated wipes (wet)	Solid area insect repellent/insecticide	Antiperspirant/deodorant stick	Roll-on personal insect repellent
	Liquid detergent	Whitening powder (stain remover)	Depilatory aerosol	Rubbing alcohol/sanitizer
	Liquid/gel air freshener (inc plug ins)		Depilatory cream	Soaps solid
	Liquid/gel area insect repellent/pesticide/herbicide		Depilatory finishing wipe	Soaps water-based surfactant
	Machine cleanser		Depilatory wax	Shaving cream
			'EU market' aerosol antiperspirant/deodorant	Shaving foam/aerosol
			Hair aerosol mousse	Toothpaste
			Hair aerosol spray	Water-based toner

## Frame formulation development

Frame formulations provide composition specifications for a group of products having the same usage profile. Generally this is in the form of a list of ingredients including the 'typical' or 'average' concentrations of each of these ingredients in the frame formulation.

As noted already, it was decided to use frame formulations because of the advantages this provided compared to surveying companies and attempting to collate data on thousands of individual product SKUs.

The experience with the SLR survey demonstrated that attempts to survey the entire product range of every household & personal care company in order to obtain detailed formulation compositions would be too costly, resource intensive and run up against insurmountable confidentiality issues.

Initial frame formulations were developed with input from key industry experts as well as available reference sources like the 'Cosmetic Frame Formulations' guideline<sup>6</sup> published by Colipa (now known as Cosmetics Europe).

These were subject to a process of ongoing refinement, with feedback being received from members of the Accord VOC Technical Working Group, in order to build frame formulations representative of the typical products sold to Australian consumers. Additionally, Accord commissioned leading industry regulatory and technical consultant, Dr Graeme Haley (Engel Hellyer & Partners), to develop and refine frame formulations for personal care product categories.

Frame formulations for each of the 53 product categories were determined as representations of the ingredients present in a category. These frame formulations contain ingredients that are not VOCs, but also capture all VOCs that are likely to be found in a product grouping.

Each ingredient was identified by chemical name and assigned a unique ID. For each ingredient identified in the frame formulation, minimum and maximum concentrations within the product grouping were estimated. From these estimates of the minimum and maximum concentration of each ingredient, a 'median' concentration was designated as the mid-point between these two values.

The median concentration is likely to provide a more realistic indication of the ingredient concentration across *all* products within a category than either the minimum concentration (which was frequently zero concentration) or the maximum concentration.

<sup>6</sup> Colipa Guidelines 'Cosmetic Frame Formulations', Guidelines realised in collaboration with The European Association of Poison Centres and Clinical Toxicologists (EAPCCT), January, 2000



While a mean value would have been preferred, this could not be mathematically derived within our survey and such values would have required full confidential product formula disclosure. Instead frame formulations were derived from highly representative ingredient range declarations provided confidentially by individual company respondents.

Subsequent results and discussion primarily focus on calculations using these median values.

At various points throughout the conduct of this survey, frame formulation details were cross-checked and confirmed as representative by Accord's VOC Technical Working Group of industry experts.

### Sales volume data collection

Accord member companies supplying cosmetics, personal care, salon and household products were surveyed for sales volume data for the period January-December 2012 across the 53 product groupings.

On a confidential basis, companies provided a single amalgamated sales volume per Product ID for each of the particular product groupings relevant to the individual company, i.e. as the sum of sales volumes for all SKUs within the product grouping.

Sales volume data were primarily provided by mass (kilograms) of product. However when mass data were not available, volume in litres was collected. These data were consolidated for each of the 53 product groupings across the 23 responding companies.

Data was supplied by 23 major companies as listed below:

***Aesop, Amway, Avon, Beiersdorf, Chanel, Colgate-Palmolive, Cosmax, Coty, Estée Lauder, Frostbland, Johnson & Johnson, Keune, L'Oréal, NAK, Nutrimetics, Procter & Gamble, PZ Cussons, Reckitt Benckiser, Revlon, Rusk, SC Johnson, The Heat Group, Unilever***

This survey cohort is a good representative sample of the overall industry which Accord represents, providing a sound base from which to calculate relative product rankings. Based on *Retail World* market shares and knowledge of our sector we estimate *this sample of 23 companies* covers:

- 65-80% of the colour cosmetics market by volume (depending on specific product)
- 50-85% of the home care market by volume (depending on specific product)
- 65-90% of the personal care products market by volume (depending on specific product)

### Calculations

#### Total sales volume

Following collection of company sales volume data, a total "industry" sales volume was calculated for each product grouping as the sum of all individual company sales volumes for that Product ID.

Where both mass and volume was provided, the values were summed. In the absence of specific data on density or specific gravity, it was assumed that the specific gravity of all volumes given in litres was 1 (when referenced to water).

#### Maximum Incremental Reactivity (MIR)

The Maximum Incremental Reactivity (MIR) scale is used as an indicator of the ozone-forming potential of VOCs, with every individual VOC having a specific MIR.

As noted already, the MIR scale is used by various environmental bodies around the world, including the US EPA and the California Air Resource Board (CARB).

The MIR value for each VOC of interest identified in each frame formulation was supplied to Accord by the NSW EPA.

## Frame formulation MIR calculations

For each VOC of interest, the MIR value was multiplied by its minimum, median and maximum concentration in each frame formulation to calculate its minimum, median and maximum MIR contribution respectively in the frame formulation.

The total MIR contribution (minimum, median and maximum) of the frame formulation was calculated as the sum of the individual MIR contributions of each substance in the frame formulation.

To facilitate comparison of MIR contributions between product groups, the total MIR contribution (minimum, median and maximum) for each frame formulation was divided by the sum of the concentration of ingredients (minimum, median and maximum) in the frame formulation. The resulting values are termed “normalised” MIR contributions.

## Sales volume MIR contributions

The normalised MIR of each frame formulation (minimum, median and maximum) was multiplied by the total “industry” sales volume for each product grouping to provide the MIR contribution (minimum, median and maximum) for the whole product category.

These are the values which allow for comparison between product categories and a ranking of which is estimated to make the most significant contribution to tropospheric VOC emissions.

## Results

### Frame formulations for each product categories

The frame formulations developed for each of the 53 product categories can be viewed at Appendix A. For each of these, formulation MIR values have been calculated. The frame formulations have been entered into a Microsoft Access database, which Accord is making available to NSW EPA as a reference for possible future analysis needs around the VOC content of common household and personal care products.

### Product categories by total sales volume

For complete tables and graphs of the 53 product categories by total sales volume refer to Appendix B. The ten most significant product categories in terms of total sales volumes – based on consolidated responses across the 23 responding companies – were as follows:

	Product category	Product class	Product type/use	Estimated % market share by volume for 23 company survey cohort*	Consolidated volume (kg or L), est** (M = millions)
#1	Soaps water-based surfactants	Personal care	Skin care	75%	10.015 M
#2	Dishwashing liquid (manual)	Home care	Dish wash	60-65%	6.436 M
#3	Toothpaste	Personal care	Oral care	75%	5.975 M
#4	Liquid shampoo/conditioner	Personal care	Hair care	75%	5.905 M
#5	Liquid detergent	Home care	Hard surface cleaners/ disinfectants	75%	5.218 M
#6	Alcohol-based mouthwash	Personal care	Oral care	>90%	4.771 M
#7	Antiperspirant/deodorant (EU)	Personal care	Antiperspirant deodorant	>90%	4.207 M
#8	Moisturising lotions	Personal care	Skin care	ca. 75%	2.918 M
#9	Alcohol-free mouthwash	Personal care	Oral care	>90%	2.509 M
#10	Aerosol cleaner	Home care	Hard surface cleaners/ disinfectants	ca. 75%	1.775 M

\* This estimate is based on market share percentages available from Retail World sales volume data and Accord knowledge of the industry sector we represent. Retail World market share data is less reliable for moisturising lotions and household aerosol cleaners.

\*\* As already noted these figures are considered reflective of the relative volumes of the product categories, noting though that these figures do not include volumes for supermarket retailer private label brands. However, in comparison to the earlier SLR report these volume data cover all major distribution chains – supermarket, mass market, department store, pharmacy, direct selling. Despite this we would caution against using our data for any more than comparison purposes between product categories.

Also having a sales volumes greater than (or near to) the 1 M kg/L mark were *pre-trigger laundry spray* and *solid soaps*.

### Product categories by calculated MIR values

For complete tables and graphs of the MIR values for the 53 product categories refer to Appendix C. The eleven most significant product categories in terms of normalised, estimated MIR values are as follows:

	Product category	Product class	Product type/use	Max MIR	Median MIR
#1	Solid air freshener	Home care	Air fresheners	1.60	1.61
#2	Rubbing alcohol/sanitising hand rub	Personal care	Skin care/hygiene	1.18	1.13
#3	Alcohol-free mouthwash	Personal care	Oral care/hygiene	1.14	1.07
#4	Pre-treater aerosol spray	Home care	Laundry	1.14	0.91
#5	Aerosol air freshener	Home care	Air freshener	1.07	1.01
#6	Nail polish	Colour cosmetic	Nail care	1.04	0.97
#7	Aerosol deodoriser	Home care	Soft furnishing/carpet	1.04	1.03
#8	Impregnated wipes - wet	Home care	Hard surface cleaners/disinfectants	1.03	0.93
#9	Aerosol area insect repellent	Home care	Insect repellent/ pesticides	1.00	0.82
#10	Aerosol personal insect repellent	Personal care	Skin care	0.98	0.98
#11	Antiperspirant/deodorant stick	Personal care	Antiperspirant deodorant	0.98	0.92

Additional to these the following product category was in the 'top ten' for median MIR values: aerosol shampoo (median MIR – 0.94; ranked 8<sup>th</sup>).

### VOC ingredients by MIR and volume

Based on the frame formulations for the 53 products categories the following ten ingredients are the most significant in terms of MIR value:

	VOC ingredients	No. of product categories present in	MIR
#1	toluene	1	4.00
#2	2-(2-ethoxyethoxy) ethanol	10	3.26
#3	glycerol	17	3.15
#4	ethylene glycol	1	3.13
#5	propylene glycol	22	2.58
#6	1-methoxy-2-propanol	1	2.44
#7	ethanol	39	1.53
#8	isobutane	15	1.23
#9	n-butane	13	1.15
#10	n-butyl acetate	1	0.83

Using the product category sales volume data and the concentrations in the frame formulations, the top eleven VOC ingredients, by estimated volume, is as follows:

		Calculated Volumes kg or L in millions		
	VOC ingredients	Minimum	Maximum	Median
#1	ethanol	0.561 M	29.257 M	9.195 M
#2	glycerol	0.394 M	15.242 M	5.323 M
#3	n-butane	0.088 M	13.890 M	3.748 M
#4	dimethyl ether	0.000M	10.365 M	2.599 M
#5	isobutane	0.059 M	7.137 M	1.962 M
#6	propylene glycol	0.000 M	5.678 M	1.822 M
#7	propane	0.029 M	3.764 M	1.046 M
#8	perchloroethylene	0.000 M	1.641 M	0.536 M
#9	2-(2-ethoxyethoxy) ethanol	0.000 M	1.388 M	0.435 M
#10	acetone	0.076 M	0.222 M	0.139 M
#11	Isopropyl alcohol	0.002 M	0.265 M	0.075 M

### Product categories ranked by their sales volume multiplied by MIR value

In order to rank the most significant product categories in terms of estimated VOC contribution on a comparative basis, we multiplied the sales volume data by the calculated frame formulation MIR value.

This gave the following:

- Calculated using maximum estimated frame formulation MIR values

	Product category	Product class	Product type/use	Vol x <u>Max</u> MIR*
#1	Toothpaste	Personal care	Oral care/hygiene	4062965
#2	Alcohol-based mouthwash	Personal care	Oral care/hygiene	3721753
#3	Aerosol antiperspirant/deodorant (EU)	Personal care	Antiperspirant/deodorant	2944984
#4	Alcohol-free mouthwash	Personal care	Oral care/hygiene	2860381
#5	Soaps water-based surfactant	Personal care	Skin care/hygiene	2403516
#6	Aerosol body spray	Personal care	Body spray	1306726
#7	Aerosol cleaner	Home care	Hard surface cleaners/ disinfectants	1260534
#8	Pre-treater trigger spray	Home care	Laundry	1053353
#9	Moisturising lotions	Personal care	Skin care	1021190
#10	Aerosol air freshener	Home care	Air freshener	850068

- Calculated using minimum estimated frame formulation MIR values

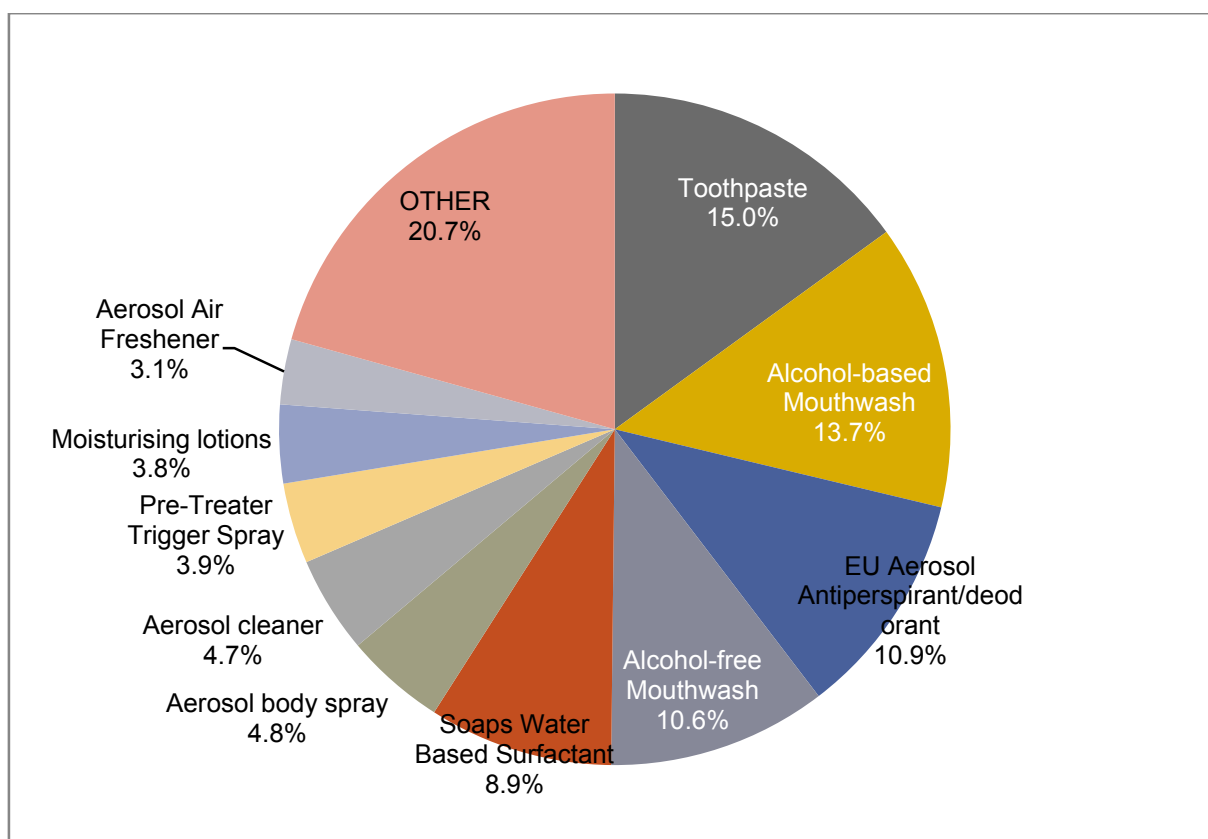
	Product category	Product class	Product type/use	Vol x <u>Min</u> MIR*
#1	Alcohol-based mouthwash	Personal care	Oral care/hygiene	2147165
#2	Alcohol-free mouthwash	Personal care	Oral care/hygiene	1831647
#3	Toothpaste	Personal care	Oral care/hygiene	1194990
#4	Hair aerosol spray	Personal care	Hair care	921164
#5	Perfume	Personal care	Fragrance	538408
#6	Aerosol air freshener	Home care	Air fresheners	325727
#7	Aerosol personal insect repellent	Personal care	Skin care/pest control	251040
#8	Aerosol cleaner	Home care	Hard surface cleaner/ disinfectant	177540
#9	Hair aerosol mousse	Personal care	Hair care	153370
#10	Shaving foam aerosol	Personal care	Shaving products	15116

- Calculated using median estimated frame formulation MIR values -

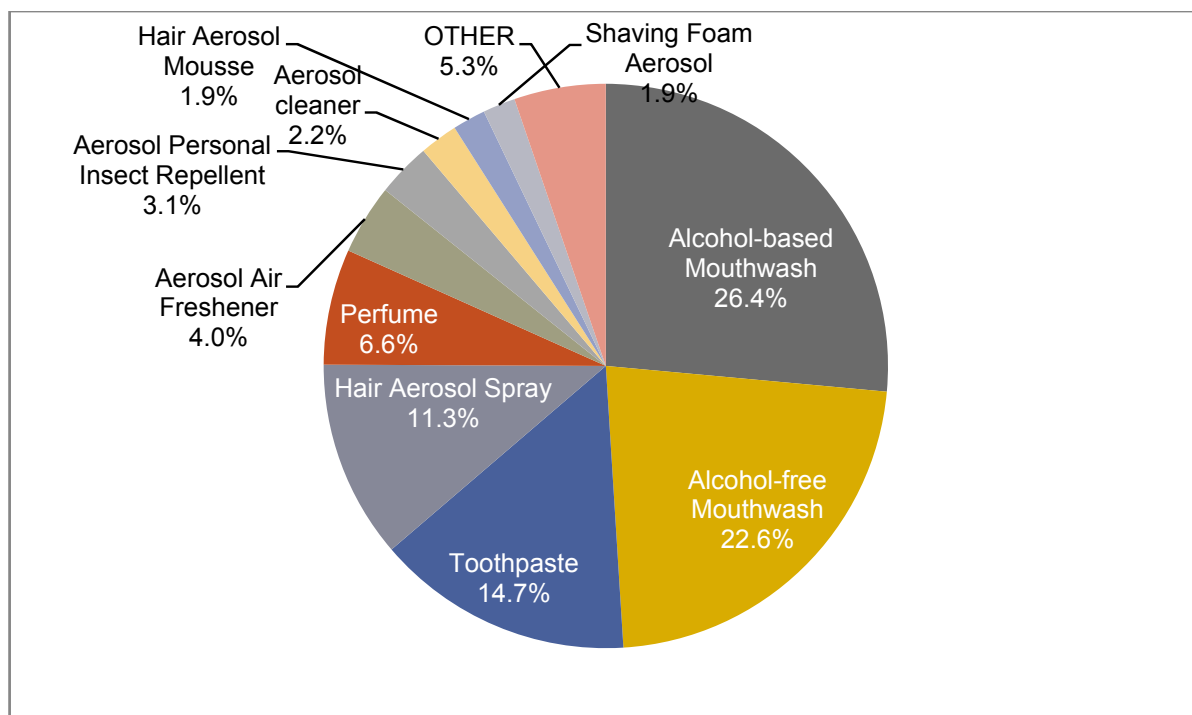
	Product category (using <i>median</i> MIR)	Product class	Product type/use	Vol x <u>Median MIR*</u>
#1	Alcohol-based mouthwash	Personal care	Oral care/hygiene	3435464
#2	Toothpaste	Personal care	Oral care/hygiene	3405721
#3	Aerosol antiperspirant/deodorant (EU)	Personal care	Antiperspirant/deodorant	2902913
#4	Alcohol-free mouthwash	Personal care	Oral care/hygiene	2684743
#5	Soaps water-based surfactant	Personal care	Skin care/hygiene	1902783
#6	Aerosol body spray	Personal care	Body spray	1292367
#7	Aerosol cleaner	Home care	Hard surface cleaner/ disinfectant	1011978
#8	Aerosol air freshener	Home care	Air freshener	802400
#9	Pre-treater trigger spray	Home care	Laundry	800548
#10	Moisturing lotions	Personal care	Skin care	729421

\* This value is being used for ranking purposes as it combines the two key characteristics of interest: 1) the estimated intrinsic ozone-formation potential of the product (based on the product frame formulation MIR value); and, 2) the annual sales volume for the product category (based on the collated sales data from 23 major companies).

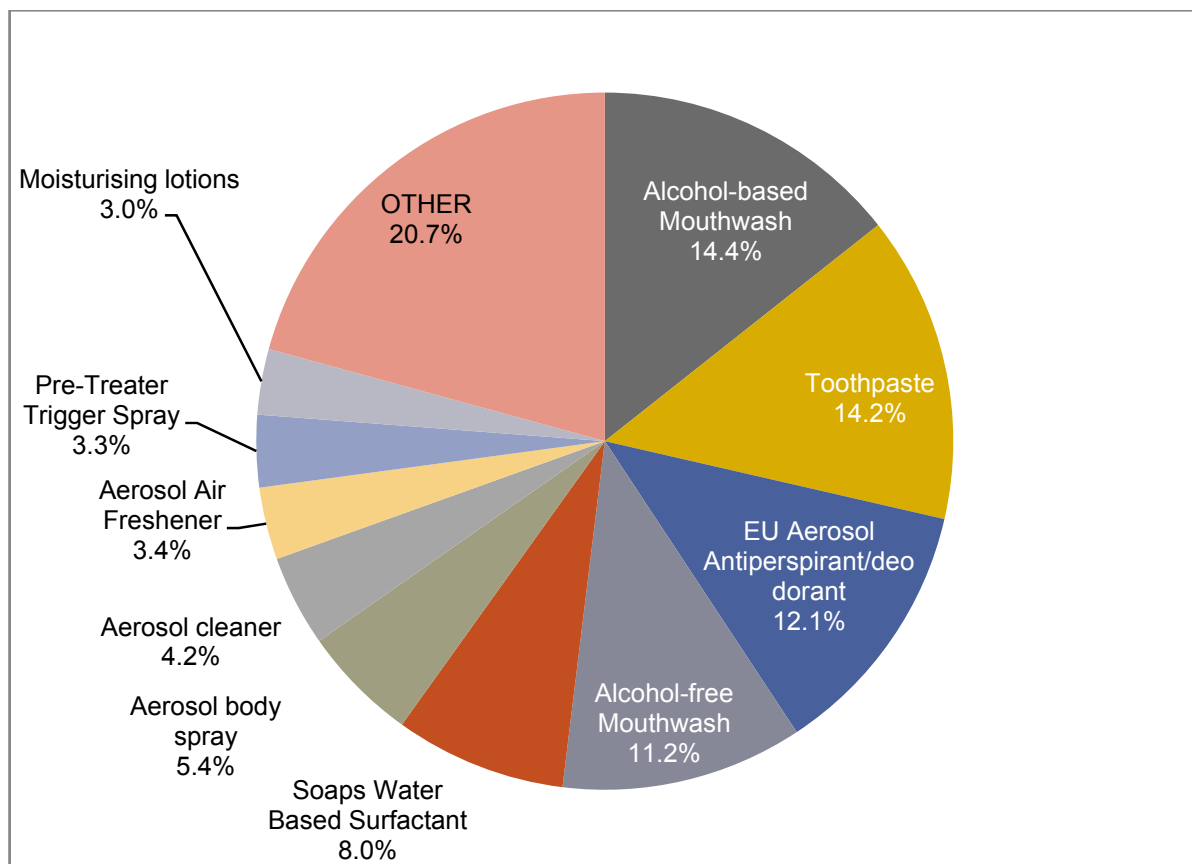
The relative 'VOC significance' of the various product categories can best be shown via pie charts which plot the '% contribution' of each to the overall 'total', as follows:



**Chart 1: Percentage contribution of most significant product categories in terms of estimated VOC contribution (Vol x Max MIR)**



**Chart 2: Percentage contribution of most significant product categories in terms of estimated VOC contribution (Vol x Min MIR)**



**Chart 3: Percentage contribution of most significant product categories in terms of estimated VOC contribution (Vol x Median MIR)**



Across the three different methods of calculation of 'volume used' multiplied by 'frame formulation' MIR (by adding the figures across the three tables above), the 5 most significant product categories were, in order:

1. **alcohol-based mouthwash** (combined 'Volume x MIR' = 9304382)
2. **toothpaste** (8663676)
3. **alcohol-free mouthwash** (7376771)
4. **aerosol antiperspirant/deodorant (EU market formulation)** (5847897)
5. **soaps water-based surfactant** (4306299)

Of greater <u>tropospheric</u> VOC significance...	Secondary significance...	Minor 'contribution'...
<b>Alcohol-based mouthwash; toothpaste; 'EU market' aerosol antiperspirant/ deodorant; alcohol-free mouthwash; soap water-based surfactant; aerosol body spray; aerosol cleaner</b>  <i>...this group accounts for <b>69.5%</b> of the relative 'VOC contribution' value for our survey sample (using median MIR values)</i>	<b>Pre-treater laundry trigger spray; moisturising lotion; aerosol air freshener; liquid detergent; DIY pesticide trigger pack; aerosol deodoriser; hair aerosol spray; perfume; soap solid; rubbing alcohol/sanitising handrub; antiperspirant/deodorant stick; moisturising cream; aerosol personal insect repellent; pre-treater laundry aerosol spray; shaving foam aerosol</b>  <i>...this group accounts for an estimated 20-25% of the relative 'VOC contribution' value; 3 products in this group – pre-treater laundry trigger spray, moisturising lotion, aerosol air freshener – accounted for <b>9.7%</b> of the 'VOC contribution' (using median MIR values)</i>	<b>Hair styling gel; hair aerosol mousse; nail polish; nail polish remover acetone based; aerosol shampoo; pump spray personalised insect repellent; liquid/gel air freshener (inc plug ins); aerosol sunscreen; alcohol-based toner; depilatory wax; water-based toner; roll-on insect repellent; nail polish acetone free; solid air freshener; dishwashing liquid (manual); impregnated wipes (wet); machine freshener/deodorizer; machine cleanser; aerosol area insect repellent; liquid/gel area insect repellent/pesticide/herbicide; slow release generator area insect repellent/pesticide/herbicide; solid area insect repellent/insecticide; liquid shampoo/conditioner; aerosol mousse or spray; alcohol-based cleanser; depilatory aerosol; depilatory cream</b>  <i>...this group accounts for an estimated 5-10% of the relative 'VOC contribution' value</i>

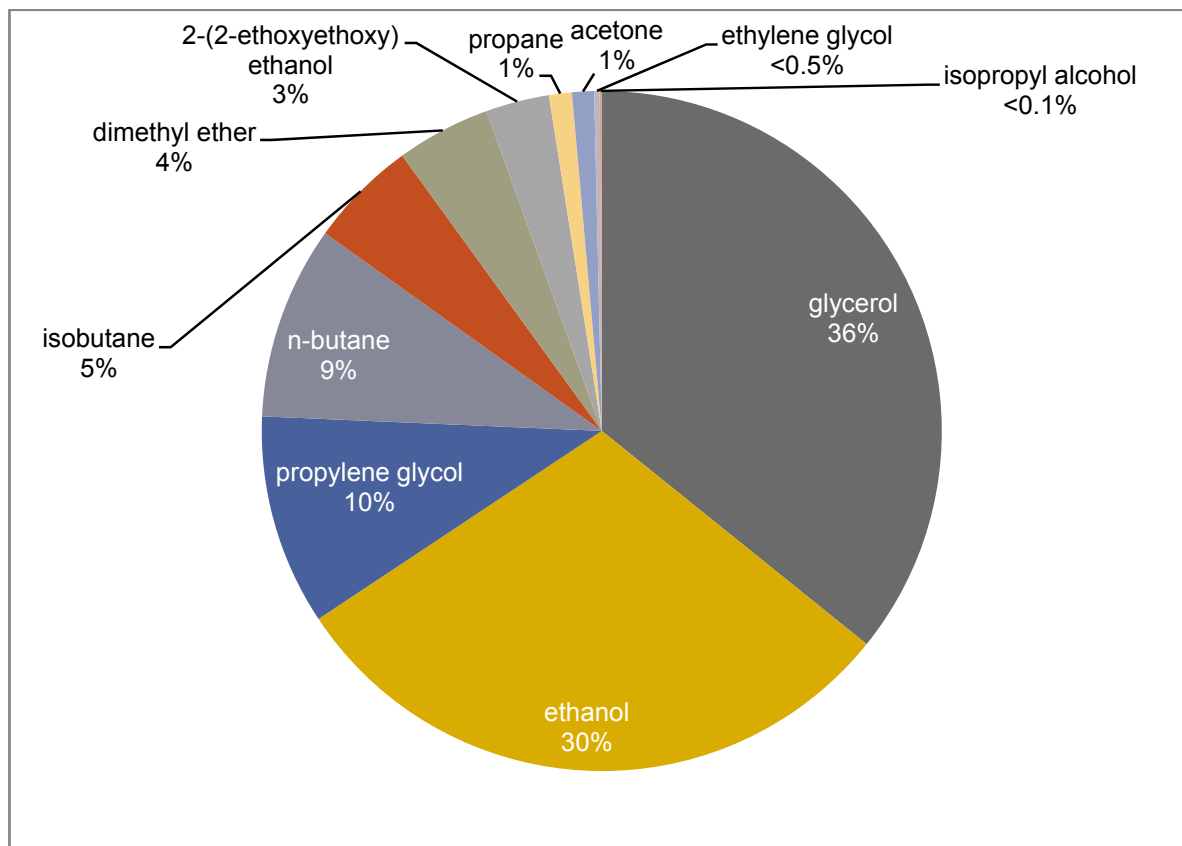
### VOC ingredients ranked by estimated sales volume multiplied by MIR value

In order to rank the most significant VOC ingredients across the 53 product category frame formulations, we multiplied the calculated sales volume data value by the ingredient's MIR value. This gave the following:

		Calculated Volumes (kg or L) x MIR (in millions)*		
	VOC ingredients	Minimum Vol	Maximum Vol	Median Vol
#1	glycerol	1.243 M	48.075 M	16.791 M
#2	ethanol	0.856 M	44.638 M	14.029 M
#3	n-butane	0.102 M	15.988 M	4.314 M
#4	propylene glycol	0	14.639 M	4.697 M
#5	isobutane	0.073 M	8.779 M	2.414 M
#6	dimethyl ether	0	8.362 M	2.097 M
#7	2-(2-ethoxyethoxy) ethanol	0	4.529 M	1.417 M
#8	propane	0.015 M	1.842 M	0.512 M
#9	ethylene glycol	0	0.319 M	0.122 M
#10	isopropyl alcohol	0.001 M	0.163 M	0.045 M
#11	acetone	0.027 M	0.079 M	0.49 M

\* These calculated values allow for a ranking on the basis of the two critical variables - use volume and VOC reactivity (as measured by the Carter MIR value) - but are not 'meaningful' values for other purposes.

The following pie-chart (using the median values) allows for a ready visual representation of the relative significance of main VOC ingredients:



**Chart 4: Percentage contribution of most significant VOC ingredients (using Median MIR)**

## Discussion

### Key findings across the product categories

It is no great surprise that the seven most 'VOC significant' product categories – three oral hygiene products, liquid hand soap, hard-surface aerosol cleaner and aerosol antiperspirant/deodorant/body spray – are amongst the most used consumer products our sector produces.

This group of seven products accounted for 69.5% of the 'VOC contribution' for our sector, as determined by our method of multiplying product category sales volume data by the category's calculated frame formulation MIR value.

The vast majority of people in Australian society use these products on very regular basis.

In the case of oral hygiene products that are essential for dental and gum health, these are used at least once daily but, more often, twice a day.

Antiperspirant sprays and body sprays are also generally used daily. And so are hard-surface aerosol cleaners.

The consequent large use volumes of these products means they are the most significant in terms of potential emissions of VOCs, over-riding other product categories which have higher calculated 'frame formulation MIR' values, but much less usage.

There were a number of product categories with high usage volumes that did not feature as being 'VOC significant'. These included dishwashing liquid, liquid detergent and liquid shampoo/conditioner, which had frame

formulations with negligible content of VOC ingredients. The organic compounds in these products tend to be of larger molecular weight and lower vapour pressure.

Falling into the middle category of having secondary VOC significance, but relatively high-volume usage, were moisturising lotions.

Solid air freshener products had the highest calculated frame formulation MIR value at around 1.6, with the next highest being sanitising alcohol hand-rub at around 1.2.

Many other product categories had frame formulations with calculated MIR values between 0.9 and 1.1.

Given that formulations across the household and personal care products industry tend to use VOC ingredients which have Carter MIR values of no greater than 4.0 but more generally around 1.0 to 1.5, this finding is not a surprise.

### Findings for key ingredients

The most reactive compounds in terms of ozone forming potential are unsaturated hydrocarbons and/or highly aromatic hydrocarbons. 'Aromatic' in this sense refers to the chemical definition (ring structure or conjugated unsaturation of the hydrocarbon) rather than the common perception of 'aroma'. Such reactive chemistries do not generally have a place in modern day household and personal care products.

Toluene (MIR 4.00) is an aromatic hydrocarbon that is potentially used in relatively small concentrations (median level around 5%) in some older formulations of nail polish and as such is listed in our survey. Apart from this potential use in nail polish, this more reactive ingredient is not used in the other 52 product categories surveyed.

Other 'reactive' VOC ingredients used generally in low concentrations are 2-(2-Ethoxyethoxy)ethanol (10 product categories - MIR 3.26), glycerol (17 product categories; MIR 3.15), ethylene glycol (1 product category; MIR 3.13), propylene glycol (22 product categories, MIR 2.58); 1-methoxy-2-propanol (1 product categories; MIR 2.44). Others in the 'top ten' by MIR value were ethanol, isobutane, n-butane and n-butyl acetate.

The most used VOC ingredients in terms of calculated volume were ethanol (39 product categories; MIR 1.53), glycerol (16 product categories; MIR 3.15), n-butane (13 product categories; MIR 1.15), dimethyl ether (2 product categories; MIR 0.81), isobutane (15 product categories; MIR 1.23) and propylene glycol (22 product categories; MIR 2.58).

For ethanol, the general concentrations were of the order of standard alcoholic beverages, spanning the same range of 5% to about 40%. Ethanol is an important, well-characterised ingredient used across a wide variety of products as a solvent and, when above about 13%, often additionally as a preservative.

*n*-Butane, isobutane and dimethyl ether are standard propellant gases used in aerosols. As with ethanol these ingredients are well-characterised and, while flammable, offer a high level of safety under normal conditions of use, storage and transport.

Many Australian consumers, via their purchasing choices, prefer aerosol-based formulations for certain products and applications. This is the case for antiperspirants/deodorants, hair styling products and some specialty cleaning products, like fabric/carpet cleaners and deodorisers.

Glycerol and propylene glycol are used as solvents, humectants (i.e. substances that absorb and carry moisture) and both have a long history of usage in personal care products due to their moisturising ability.

By multiplying the ingredient MIR value by the calculated volume, the most significant ingredients were revealed to be (in order): glycerol; ethanol; n-butane; propylene glycol; isobutane; and dimethyl ether.

### Some methodological limitations and the importance of not equating our findings to 'total emissions'

The method we employed should not be relied on to derive absolute values for either key product categories or key VOC ingredients. Instead the method is geared towards providing reliable relative comparisons between products and ingredients and, as such, is useful in better determining possible priorities. As such, the data and calculations included in this report cannot be validly used to estimate actual air pollution impacts.

To ensure that the comparisons obtained are valid, a fundamental premise of the methodology was to be as inclusive as possible in terms of product categories covered (within the scope of Accord's industry coverage) and the market share covered for each of these categories.

It needs to be noted that in the first stage of this project, company feedback was sought on a larger list of product categories –106 – and those with a generic VOC content of less than 5% were not subject to further work in terms of creating a realistic generic frame formulation. These are listed in Appendix D.

Any attempt to derive total VOC emissions would need to look again at some of these categories. Additionally though, such attempts would need to develop a methodology to estimate the amount of VOC ingredients that are actually emitted into the troposphere.

The VOC content of formulated products used in either households or industry will not necessarily in end up being emitted 100% into the atmosphere. In assessing any in depth assessment of the environmental fate of chemicals it is important to also consider their likely partition coefficients between air/water/soil.

Simply assuming that the entire volume of a VOC ingredient (in kilograms or litres) is emitted from a product once used would greatly overestimate the level of emissions.

Of the 23 responding companies we had: seven large makers/suppliers of FMCG<sup>7</sup> household cleaning products; six large mass-market personal care products companies; and 13 companies that were also makers/suppliers of 'luxury' cosmetics and makeup.

Over the three categories covered – colour cosmetics, household cleaning (home care) products and personal care products – we estimate that the responding companies would comprise greater than 85% of product volume for household cleaning products<sup>8</sup> and greater than 75% of product volume for the other product categories.

The expanding supermarket chain private label product portfolios were not covered in this survey.

As noted earlier, the authors recognise some inherent limitations associated with the use of Carter MIR values that have been derived for use in Southern California. However, the overall ozone forming reactivity of VOC ingredients does vary, and MIR values are reasonable proxies by which to rank relative reactivity. Because of variability in the concentration range of ingredients in the frame formulations, we calculated three MIR values for each frame formulation - a minimum, maximum and median MIR value.

Creating a scale based on multiplying the volume of the product category by its frame formulation MIR values represents a practical way of ranking products in terms of their 'VOC significance'. By this means, environmental policy makers gain a better insight into which products may need to be factored into efforts to reduce emissions that play a role in the formation of ozone and smog.

### Discussion of this survey's results compared to the earlier SLR report and their policy implications

As discussed above, this survey's goal was to gather a comprehensive and representative set of data to allow for reliable comparisons of the 'VOC significance' of the commonly used household and personal care products on the Australian market.

A detailed comparison of this survey with the SLR report was outlined in the Background above.

An additional concern with the approach of the earlier SLR survey was that it embedded considerable bias towards products and VOC ingredients already regulated in California, under the CARB regulations. It is also noted that the SLR report relied on CARB product categories and other relevant background in developing its product lists and survey methodology.

It is important to note that US CARB rules have a long history and have evolved for use within a specific region to an extent which means they may not be an inherently good fit for Australian conditions. Embedded within them are technological *and* political tradeoffs specifically relevant to the air pollution goals, market dynamics, product

<sup>7</sup> FMCG = fast moving consumer good

<sup>8</sup> An exception is the manual dishwashing liquid category, which features a significant level of private label product (up to 24.5%, according to 2013 *Retail World* values).

use patterns, legislative/regulatory processes and specific environmental characteristics applying in the USA and, more specifically, the state of California.

As noted in the SLR report, since 1977 the US EPA has “used the reactivity of ethane as the threshold of negligible reactivity”. Ethane has a Carter MIR value of 0.26. And because of this, the US EPA in 1995 exempted acetone from its VOC requirements. Acetone has an MIR of 0.36, just 0.1 higher than ethane.

Ethanol (or ethyl alcohol as it is also known) is specifically exempted from the “medium volatility organic compound (MVOC) standards” of the CARB Antiperspirants and Deodorants Regulation. This widely used solvent, which has preservative attributes at concentrations greater than 13%, has a Carter MIR of 1.53, close to six times higher than that of ethane.

Some US product formulation profiles were also used in the SLR survey and report which were not relevant to the product formulation profiles on the Australian market. And indeed some products that have received focus in the USA and were listed in the SLR report – e.g. charcoal lighters, finishing spritzes, laundry starches/sizings – are not of significance in the local market.

Noting these concerns, care has been taken with our survey to avoid any inbuilt bias by reverting to:

- a value-neutral and catch-all ‘VOC of interest’ definition
- product categories reflective of the products sold on the Australian market by the household and personal products sector Accord represents
- frame formulations for those product categories containing ‘VOC of interest’ content of greater than 5% that are reflective of the product sold and used in Australia
- sales volume data based on data supplied by 23 leading companies within the sector Accord represents.

As already presented, results for the ‘top ten’ products based on their relative ‘VOC emission significance’ from the SLR survey compared to our survey are as follows (our figures are based on ‘median’ values):

	SLR survey report	% contribution	Accord survey	% contribution
#1	Finishing hair sprays	13%	Alcohol-based mouthwash	14%
#2	Underarm deodorants	12%	Toothpaste	14%
#3	Windshield washer fluids	6%	Aerosol antiperspirant/ deodorant (EU formulation)	12%
#4	Non-flat enamels	4%	Alcohol-free mouthwash	11%
#5	Other repair products	3%	Soaps water-based surfactant	8%
#6	Glass cleaners	3%	Aerosol body spray	5%
#7	Herbicides, defoliants	3%	Aerosol cleaner	4%
#8	Packaged solvents	3%	Aerosol air freshener	3%
#9	Construction adhesives	3%	Pre-treater trigger spray (laundry)	3%
#10	Underarm antiperspirants	3%	Moisturising lotion	3%

It is unlikely that any in-depth comparative analysis can be undertaken between the two surveys given the significant differences in product coverage, VOC definition, input data sources and their respective comprehensiveness.

## Considerations for any future policy development

### Account needs to be taken of the surveyed sector’s complexity and diversity

Our survey reinforces the need to take into account the more complex and diverse nature of the household and personal care products sector when considering its potential contributions to tropospheric ozone and photochemical smog formation.

With products ranging from nail polish to liquid hand soap; floor cleaners to shampoo; and deodorants to aerosol insect sprays, there is huge a variety of formulations in use, all presented in a variety of different formats and pack sizes.

Use patterns also vary from products used multiple times a day like oral hygiene products to specialised cleaners that are used weekly or monthly as well as products that are used primarily on a seasonal basis like sunscreens and insect repellents.

And in terms of estimating the volumes of product sold, there are also a great variety of distribution channels for these products. This includes supermarket retailers, pharmacies, department stores, direct selling, online sales, mass-market retailers, hardware stores, discount stores and two-dollar shops.

Additionally, within the household and personal care products sector the proportion of imported to locally manufactured product varies and can be anywhere in the range of 30 to 80 per cent depending on the product category. Fragrances and perfume products would have the highest proportion of imports as would colour cosmetics. Many water-based cleaning products sold in larger container volumes would, on the other hand, mainly be locally produced.

All of the above contrasts with some of the other sectors in the downstream formulated chemical products industry. Paints, for example, while covering a range of coatings for specific surfaces and applications, are generally sold in fairly standard formats of emulsion formulations in 500mL, 1L, 4L and 20L tins or, less commonly, as 400mL aerosols. Within this sector there is also a greater convergence of fundamental 'frame formulations', as well as retail distribution channels, and higher proportions of locally manufactured products.

The greater level of product divergence within the household and personal care products sectors increases difficulties with obtaining accurate estimates of the absolute size of VOC emissions without incurring significant transaction costs in terms of data collection and analysis.

Such product divergence also mitigates against simplistic policy approaches seeking unilateral reductions in specific VOCs without taking proper account of why certain ingredients are used in a product and what functionality would be lost through formulation change.

### Categories with most significant 'VOC contribution' have significant societal benefits

The findings of our survey are that just under 40% of the total 'VOC contribution' (39.8%) across our sector was attributable to the three main types of oral hygiene product used by Australians – alcohol-based mouthwash, toothpaste and alcohol-free mouthwash. These products play an important role in dental and gum health and their usage is strongly encouraged by dental health professionals and health departments.

Depending on the product performance claims and levels of fluoride, these products may also be subject to regulation by the Therapeutic Goods Administration. The overall composition of this category of products is meticulously formulated to provide a high level of oral hygiene performance. Across the three types of oral hygiene products our survey looked at, glycerol (MIR – 3.15) and ethanol (MIR – 1.53) are the primary VOC ingredients. The ethanol component, in particular in alcohol-based mouthwash, acts as a solvent, preservative and antiseptic. Glycerol (glycerin) is a humectant and solvent that has some antiseptic properties and also imparts a sweet flavour to the product.

The survey also found that aerosol-type antiperspirants and deodorants accounted for an estimated 12% of the total 'VOC contribution' across our sector (12.1%). Antiperspirant and deodorants are an integral part of the daily hygiene routine. They work effectively to control underarm sweat and reduce offensive body odour, which is important for daily interactions between people. Australian consumer preference is for the aerosol format of antiperspirant/deodorant due to performance and convenience. Statistics published in the Retail World Annual Report 2013 show that the breakdown by volume sold of antiperspirants/deodorants via the supermarket distribution channel was:

*Aerosols – 58.6%: Roll-ons – 27.5%: Body sprays – 7.7%: Solids/sticks – 4.7%: Pump sprays – 1.4%: Creams – 0.2%*

The spray format for antiperspirants/deodorants is generally associated with EU-based company imports or local manufacturing; given US CARB regulations in force since the 1990s have meant that antiperspirant/deodorant sticks dominate the US market.

To properly differentiate the impact of CARB on formulation compositions in this category, we created a distinct EU aerosol antiperspirant/deodorant frame formulation. The primary VOC ingredients in this 'EU' formulation are: ethanol (MIR – 1.53), isobutane (MIR – 1.15), n-butane (MIR – 1.15), diemethyl ether (MIR – 0.81) and propane



(MIR – 0.49). In contrast the antiperspirant/deodorant stick frame formulation has as its primary VOC ingredients propylene glycol (MIR – 2.58) and ethanol (MIR 1.53). The prevention of offensive body odour plays a critical role in all social interactions that occur at an interpersonal level as well as in our daily work, training, commuting and leisure environments. For this reason most people in Australian society opt for daily use of an antiperspirant or deodorant as part of their personal hygiene routine.

Liquid soaps with a water-based surfactant were found by our survey to account for an estimated 8% of total 'VOC contribution' across our sector. The primary VOC ingredients in this frame formulation category are glycerol (MIR – 3.15), propylene glycol (MIR – 2.58) and ethanol (MIR – 1.53). These products are not just essential for general cleanliness but also play a key role in the good hand hygiene practices that help stop the spread of infectious disease such as colds and flu and foodborne microbial illnesses.

Home care aerosol products (aerosol cleaner and aerosol air freshener) accounted for a combined 7.6% of the total 'VOC contribution' across our sector. And next in line were aerosol body spray (5.4%), pre-treater laundry trigger spray (3.3%), which is a pump rather than aerosol format, and moisturising lotion (3.0%).

### **The costs of any potential formulation changes to reduce VOC content can also include significant undesirable environmental trade-offs**

Of the findings above, around 25% of the 'VOC contribution' across our sector was from aerosol-based formulations. Notwithstanding that this was eclipsed by the approximate 40% 'VOC contribution' coming from non-aerosol, oral hygiene products, there may be interest in looking at aerosol propellants given the fact that US CARB regulation has targeted these ingredients.

Aerosol propellants have previously been a focus for global environmental action, via the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer in order to remove CFC (chlorofluorocarbon) ingredients linked to destruction of the stratospheric ozone layer. CFC, other halon and ozone depleting propellants were phased out of aerosols in Australia following the enactment of the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*.

Hydrocarbon propellants, like propane and butane, took the place of the CFCs. As noted above, these hydrocarbon propellants then became the focus of attention because of tropospheric ozone formation potential and have been subject to regulation in the USA. This regulatory attention was because of localised environmental concerns relating to the significant air pollution issues impacting the greater Los Angeles region.

Somewhat ironically, many of the commonly available replacement propellants encouraged in the USA by the CARB regulatory regime are greenhouse gases, many with significantly greater greenhouse potential than carbon dioxide, thereby replacing a localised environmental concern with a global one.

It is an over-simplified approach to environmental policy to presume that replacement of ingredients with certain undesirable environmental characteristics will not instead create other unintended environmental issues due to the characteristics of the replacement ingredients. Simple substitutions of 'harmful' or 'undesirable' ingredients with non-harmful or non-environmentally significant ones rarely occurs in practice.

Unlike the USA, Australia under the previous federal government had adopted a national carbon pricing/taxation regime designed specifically to discourage the use of chemicals that have greenhouse characteristics. While this framework is being dismantled by the current federal government, it will still be replaced by a direct action plan that targets measures to reduce emissions of greenhouse gases.

Any policy consideration down the track seeking to reduce the VOC contribution of hydrocarbon aerosol propellants would need to carefully consider national greenhouse policy goals.

For example, regulation against hydrocarbon propellant gas use in some US states has resulted in substitution with chemicals like hydrofluorocarbons (HFCs). These are often compounds with strong greenhouse gas potential. The non-hydrocarbon propellant HFC-125, which is allowed under US law but restricted in the EU, has 4,600 times the global warming potential of carbon dioxide.

Trade-offs can also occur beyond environmental characteristics to entail other key product attributes such as occupational and consumer safety and product functionality and performance.

As highlighted in the previous section household and personal care product formulation ingredients often have specific important functions. For example, ethanol as well as being a solvent is often used for its additional antiseptic and/or preservative attributes.

For these reasons, the authors recommend that a clear, evidence-based case would be needed before any serious consideration can be given to pushing manufacturers and importers of more 'VOC significant' product categories to reformulate their products to replace VOCs.

### **Potential trade policy impacts need to be given strong consideration**

Australian trade policy supports trade liberalisation and an open, dynamic and competitive Australian economy. Unlike stratospheric ozone-depleting substances or greenhouse gas induced climate change which are both global issues, the issue of tropospheric ozone forming VOCs is a localised issue. As such this environmental concern is very unlikely to form the basis of any internationally agreed or harmonised response.

Care is therefore needed to ensure that any proposed measures to address this issue do not create unintended technical barriers to trade.

This is especially the case for those product categories whose market is comprised of a significant amount of imported products. There is significant global trade in personal care and cosmetic products and 2010 United Nations COMTRADE figures put the value of product imports into Australia at just over \$1.2billion US dollars.

Europe, North America and, to a growing extent, Asia remain the main economic centres for the global cosmetics and personal care products industry. These products are also subject to an extensive array of national and regional regulatory regimes which directly impact on the choice of ingredients and formulations that are put into international trade and sold globally to consumers. Of these regulatory regimes the most significant is the European Union Cosmetics Directive, which also forms the basis for the ASEAN Cosmetics Directive as well as New Zealand's Cosmetic Product Group Standard. A large percentage of the product formulations used globally are developed to comply with the EU ingredient requirements, the focus of which is on consumer and environmental health and safety.

Any adoption of localised formulation restrictions could have the effect of limiting the existing choice Australian consumers have for the latest innovative formulations developed overseas.

### **The comparative VOC significance of the household and personal care products sector needs to be considered against other product sectors and the potential role of natural sources of ozone-forming chemicals cannot be overlooked in the overall air pollution formation equation**

Our sector, the everyday household and personal products sector, is just one of the many industry sectors within the broader chemicals industry. And, as already noted, highly reactive VOC ingredients, such as aromatic solvents, do not play a significant part in our sector's everyday consumer products.

Aromatic and unsaturated hydrocarbon chain solvents are probably more a feature of other specialty products and the industries supplying and using them. This could include: specialty paint and surface treatment products; adhesives and construction fillers/sealants; specialty hardware and trades products, especially those in aerosol format; garden pest control and garden maintenance products; motor vehicle smash repair and detailing products; consumer automotive care products; specialty fuels and gases; dry cleaning chemicals; and metal finishing products.

A more complete picture of the relative significance of all downstream, chemical-based products should be developed and considered prior to any specific policy proposals regarding the product sector covered in this industry report.

In regard to the everyday household and personal care products sector, the relative significance of supermarket private label product also needs to be considered.

There are some specific product categories covered by this report which feature significant volumes of private label product. Sometimes the private label format and formulations can be quite different to the brand name products within the product category and may reflect older style formulations.

A snapshot of the relative significance of private label products within the various product sub-categories represented by Accord can be obtained by looking at *Retail World* figures\*:

Product category (Retail World)	Private label % of market by volume
Ironing aids	40.6%
Disinfectants	26.6%
Laundry bleaches/softeners	26.3%
Sun care products	25.2%
Manual dishwash	24.5%
Household cleaners	20.0%
Auto dishwash	20.0%
Household pest control	19.7%
Fabric softeners	17.1%
Air care products	14.3%
Toilet cleaners (household)	13.8%
Mouthwash	2.9%
Hair care	2.8%
Deodorants/antiperspirants	Minimal
Skin care	Minimal

\* Note: Retail World figures cover the grocery (supermarket) supply chain only.

Environmental policy also needs to recognise the role and contribution of natural VOC emissions from bushland within and adjoining the greater Sydney Metropolitan region and the likely interactions these have with the overall load of NO<sub>x</sub> and particulate emissions from transport and industry. For example, naturally occurring VOC emissions from plants, which for eucalypts can include isoprene (MIR – 10.6) and terpene (MIR – 3.9) can contribute to ozone formation, especially in summer, as can bushfire smoke.

In considering the relative significance of the household and personal care products sector it is important to consider that, within the totality of air pollution emissions, those from other sources outweigh those of the household products sector represented by Accord.

This is something that any future policy consideration needs to take into account. Should environmental regulators consider that a legislative option need be investigated for industries, operations and/or products of air pollution significance in terms of either VOCs or NO<sub>x</sub> or particulates, then this would need to be supported by a rigorous Regulation Impact Statement (RIS) process that includes proper cost-benefit assessment of all possible options.

The Office of Best Practice Regulation in the Department of Prime Minister and Cabinet outlines the expectations for any RIS and cost-benefit analysis process: <http://ris.dpmc.gov.au> and <http://www.cuttingredtape.gov.au/handbook/australian-government-guide-regulation>.

The findings presented in this report do not in the authors' view establish any clear-cut case for moving to a regulatory response on VOC content of everyday household and personal care products. In fact, the discussion above highlights the many complications that would be involved in taking forward a regulated approach.

At this stage, perhaps the most significant complication is the question of where to meaningfully target any VOC reduction actions in an effective and cost-efficient manner.

This report has looked at the potential significance of VOCs in everyday household and personal care products from the perspective of tropospheric air quality impacts. Indoor air quality is also a matter of significance with regard to VOC content. And, as a result, there is an associated environmental push to reduce the possible localised impact of VOCs in the indoor environment.

There is general awareness of this issue across those industries manufacturing and supplying formulated chemical-based products, including the sector represented by Accord. As a result, the desirability of reducing VOCs, where technically possible, is already on the agenda of many companies. The trend to environmentally superior product formulations and the promotion of these to the community should drive VOC reductions.

For this reason, the authors are of the view that, policy effort may be most cost-effectively focused in the first instance on tracking the trends in estimated emissions across our sector and others, to determine if both the market-drive and innovation trends have the level of VOC emissions heading in the right direction.

It is hoped that the information from this survey will assist the NSW EPA and other environmental response agencies to better model the potential impact of our sector, and others, on current trends in air pollution in urban areas across the nation.

### **Through Accord, the household and personal care products sector stands by to further assist with evidence-based policy development on this issue**

The consolidated sales volume data and frame formulation database developed by Accord for this survey will be made available to NSW EPA as a resource that the agency can use for any further investigation that may be needed.

Such a frame formulation approach could foreseeably be extended to other formulated product industry sectors that may be of potential significance to VOC emissions.

At this stage, our recommendation is that, without clear-cut evidence that the costs and unintended consequences of any push to remove or drastically reduce VOC content in the most 'VOC significant' product categories in our sector are outweighed by the tangible air pollution benefits, no mandated action on formulations is warranted.

Of course, reducing VOCs also has helpful benefits within households and the makers of household and personal care products continue to look at ways in which VOC levels can be reduced without compromising performance.

At this stage, our recommendation is that an assessment of the overall trends within our sector be undertaken on a 2 to 3-year basis, using the frame formulation database developed for this survey but updating the sales volume data.

Such a trend analysis will assist with NSW EPA air policy development and, down the track, may assist in identifying priorities or trigger points for further assessment or intervention.

There would still be a considerable cost associated with re-conducting this survey, and Accord would also propose that, should it be considered a necessary priority in the future, funding be made available from either state or commonwealth environment agencies.

**July 2014**

## APPENDIX A: Frame formulations

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Aerosol Air Freshener</b>					
	propylene glycol	PR-GLYCL	0	1	0.5
	propane	PROPANE	5	25	15
	Substance with no MIR data	NOMIR	0	1	0.5
	isopropyl alcohol	I-C3-OH	0	5	2.5
	Organic C>12	C>12	1	2	1.5
	n-butane	N-C4	0	60	30
	isobutane	2-ME-C3	5	30	17.5
	ethanol	ETOH	0	65	32.5
	Water	H2O	10	20	15
<b>Total</b>			21	209	115
<b>Aerosol area insect repellent</b>					
	Organic C>12	C>12	20	30	25
	2-(2-ethoxyethoxy) ethanol	DGEE	0	50	25
	ethanol	ETOH	0	15	7.5
	Substance with no MIR data	NOMIR	5	20	12.5
	propane	PROPANE	5	15	10
	isobutane	2-ME-C3	5	30	17.5
	n-butane	N-C4	5	75	40
	Water	H2O	50	80	65
<b>Total</b>			90	315	202.5

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Aerosol body spray</b>					
	n-butane	N-C4	0	60	30
	Substance with no MIR data	NOMIR	0	5	2.5
	Water	H2O	1	60	30.5
	propane	PROPANE	0	15	7.5
	Substance with no MIR data	NOMIR	0	10	5
	dimethyl ether	ME-O-ME	0	60	30
	isobutane	2-ME-C3	0	30	15
	ethanol	ETOH	0	90	45
<b>Total</b>			1	330	165.5
<b>Aerosol cleaner</b>					
	Organic C>12	C>12	0	2	1
	isobutane	2-ME-C3	2	15	8.5
	n-butane	N-C4	4	30	17
	Water	H2O	50	80	65
	2-(2-ethoxyethoxy) ethanol	DGEE	0	10	5
	ethanol	ETOH	0	60	30
	Organic C>12	C>12	20	30	25
	propane	PROPANE	1	10	5.5
	perchloroethylene	CL4-ETHE	0	20	10
<b>Total</b>			77	257	167
<b>Aerosol deodoriser</b>					
	ethanol	ETOH	0	55	27.5
	propane	PROPANE	0	10	5
	Organic C>12	C>12	1	3	2
	isobutane	2-ME-C3	0	25	12.5
	Water	H2O	0	70	35
	2-(2-ethoxyethoxy) ethanol	DGEE	0	20	10
	n-butane	N-C4	0	45	22.5
<b>Total</b>			1	228	114.5



Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Aerosol mousse or spray</b>					
	n-butane	N-C4	1	15	8
	Water	H2O	0	70	35
	Substance with no MIR data	NOMIR	0	10	5
	ethanol	ETOH	5	30	17.5
	propane	PROPANE	1	5	3
	Organic C>12	C>12	0	3	1.5
	isobutane	2-ME-C3	1	5	3
<b>Total</b>			8	138	73
<b>Aerosol Personal Insect Repellent</b>					
	propane	PROPANE	0	10	5
	isobutane	2-ME-C3	0	25	12.5
	Organic C>12	C>12	0	1	0.5
	n-butane	N-C4	20	45	32.5
	Organic C>12	C>12	5	10	7.5
	Substance with no MIR data	NOMIR	5	20	12.5
	ethanol	ETOH	10	75	42.5
	Water	H2O	0	20	10
<b>Total</b>			40	206	123
<b>Aerosol Shampoo</b>					
	isobutane	2-ME-C3	5	30	17.5
	propane	PROPANE	5	15	10
	Organic C>12	C>12	0	5	2.5
	Organic C>12	C>12	0	2	1
	Substance with no MIR data	NOMIR	0	10	5
	ethanol	ETOH	0	10	5
	n-butane	N-C4	5	40	22.5
<b>Total</b>			15	112	63.5

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Aerosol Sunscreen</b>					
	Substance with no MIR data	NOMIR	0	10	5
	ethanol	ETOH	0	10	5
	Organic C>12	C>12	0	2	1
	isobutane	2-ME-C3	5	30	17.5
	Organic C>12	C>12	0	50	25
	n-butane	N-C4	5	40	22.5
	propane	PROPANE	5	15	10
<b>Total</b>			15	157	86
<b>Alcohol-based cleanser</b>					
	isopropyl alcohol	I-C3-OH	5	10	7.5
	Organic C>12	C>12	5	30	17.5
	ethanol	ETOH	5	70	37.5
	glycerol	GLYCERL	0	5	2.5
	Organic C>12	C>12	20	70	45
	propylene glycol	PR-GLYCL	0	10	5
	Organic C>12	C>12	2	20	11
	Organic C>12	C>12	0	2	1
<b>Total</b>			37	217	127
<b>Alcohol-based Mouthwash</b>					
	Substance with no MIR data	NOMIR	20	70	45
	Inorganic	INORGANIC	0	1	0.5
	ethanol	ETOH	5	30	17.5
	Organic C>12	C>12	0	2	1
	Organic C>12	C>12	2	5	3.5
	glycerol	GLYCERL	5	40	22.5
	Water	H2O	20	70	45
	Organic C>12	C>12	0	3	1.5
<b>Total</b>			52	221	136.5

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Alcohol-based toner</b>					
	ethanol	ETOH	10	90	50
	glycerol	GLYCERL	0	5	2.5
	propylene glycol	PR-GLYCL	0	10	5
	Water	H2O	60	80	70
	Organic C>12	C>12	0	1	0.5
	Organic C>12	C>12	0	1	0.5
	Organic C>12	C>12	5	15	10
<b>Total</b>			75	202	138.5
<b>Alcohol-free Mouthwash</b>					
	glycerol	GLYCERL	5	40	22.5
	Inorganic	INORGANIC	0	1	0.5
	Organic C>12	C>12	2	5	3.5
	Organic C>12	C>12	0	2	1
	Organic C>12	C>12	0	3	1.5
	ethanol	ETOH	5	30	17.5
	Water	H2O	20	70	45
<b>Total</b>			32	151	91.5
<b>Antiperspirant/deodorant Stick</b>					
	Organic C>12	C>12	0	1	0.5
	Substance with no MIR data	NOMIR	0	30	15
	Organic C>12	C>12	1	3	2
	Water	H2O	0	20	10
	Substance with no MIR data	NOMIR	0	80	40
	Substance with no MIR data	NOMIR	10	15	12.5
	ethanol	ETOH	0	80	40
	Substance with no MIR data	NOMIR	10	25	17.5
	propylene glycol	PR-GLYCL	0	80	40
<b>Total</b>			21	334	177.5

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Depilatory Aerosol</b>					
	Substance with no MIR data	NOMIR	5	10	7.5
	isobutane	2-ME-C3	0	15	7.5
	Water	H2O	20	70	45
	glycerol	GLYCERL	0	5	2.5
	Organic C>12	C>12	0	10	5
	Organic C>12	C>12	0	2	1
	propylene glycol	PR-GLYCL	0	1	0.5
	Organic C>12	C>12	0	10	5
	Substance with no MIR data	NOMIR	5	10	7.5
<b>Total</b>			30	133	81.5
<b>Depilatory Cream</b>					
	Organic C>12	C>12	0	2	1
	Inorganic	INORGANIC	0	15	7.5
	Water	H2O	20	70	45
	glycerol	GLYCERL	0	10	5
	Substance with no MIR data	NOMIR	5	10	7.5
	Organic C>12	C>12	5	30	17.5
	ethanol	ETOH	0	10	5
	propylene glycol	PR-GLYCL	0	10	5
	Organic C>12	C>12	2	20	11
<b>Total</b>			32	177	104.5
<b>Depilatory Wax</b>					
	Organic C>12	C>12	0	2	1
	Substance with no MIR data	NOMIR	0	10	5
	propylene glycol	PR-GLYCL	0	10	5
	Organic C>12	C>12	20	70	45
	Organic C>12	C>12	5	30	17.5
	glycerol	GLYCERL	0	5	2.5
	Organic C>12	C>12	2	20	11
<b>Total</b>			27	147	87

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Dishwashing liquid (manual)</b>					
	Organic C>12	C>12	5	20	12.5
	Substance with no MIR data	NOMIR	0	2	1
	Water	H2O	70	90	80
	Organic C>12	C>12	0	2	1
	Organic C>12	C>12	0	1	0.5
	Organic C>12	C>12	0	5	2.5
<b>Total</b>			75	120	97.5
<b>DIY pesticide trigger pack</b>					
	Water	H2O	0	50	25
	Organic C>12	C>12	0	2	1
	isopropyl alcohol	I-C3-OH	0	10	5
	Substance with no MIR data	NOMIR	5	20	12.5
	Organic C>12	C>12	0	2	1
	propylene glycol	PR-GLYCL	0	20	10
	2-(2-ethoxyethoxy) ethanol	DGEE	0	1	0.5
	ethanol	ETOH	0	50	25
<b>Total</b>			5	155	80
<b>EU Aerosol Antiperspirant/deodorant</b>					
	Organic C>12	C>12	1	3	2
	Substance with no MIR data	NOMIR	0	10	5
	n-butane	N-C4	0	60	30
	ethanol	ETOH	0	30	15
	propane	PROPANE	0	15	7.5
	dimethyl ether	ME-O-ME	0	60	30
	isobutane	2-ME-C3	0	30	15
	Substance with no MIR data	NOMIR	0	30	15
	Water	H2O	0	60	30
<b>Total</b>			1	298	149.5

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Hair aerosol mousse</b>					
	propane	PROPANE	5	5	5
	Substance with no MIR data	NOMIR	0	10	5
	ethanol	ETOH	5	30	17.5
	Water	H2O	0	70	35
	isobutane	2-ME-C3	5	5	5
	Organic C>12	C>12	1	3	2
	n-butane	N-C4	10	15	12.5
<b>Total</b>			26	138	82
<b>Hair aerosol spray</b>					
	Organic C>12	C>12	0	3	1.5
	ethanol	ETOH	5	30	17.5
	Water	H2O	0	70	35
	isobutane	2-ME-C3	1	5	3
	Substance with no MIR data	NOMIR	0	10	5
	propane	PROPANE	1	5	3
	n-butane	N-C4	1	15	8
<b>Total</b>			8	138	73
<b>Hair Styling Gel</b>					
	propylene glycol	PR-GLYCL	0	20	10
	Organic C>12	C>12	0	2	1
	Organic C>12	C>12	0	2	1
	Substance with no MIR data	NOMIR	5	10	7.5
	ethanol	ETOH	5	50	27.5
	Water	H2O	0	50	25
	isopropyl alcohol	I-C3-OH	0	10	5
	Substance with no MIR data	NOMIR	0	25	12.5
<b>Total</b>			10	169	89.5



Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Impregnated wipes - wet</b>					
	Organic C>12	C>12	0	2	1
	Substance with no MIR data	NOMIR	1	2	1.5
	isopropyl alcohol	I-C3-OH	0	70	35
	Organic C>12	C>12	0	2	1
	ethanol	ETOH	0	70	35
	propylene glycol	PR-GLYCL	0	20	10
	Water	H2O	20	30	25
<b>Total</b>			21	196	108.5
<b>Liquid detergent</b>					
	Organic C>12	C>12	0	2	1
	Organic C>12	C>12	0	1	0.5
	Substance with no MIR data	NOMIR	0	3	1.5
	Organic C>12	C>12	0	2	1
	Organic C>12	C>12	20	30	25
	Inorganic	INORGANIC	0	30	15
	Substance with no MIR data	NOMIR	0	2	1
	propylene glycol	PR-GLYCL	0	10	5
	Water	H2O	60	80	70
<b>Total</b>			80	160	120
<b>Liquid Shampoo/conditioner</b>					
	Organic C>12	C>12	0	2	1
	Water	H2O	70	90	80
	Organic C>12	C>12	1	30	15.5
	Organic C>12	C>12	0	1	0.5
	Organic C>12	C>12	0	5	2.5
	Substance with no MIR data	NOMIR	0	5	2.5
	Substance with no MIR data	NOMIR	0	2	1
<b>Total</b>			71	135	103

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Liquid/Gel Air Freshener including plug-ins</b>					
	isopropyl alcohol	I-C3-OH	0	15	7.5
	Substance with no MIR data	NOMIR	0	5	2.5
	Organic C>12	C>12	1	2	1.5
	ethanol	ETOH	0	90	45
	Organic C>12	C>12	0	1	0.5
	2-(2-ethoxyethoxy) ethanol	DGEE	0	5	2.5
	Water	H2O	40	90	65
	Substance with no MIR data	NOMIR	0	1	0.5
<b>Total</b>			41	209	125
<b>Liquid/Gel area insect repellent/pesticide/herbicide</b>					
	Water	H2O	0	50	25
	ethanol	ETOH	5	50	27.5
	Substance with no MIR data	NOMIR	5	20	12.5
	Organic C>12	C>12	0	2	1
	isopropyl alcohol	I-C3-OH	0	10	5
	Organic C>12	C>12	0	2	1
	propylene glycol	PR-GLYCL	0	20	10
<b>Total</b>			10	154	82
<b>Machine cleanser</b>					
	Substance with no MIR data	NOMIR	0	5	2.5
	Organic C>12	C>12	0	2	1
	Water	H2O	80	90	85
	2-(2-ethoxyethoxy) ethanol	DGEE	0	5	2.5
	Substance with no MIR data	NOMIR	0	1	0.5
	Organic C>12	C>12	0	1	0.5
<b>Total</b>			80	104	92

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Machine freshener/deodoriser</b>					
	Organic C>12	C>12	0	2	1
	Water	H2O	1	90	45.5
	ethanol	ETOH	0	90	45
	Organic C>12	C>12	0	1	0.5
	Substance with no MIR data	NOMIR	0	2	1
<b>Total</b>			1	185	93
<b>Metal polish</b>					
	Organic C>12	C>12	0	2	1
	Water	H2O	70	70	70
	Substance with no MIR data	NOMIR	0	2	1
	ethanol	ETOH	0	30	15
	1-methoxy-2-propanol	MEOC3OH	0	20	10
	Organic C>12	C>12	0	10	5
<b>Total</b>			70	134	102
<b>Moisturising creams</b>					
	Substance with no MIR data	NOMIR	0	10	5
	Organic C>12	C>12	0	1	0.5
	glycerol	GLYCERL	0	10	5
	propylene glycol	PR-GLYCL	0	10	5
	Organic C>12	C>12	0	1	0.5
	Water	H2O	60	80	70
	Organic C>12	C>12	10	30	20
<b>Total</b>			70	142	106

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Moisturising lotions</b>					
	propylene glycol	PR-GLYCL	0	10	5
	Organic C>12	C>12	0	10	5
	Organic C>12	C>12	0	1	0.5
	Organic C>12	C>12	0	2	1
	Water	H2O	60	80	70
	Substance with no MIR data	NOMIR	0	20	10
	Organic C>12	C>12	10	30	20
	glycerol	GLYCERL	0	10	5
<b>Total</b>			70	163	116.5
<b>Nail Polish</b>					
	ethyl acetate	ET-ACET	20	50	35
	ethanol	ETOH	0	20	10
	toluene	TOLUENE	0	10	5
	isopropyl alcohol	I-C3-OH	0	15	7.5
	n-butyl acetate	BU-ACET	20	50	35
	Organic C>12	C>12	0	2	1
<b>Total</b>			40	147	93.5
<b>Nail Polish Remover Acetone Based</b>					
	Organic C>12	C>12	0	1	0.5
	Organic C>12	C>12	0	2	1
	Substance with no MIR data	NOMIR	5	10	7.5
	acetone	ACETONE	50	80	65
	Water	H2O	30	50	40
	Organic C>12	C>12	0	1	0.5
	ethanol	ETOH	0	10	5
<b>Total</b>			85	154	119.5

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Nail Polish Remover Acetone Free</b>					
	Substance with no MIR data	NOMIR	5	10	7.5
	Organic C>12	C>12	0	1	0.5
	ethyl acetate	ET-ACET	20	50	35
	Organic C>12	C>12	0	1	0.5
	ethanol	ETOH	0	10	5
	Organic C>12	C>12	0	2	1
	isopropyl alcohol	I-C3-OH	20	50	35
	Water	H2O	20	50	35
<b>Total</b>			65	174	119.5
<b>Perfume</b>					
	ethanol	ETOH	60	90	75
	Organic C>12	C>12	0	2	1
	Substance with no MIR data	NOMIR	1	40	20.5
	Organic C>12	C>12	0	2	1
	Substance with no MIR data	NOMIR	0	1	0.5
	Water	H2O	40	80	60
	Substance with no MIR data	NOMIR	1	2	1.5
	propylene glycol	PR-GLYCL	0	10	5
	Organic C>12	C>12	1	1	1
<b>Total</b>			103	228	165.5

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Pimple cream/lotion</b>					
	propylene glycol	PR-GLYCL	0	10	5
	Substance with no MIR data	NOMIR	0	10	5
	Organic C>12	C>12	0	10	5
	glycerol	GLYCERL	0	10	5
	Organic C>12	C>12	0	2	1
	2-(2-ethoxyethoxy) ethanol	DGEE	0	5	2.5
	ethanol	ETOH	0	5	2.5
	Water	H2O	60	80	70
	Substance with no MIR data	NOMIR	0	20	10
	Organic C>12	C>12	10	30	20
	Organic C>12	C>12	0	1	0.5
<b>Total</b>			70	183	126.5
<b>Pre-Treater Aerosol Spray</b>					
	perchloroethylene	CL4-ETHE	0	20	10
	Water	H2O	50	80	65
	Organic C>12	C>12	20	30	25
	2-(2-ethoxyethoxy) ethanol	DGEE	0	70	35
	n-butane	N-C4	5	30	17.5
	isobutane	2-ME-C3	5	15	10
	Organic C>12	C>12	0	2	1
	propane	PROPANE	3	10	6.5
	ethanol	ETOH	0	15	7.5
<b>Total</b>			83	272	177.5



Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Pre-Treater Trigger Spray</b>					
	2-(2-ethoxyethoxy) ethanol	DGEE	0	10	5
	ethanol	ETOH	0	70	35
	Organic C>12	C>12	20	30	25
	Water	H2O	50	80	65
	perchloroethylene	CL4-ETHE	0	20	10
	propylene glycol	PR-GLYCL	0	10	5
	Organic C>12	C>12	0	2	1
<b>Total</b>			70	222	146
<b>Pump spray personal insect repellent</b>					
	ethanol	ETOH	10	75	42.5
	Water	H2O	10	50	30
	Substance with no MIR data	NOMIR	5	20	12.5
	Organic C>12	C>12	5	10	7.5
	Organic C>12	C>12	0	2	1
<b>Total</b>			30	157	93.5
<b>Roll-on insect repellent</b>					
	Substance with no MIR data	NOMIR	5	20	12.5
	ethanol	ETOH	10	80	45
	Organic C>12	C>12	0	1	0.5
	Water	H2O	0	70	35
	Organic C>12	C>12	5	15	10
<b>Total</b>			20	186	103
<b>Rubbing Alcohol/sanitising handrub</b>					
	Organic C>12	C>12	5	10	7.5
	propylene glycol	PR-GLYCL	0	2	1
	Organic C>12	C>12	0	1	0.5
	ethanol	ETOH	0	100	50
	Organic C>12	C>12	0	1	0.5
	Water	H2O	0	20	10
<b>Total</b>			5	134	69.5

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Shaving Cream</b>					
	Organic C>12	C>12	40	60	50
	glycerol	GLYCERL	0	10	5
	ethanol	ETOH	0	10	5
	Organic C>12	C>12	0	2	1
	Water	H2O	20	70	45
	Organic C>12	C>12	5	10	7.5
	Organic C>12	C>12	2	5	3.5
	propylene glycol	PR-GLYCL	0	10	5
<b>Total</b>			67	177	122
<b>Shaving Foam Aerosol</b>					
	Substance with no MIR data	NOMIR	5	10	7.5
	isobutane	2-ME-C3	5	15	10
	Water	H2O	20	70	45
	Organic C>12	C>12	2	5	3.5
	Organic C>12	C>12	0	2	1
	Organic C>12	C>12	0	30	15
	glycerol	GLYCERL	0	5	2.5
<b>Total</b>			32	137	84.5
<b>Slow Release Generator area insect repellent/pesticide (e.g. electrical plug-ins)</b>					
	Organic C>12	C>12	100	100	100
	2-(2-ethoxyethoxy) ethanol	DGEE	0	20	10
	Organic C>12	C>12	0	2	1
	Substance with no MIR data	NOMIR	5	20	12.5
<b>Total</b>			105	142	123.5

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Soaps Solid</b>					
	ethylene glycol	ET-GLYCL	0	10	5
	Substance with no MIR data	NOMIR	0	1	0.5
	Substance with no MIR data	NOMIR	0	1	0.5
	Organic C>12	C>12	60	80	70
	Water	H2O	0	10	5
	Substance with no MIR data	NOMIR	0	1	0.5
	glycerol	GLYCERL	0	10	5
<b>Total</b>			60	113	86.5
<b>Soaps Water Based Surfactant</b>					
	Organic C>12	C>12	0	10	5
	Water	H2O	60	80	70
	propylene glycol	PR-GLYCL	0	10	5
	glycerol	GLYCERL	0	10	5
	Organic C>12	C>12	0	80	40
	Organic C>12	C>12	10	30	20
	Organic C>12	C>12	0	40	20
	Organic C>12	C>12	0	2	1
	Organic C>12	C>12	0	1	0.5
	ethanol	ETOH	0	5	2.5
<b>Total</b>			70	268	169
<b>Solid Air Freshener</b>					
	Substance with no MIR data	NOMIR	0	5	2.5
	Water	H2O	0	20	10
	ethanol	ETOH	0	80	40
	propylene glycol	PR-GLYCL	20	80	50
	Organic C>12	C>12	0	1	0.5
	Substance with no MIR data	NOMIR	10	15	12.5
	Organic C>12	C>12	1	4	2.5
<b>Total</b>			31	205	118

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Solid area insect repellent/insecticide</b>					
	Organic C>12	C>12	60	95	77.5
	Substance with no MIR data	NOMIR	5	20	12.5
	glycerol	GLYCERL	0	20	10
<b>Total</b>			65	135	100
<b>Toothpaste</b>					
	Organic C>12	C>12	2	5	3.5
	Organic C>12	C>12	0	2	1
	ethanol	ETOH	0	30	15
	glycerol	GLYCERL	5	40	22.5
	Substance with no MIR data	NOMIR	20	70	45
	Water	H2O	20	50	35
	Inorganic	INORGANIC	30	55	42.5
	Organic C>12	C>12	0	1	0.5
	Inorganic	INORGANIC	0	1	0.5
<b>Total</b>			77	254	165.5
<b>Water-based Toner</b>					
	Organic C>12	C>12	5	15	10
	glycerol	GLYCERL	0	5	2.5
	Water	H2O	80	95	87.5
	Organic C>12	C>12	0	1	0.5
	propylene glycol	PR-GLYCL	0	10	5
	Organic C>12	C>12	0	1	0.5
<b>Total</b>			85	127	106

Product ID	Chemical Name	ID	Min. Conc.	Max. Conc.	Median Conc
<b>Whitening powder (stain removal)</b>					
	Organic C>12	C>12	0	2	1
	Substance with no MIR data	NOMIR	5	20	12.5
	Organic C>12	C>12	0	10	5
	Substance with no MIR data	NOMIR	0	5	2.5
	Organic C>12	C>12	0	2	1
	Water	H2O	0	50	25
	Substance with no MIR data	NOMIR	10	50	30
<b>Total</b>			15	139	77

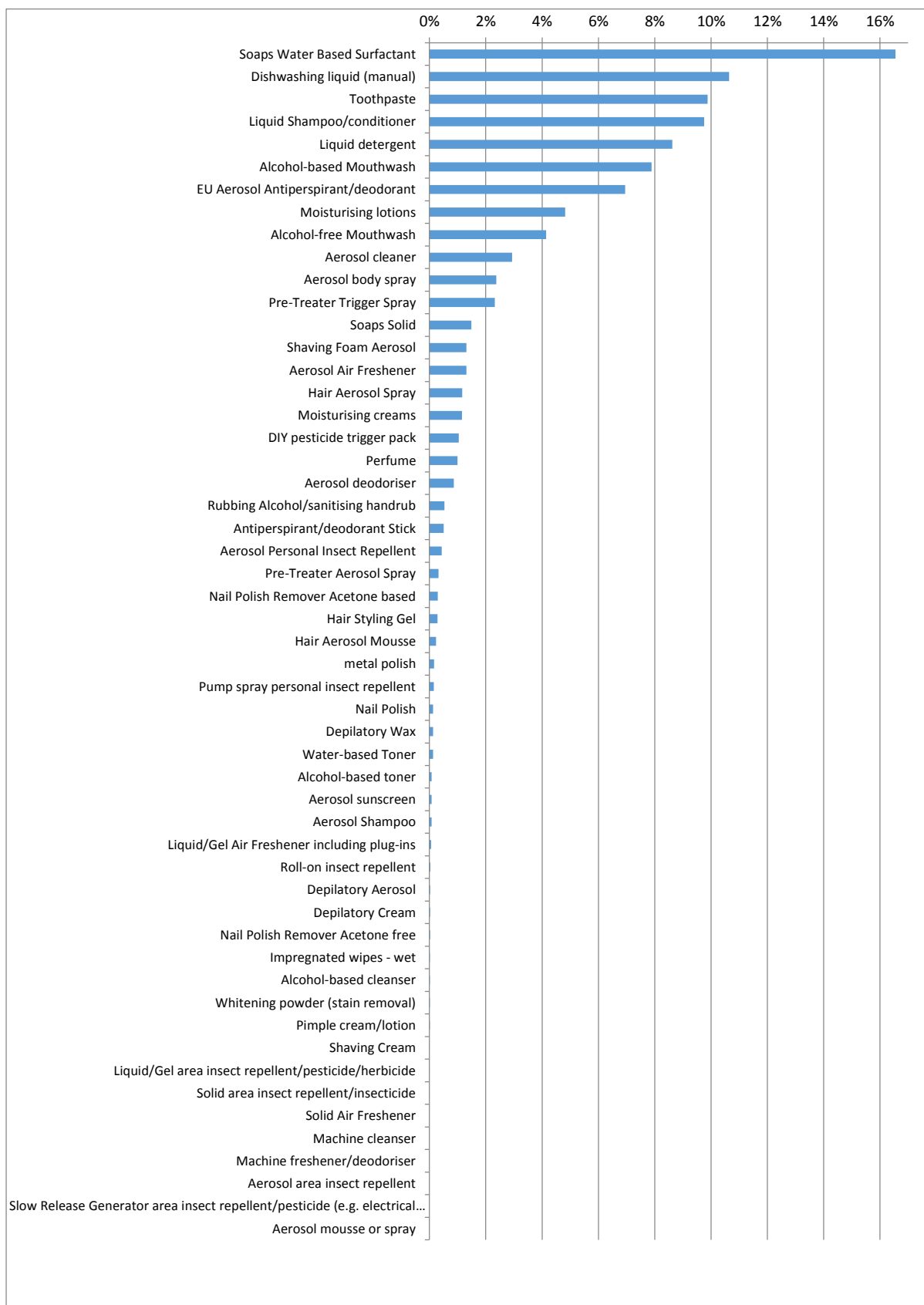
## APPENDIX B: Total sales volume

	Product ID	Total Volume (Tonnes)	Percentage of total sales volume
1	Soaps Water Based Surfactant	10.015	17%
2	Dishwashing liquid (manual)	6.436	11%
3	Toothpaste	5.975	9.9%
4	Liquid Shampoo/conditioner	5.905	9.8%
5	Liquid detergent	5.218	8.6%
6	Alcohol-based Mouthwash	4.771	7.9%
7	EU Aerosol Antiperspirant/deodorant	4.207	7.0%
8	Moisturising lotions	2.918	4.8%
9	Alcohol-free Mouthwash	2.509	4.1%
10	Aerosol cleaner	1.775	2.9%
11	Aerosol body spray	1.436	2.4%
12	Pre-Treater Trigger Spray	1.404	2.3%
13	Soaps Solid	0.901	1.5%
14	Shaving Foam Aerosol	0.795	1.3%
15	Aerosol Air Freshener	0.794	1.3%
16	Hair Aerosol Spray	0.703	1.2%
17	Moisturising creams	0.700	1.2%
18	DIY pesticide trigger pack	0.627	1.0%
19	Perfume	0.605	1.0%
20	Aerosol deodoriser	0.522	0.86%
21	Rubbing Alcohol/sanitising handrub	0.322	0.53%
22	Antiperspirant/deodorant Stick	0.305	0.50%
23	Aerosol Personal Insect Repellent	0.262	0.43%
24	Pre-Treater Aerosol Spray	0.194	0.32%
25	Nail Polish Remover Acetone based	0.180	0.30%
26	Hair Styling Gel	0.172	0.28%
27	Hair Aerosol Mousse	0.143	0.24%
28	metal polish	0.098	0.16%
29	Pump spray personal insect repellent	0.094	0.16%
30	Nail Polish	0.079	0.13%
31	Depilatory Wax	0.079	0.13%
32	Water-based Toner	0.076	0.12%
33	Alcohol-based toner	0.048	0.08%
34	Aerosol sunscreen	0.046	0.08%
35	Aerosol Shampoo	0.044	0.07%
36	Liquid/Gel Air Freshener including plug-ins	0.035	0.06%
37	Roll-on insect repellent	0.020	0.03%
38	Depilatory Aerosol	0.014	0.02%
39	Depilatory Cream	0.014	0.02%
40	Nail Polish Remover Acetone free	0.013	0.02%
41	Impregnated wipes - wet	0.010	0.02%
42	Alcohol-based cleanser	0.008	0.01%
43	Whitening powder (stain removal)	0.008	0.01%



<b>44</b>	Pimple cream/lotion	0.007	0.01%
<b>45</b>	Shaving Cream	0.006	0.01%
<b>46</b>	Liquid/Gel area insect repellent/pesticide/herbicide	0.004	0.01%
<b>47</b>	Solid area insect repellent/insecticide	0.004	0.01%
<b>48</b>	Solid Air Freshener	0.000	0.00%
<b>49</b>	Machine cleanser	0.000	0.00%
<b>50</b>	Machine freshener/deodoriser	0.000	0.00%
<b>51</b>	Aerosol area insect repellent	0.000	0.00%
<b>52</b>	Slow Release Generator area insect repellent/pesticide (e.g. electrical plug-ins)	0.000	0.00%
<b>53</b>	Aerosol mousse or spray	0.000	0.00%

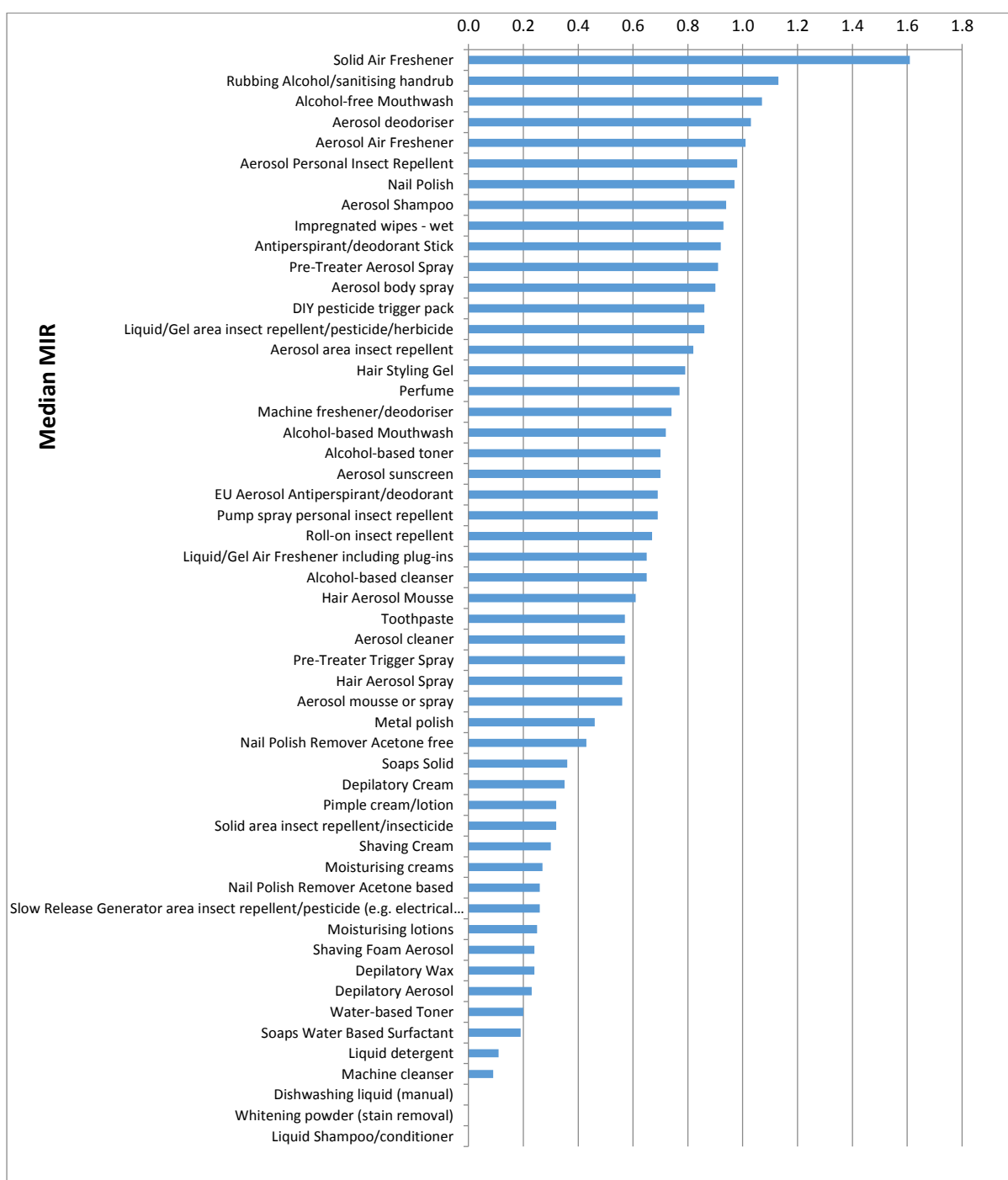
## Product sales volume as percentage of total sales volume across 53 product categories



## APPENDIX C: MIR values

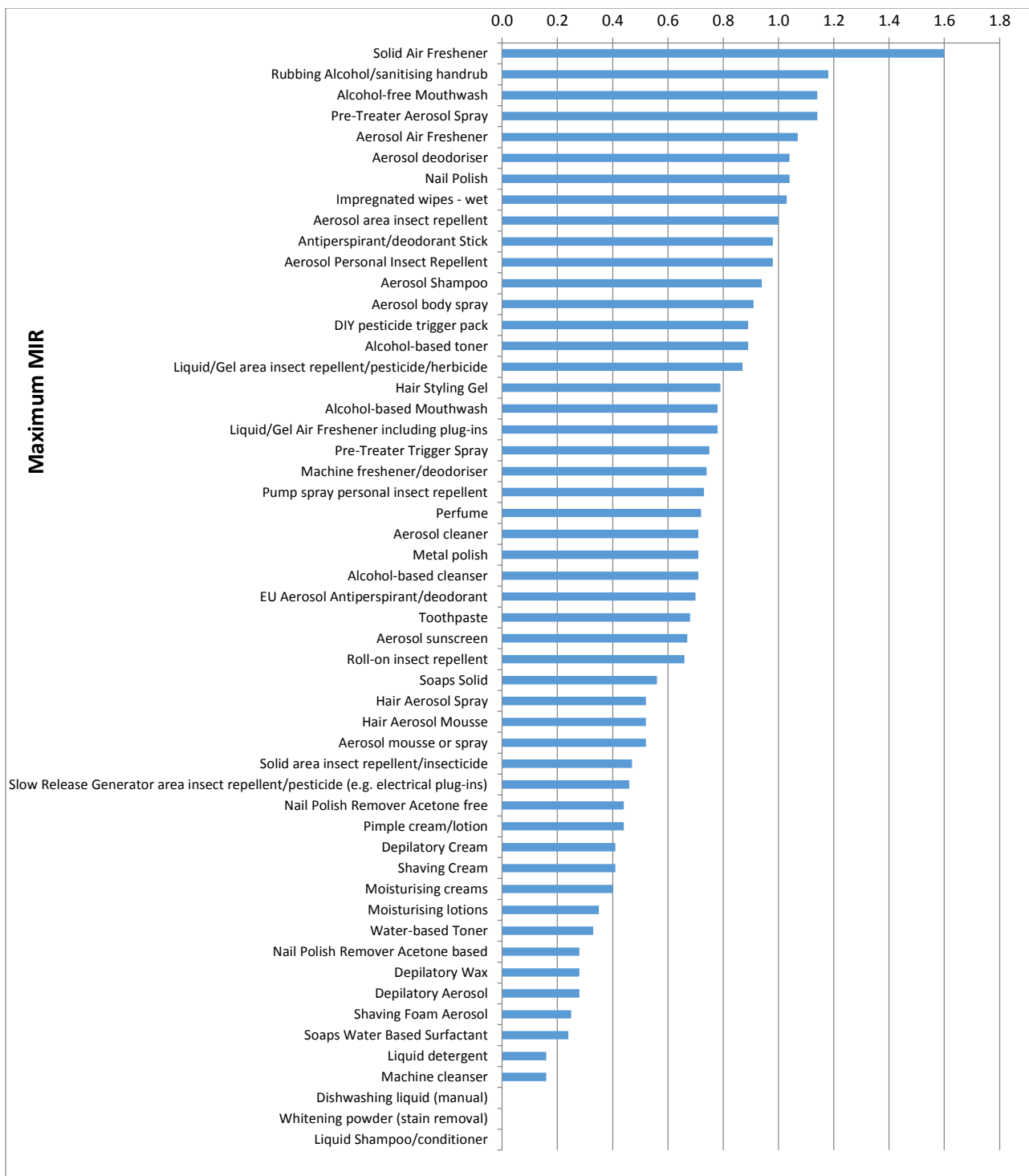
	Product ID	Median MIR
1	Solid Air Freshener	1.61
2	Rubbing Alcohol/sanitising handrub	1.13
3	Alcohol-free Mouthwash	1.07
4	Aerosol deodoriser	1.03
5	Aerosol Air Freshener	1.01
6	Aerosol Personal Insect Repellent	0.98
7	Nail Polish	0.97
8	Aerosol Shampoo	0.94
9	Impregnated wipes - wet	0.93
10	Antiperspirant/deodorant Stick	0.92
11	Pre-Treater Aerosol Spray	0.91
12	Aerosol body spray	0.90
13	DIY pesticide trigger pack	0.86
14	Liquid/Gel area insect repellent/pesticide/herbicide	0.86
15	Aerosol area insect repellent	0.82
16	Hair Styling Gel	0.79
17	Perfume	0.77
18	Machine freshener/deodoriser	0.74
19	Alcohol-based Mouthwash	0.72
20	Alcohol-based toner	0.70
21	Aerosol sunscreen	0.70
22	EU Aerosol Antiperspirant/deodorant	0.69
23	Pump spray personal insect repellent	0.69
24	Roll-on insect repellent	0.67
25	Liquid/Gel Air Freshener including plug-ins	0.65
26	Alcohol-based cleanser	0.65
27	Hair Aerosol Mousse	0.61
28	Toothpaste	0.57
29	Aerosol cleaner	0.57
30	Pre-Treater Trigger Spray	0.57
31	Hair Aerosol Spray	0.56
32	Aerosol mousse or spray	0.56
33	Metal polish	0.46
34	Nail Polish Remover Acetone free	0.43
35	Soaps Solid	0.36
36	Depilatory Cream	0.35
37	Pimple cream/lotion	0.32
38	Solid area insect repellent/insecticide	0.32
39	Shaving Cream	0.30
40	Moisturising creams	0.27
41	Nail Polish Remover Acetone based	0.26
42	Slow Release Generator area insect repellent/pesticide (e.g. electrical plug-ins)	0.26
43	Moisturising lotions	0.25

44	Shaving Foam Aerosol	0.24
45	Depilatory Wax	0.24
46	Depilatory Aerosol	0.23
47	Water-based Toner	0.20
48	Soaps Water Based Surfactant	0.19
49	Liquid detergent	0.11
50	Machine cleanser	0.09
51	Dishwashing liquid (manual)	0.00
52	Whitening powder (stain removal)	0.00
53	Liquid Shampoo/conditioner	0.00



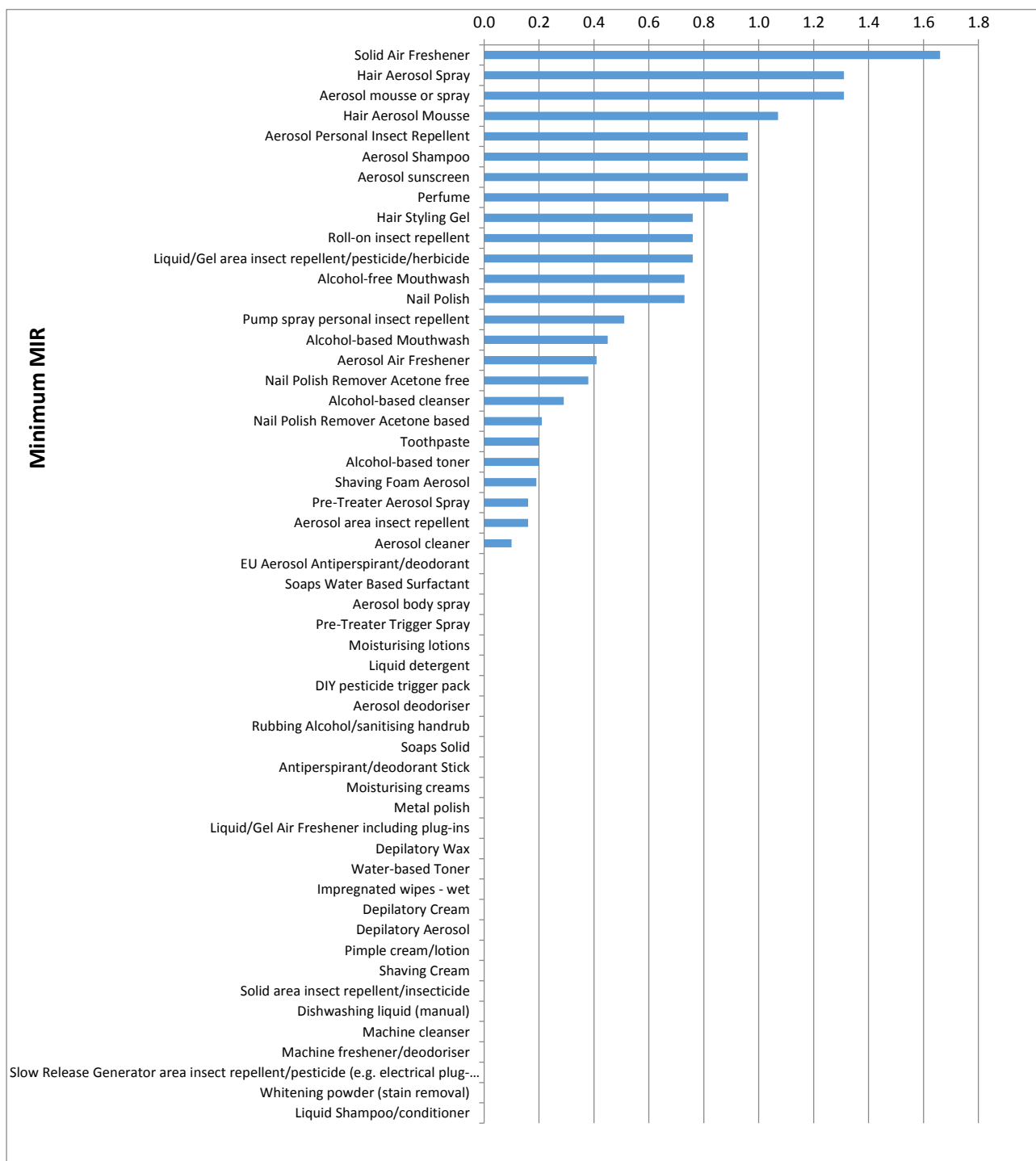
	Product ID	Maximum MIR
1	Solid Air Freshener	1.60
2	Rubbing Alcohol/sanitising handrub	1.18
3	Alcohol-free Mouthwash	1.14
4	Pre-Treater Aerosol Spray	1.14
5	Aerosol Air Freshener	1.07
6	Aerosol deodoriser	1.04
7	Nail Polish	1.04
8	Impregnated wipes - wet	1.03
9	Aerosol area insect repellent	1.00
10	Antiperspirant/deodorant Stick	0.98
11	Aerosol Personal Insect Repellent	0.98
12	Aerosol Shampoo	0.94
13	Aerosol body spray	0.91
14	DIY pesticide trigger pack	0.89
15	Alcohol-based toner	0.89
16	Liquid/Gel area insect repellent/pesticide/herbicide	0.87
17	Hair Styling Gel	0.79
18	Alcohol-based Mouthwash	0.78
19	Liquid/Gel Air Freshener including plug-ins	0.78
20	Pre-Treater Trigger Spray	0.75
21	Machine freshener/deodoriser	0.74
22	Pump spray personal insect repellent	0.73
23	Perfume	0.72
24	Aerosol cleaner	0.71
25	Metal polish	0.71
26	Alcohol-based cleanser	0.71
27	EU Aerosol Antiperspirant/deodorant	0.70
28	Toothpaste	0.68
29	Aerosol sunscreen	0.67
30	Roll-on insect repellent	0.66
31	Soaps Solid	0.56
32	Hair Aerosol Spray	0.52
33	Hair Aerosol Mousse	0.52
34	Aerosol mousse or spray	0.52
35	Solid area insect repellent/insecticide	0.47
36	Slow Release Generator area insect repellent/pesticide (e.g. electrical plug-ins)	0.46
37	Nail Polish Remover Acetone free	0.44
38	Pimple cream/lotion	0.44
39	Depilatory Cream	0.41
40	Shaving Cream	0.41
41	Moisturising creams	0.40
42	Moisturising lotions	0.35
43	Water-based Toner	0.33
44	Nail Polish Remover Acetone based	0.28
45	Depilatory Wax	0.28

46	Depilatory Aerosol	0.28
47	Shaving Foam Aerosol	0.25
48	Soaps Water Based Surfactant	0.24
49	Liquid detergent	0.16
50	Machine cleanser	0.16
51	Dishwashing liquid (manual)	0.00
52	Whitening powder (stain removal)	0.00
53	Liquid Shampoo/conditioner	0.00



	Product ID	Minimum MIR
1	Solid Air Freshener	1.66
2	Hair Aerosol Spray	1.31
3	Aerosol mousse or spray	1.31
4	Hair Aerosol Mousse	1.07
5	Aerosol Personal Insect Repellent	0.96
6	Aerosol Shampoo	0.96
7	Aerosol sunscreen	0.96
8	Perfume	0.89
9	Hair Styling Gel	0.76
10	Roll-on insect repellent	0.76
11	Liquid/Gel area insect repellent/pesticide/herbicide	0.76
12	Alcohol-free Mouthwash	0.73
13	Nail Polish	0.73
14	Pump spray personal insect repellent	0.51
15	Alcohol-based Mouthwash	0.45
16	Aerosol Air Freshener	0.41
17	Nail Polish Remover Acetone free	0.38
18	Alcohol-based cleanser	0.29
19	Nail Polish Remover Acetone based	0.21
20	Toothpaste	0.20
21	Alcohol-based toner	0.20
22	Shaving Foam Aerosol	0.19
23	Pre-Treater Aerosol Spray	0.16
24	Aerosol area insect repellent	0.16
25	Aerosol cleaner	0.10
26	EU Aerosol Antiperspirant/deodorant	0.00
27	Soaps Water Based Surfactant	0.00
28	Aerosol body spray	0.00
29	Pre-Treater Trigger Spray	0.00
30	Moisturising lotions	0.00
31	Liquid detergent	0.00
32	DIY pesticide trigger pack	0.00
33	Aerosol deodoriser	0.00
34	Rubbing Alcohol/sanitising handrub	0.00
35	Soaps Solid	0.00
36	Antiperspirant/deodorant Stick	0.00
37	Moisturising creams	0.00
38	Metal polish	0.00
39	Liquid/Gel Air Freshener including plug-ins	0.00
40	Depilatory Wax	0.00
41	Water-based Toner	0.00
42	Impregnated wipes - wet	0.00
43	Depilatory Cream	0.00
44	Depilatory Aerosol	0.00
45	Pimple cream/lotion	0.00

46	Shaving Cream	0.00
47	Solid area insect repellent/insecticide	0.00
48	Dishwashing liquid (manual)	0.00
49	Machine cleanser	0.00
50	Machine freshener/deodoriser	0.00
51	Slow Release Generator area insect repellent/pesticide (e.g. electrical plug-ins)	0.00
52	Whitening powder (stain removal)	0.00
53	Liquid Shampoo/conditioner	0.00





# APPENDIX D: Summary of feedback on full product category list

	Group	Product Type	Product ID	Supplied By Accord Members	Contains >5% VOC of Interest
1	Automotive	Air freshener	Automotive Air Freshener solution	<input type="checkbox"/>	<input type="checkbox"/>
2	Automotive	Air freshener	Aerosol Automotive Air Freshener	<input type="checkbox"/>	<input type="checkbox"/>
3	Automotive	Main body and tyres	Waxes	<input type="checkbox"/>	<input type="checkbox"/>
4	Automotive	Main body and tyres	Detergent based cleaners	<input type="checkbox"/>	<input type="checkbox"/>
5	Automotive	Windscreen	Windscreen chemical film	<input type="checkbox"/>	<input type="checkbox"/>
6	Automotive	Windscreen	Windscreen cleaner	<input type="checkbox"/>	<input type="checkbox"/>
7	Colour Cosmetics	Eyes	Eye liner pencil	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Colour Cosmetics	Eyes	Eye shadow	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Colour Cosmetics	Eyes	Liquid eye liner	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Colour Cosmetics	Eyes	Mascara	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11	Colour Cosmetics	Lips	Lipstick	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	Colour Cosmetics	Lips	Lip gloss	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13	Colour Cosmetics	Lips	Lip liner	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14	Colour Cosmetics	Nails	Nail Polish Remover Acetone free	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
15	Colour Cosmetics	Nails	Nail Polish	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
16	Colour Cosmetics	Nails	Nail Polish Remover Acetone based	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
17	Colour Cosmetics	Skin	Blush	<input checked="" type="checkbox"/>	<input type="checkbox"/>
18	Colour Cosmetics	Skin	Press-powder foundation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
19	Colour Cosmetics	Skin	Liquid foundation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20	Home Care	Air Fresheners	Aerosol Air Freshener	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
21	Home Care	Air Fresheners	Solid Air Freshener	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
22	Home Care	Air Fresheners	Liquid/Gel Air Freshener including plug-ins	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
23	Home Care	Air Fresheners	Candles	<input checked="" type="checkbox"/>	<input type="checkbox"/>
24	Home Care	Dehumidifier	Solid/granular	<input checked="" type="checkbox"/>	<input type="checkbox"/>
25	Home Care	Dishwash	Powders and tablets	<input checked="" type="checkbox"/>	<input type="checkbox"/>
26	Home Care	Dishwash	Rinse aid	<input checked="" type="checkbox"/>	<input type="checkbox"/>
27	Home Care	Dishwash	Machine freshener/deodoriser	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
28	Home Care	Dishwash	Machine cleanser	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
29	Home Care	Dishwash	Dishwashing liquid (manual)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
30	Home Care	Drain Cleaner	Drain cleaner gel liquid	<input checked="" type="checkbox"/>	<input type="checkbox"/>
31	Home Care	Drain Cleaner	Drain cleaner crystals	<input checked="" type="checkbox"/>	<input type="checkbox"/>
32	Home Care	Hard Surface Cleaners/disinfectant	Cleaning powder/solid	<input checked="" type="checkbox"/>	<input type="checkbox"/>
33	Home Care	Hard Surface Cleaners/disinfectant	Cleaning liquid - chlorine based	<input checked="" type="checkbox"/>	<input type="checkbox"/>

34	Home Care	Hard Surface Cleaners/disinfectant	Impregnated wipes - wet	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
35	Home Care	Hard Surface Cleaners/disinfectant	Impregnated wipes - dry	<input checked="" type="checkbox"/>	<input type="checkbox"/>
36	Home Care	Hard Surface Cleaners/disinfectant	Toilet bowl cleaner blocks/caged liquid/gels/paste strips	<input checked="" type="checkbox"/>	<input type="checkbox"/>
37	Home Care	Hard Surface Cleaners/disinfectant	metal polish	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
38	Home Care	Hard Surface Cleaners/disinfectant	Cleaning cream/viscous liquid	<input checked="" type="checkbox"/>	<input type="checkbox"/>
39	Home Care	Hard Surface Cleaners/disinfectant	Aerosol cleaner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
40	Home Care	Hard Surface Cleaners/disinfectant	Alcohol-based solution	<input type="checkbox"/>	<input type="checkbox"/>
41	Home Care	Hard Surface Cleaners/disinfectant	Liquid detergent	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
42	Home Care	Insect Repellent/pesticides/Herbicides	DIY pesticide trigger pack	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
43	Home Care	Insect Repellent/pesticides/Herbicides	Solid area insect repellent/insecticide	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
44	Home Care	Insect Repellent/pesticides/Herbicides	Granular area insect repellent/pesticide/herbicide	<input checked="" type="checkbox"/>	<input type="checkbox"/>
45	Home Care	Insect Repellent/pesticides/Herbicides	Slow Release Generator area insect repellent/pesticide (e.g. electrical plug-ins)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
46	Home Care	Insect Repellent/pesticides/Herbicides	Liquid/Gel area insect repellent/pesticide/herbicide	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
47	Home Care	Insect Repellent/pesticides/Herbicides	Aerosol area insect repellent	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
48	Home Care	Laundry	Pre-Treater Aerosol Spray	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
49	Home Care	Laundry	Laundry Powder	<input checked="" type="checkbox"/>	<input type="checkbox"/>
50	Home Care	Laundry	Fabric Softener	<input checked="" type="checkbox"/>	<input type="checkbox"/>
51	Home Care	Laundry	Laundry Liquid	<input checked="" type="checkbox"/>	<input type="checkbox"/>
52	Home Care	Laundry	Bleach	<input checked="" type="checkbox"/>	<input type="checkbox"/>
53	Home Care	Laundry	Pre-Treater Trigger Spray	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
54	Home Care	Laundry	Whitening powder (stain removal)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
55	Home Care	Rodenticide	Pelletised Grain-based bait	<input checked="" type="checkbox"/>	<input type="checkbox"/>
56	Home Care	Soft furnishing/fabric/carpet cleaners	Liquid/suspension/trigger	<input checked="" type="checkbox"/>	<input type="checkbox"/>
57	Home Care	Soft furnishing/fabric/carpet cleaners	Aerosol deodoriser	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
58	Home Care	Soft furnishing/fabric/carpet cleaners	Powder deodoriser	<input checked="" type="checkbox"/>	<input type="checkbox"/>
59	Home Care	Soft furnishing/fabric/carpet cleaners	Aerosol mousse or spray	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
60	Personal Care	Antiperspirant Deodorant	Antiperspirant/deodorant roll-on	<input checked="" type="checkbox"/>	<input type="checkbox"/>
61	Personal Care	Antiperspirant Deodorant	Antiperspirant/deodorant powder	<input checked="" type="checkbox"/>	<input type="checkbox"/>
62	Personal Care	Antiperspirant Deodorant	Antiperspirant/deodorant Stick	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
63	Personal Care	Antiperspirant Deodorant	EU Aerosol Antiperspirant/deodorant	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
64	Personal Care	Body spray	Aerosol body spray	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
65	Personal Care	Fragrance	Perfume	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
66	Personal Care	Hair Care	Hair Dye Paste	<input type="checkbox"/>	<input type="checkbox"/>
67	Personal Care	Hair Care	Aerosol Shampoo	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

68	Personal Care	Hair Care	Hair Dye Aerosol	<input type="checkbox"/>	<input type="checkbox"/>
69	Personal Care	Hair Care	Hair Styler Wax	<input checked="" type="checkbox"/>	<input type="checkbox"/>
70	Personal Care	Hair Care	Hair Aerosol Spray	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
71	Personal Care	Hair Care	Hair Styling Gel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
72	Personal Care	Hair Care	Hair Styler Cream	<input checked="" type="checkbox"/>	<input type="checkbox"/>
73	Personal Care	Hair Care	Hair Styler Emulsion	<input checked="" type="checkbox"/>	<input type="checkbox"/>
74	Personal Care	Hair Care	Liquid Shampoo/conditioner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
75	Personal Care	Hair Care	Hair Aerosol Mousse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
76	Personal Care	Lip Care	Lip Balm Paraffin Wax	<input checked="" type="checkbox"/>	<input type="checkbox"/>
77	Personal Care	Oral Care	Toothpaste	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
78	Personal Care	Oral Care	Alcohol-based Mouthwash	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
79	Personal Care	Oral Care	Alcohol-free Mouthwash	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
80	Personal Care	Shaving Products	Shaving Foam Aerosol	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
81	Personal Care	Shaving Products	Shaving Gel	<input checked="" type="checkbox"/>	<input type="checkbox"/>
82	Personal Care	Shaving Products	Shaving Soap/Stick	<input checked="" type="checkbox"/>	<input type="checkbox"/>
83	Personal Care	Shaving Products	Aftershave Balm	<input checked="" type="checkbox"/>	<input type="checkbox"/>
84	Personal Care	Shaving Products	Aftershave Lotion	<input checked="" type="checkbox"/>	<input type="checkbox"/>
85	Personal Care	Shaving Products	Shaving Cream	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
86	Personal Care	Skin Care	Sunscreen lotion	<input checked="" type="checkbox"/>	<input type="checkbox"/>
87	Personal Care	Skin Care	Moisturising lotions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
88	Personal Care	Skin Care	Roll-on insect repellent	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
89	Personal Care	Skin Care	Aerosol Personal Insect Repellent	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
90	Personal Care	Skin Care	Rubbing Alcohol/sanitising handrub	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
91	Personal Care	Skin Care	Depilatory Wax	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
92	Personal Care	Skin Care	Soaps Solid	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
93	Personal Care	Skin Care	Soaps Water Based Surfactant	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
94	Personal Care	Skin Care	Pimple cream/lotion	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
95	Personal Care	Skin Care	Non-alcohol based cleanser (fruit acids)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
96	Personal Care	Skin Care	Alcohol-based cleanser	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
97	Personal Care	Skin Care	Moisturising Oils	<input checked="" type="checkbox"/>	<input type="checkbox"/>
98	Personal Care	Skin Care	Depilatory Finishing Wipes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
99	Personal Care	Skin Care	Aerosol sunscreen	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
100	Personal Care	Skin Care	Depilatory Cream	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
101	Personal Care	Skin Care	Depilatory Aerosol	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
102	Personal Care	Skin Care	Soaps Emulsions	<input type="checkbox"/>	<input type="checkbox"/>
103	Personal Care	Skin Care	Moisturising creams	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
104	Personal Care	Skin Care	Alcohol-based toner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
105	Personal Care	Skin Care	Water-based Toner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
106	Personal Care	Skin Care	Pump spray personal insect repellent	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>