



LAB/LABSA
BUSINESS UNIT



CEPSA

LAB/LABSA BUSINESS UNIT

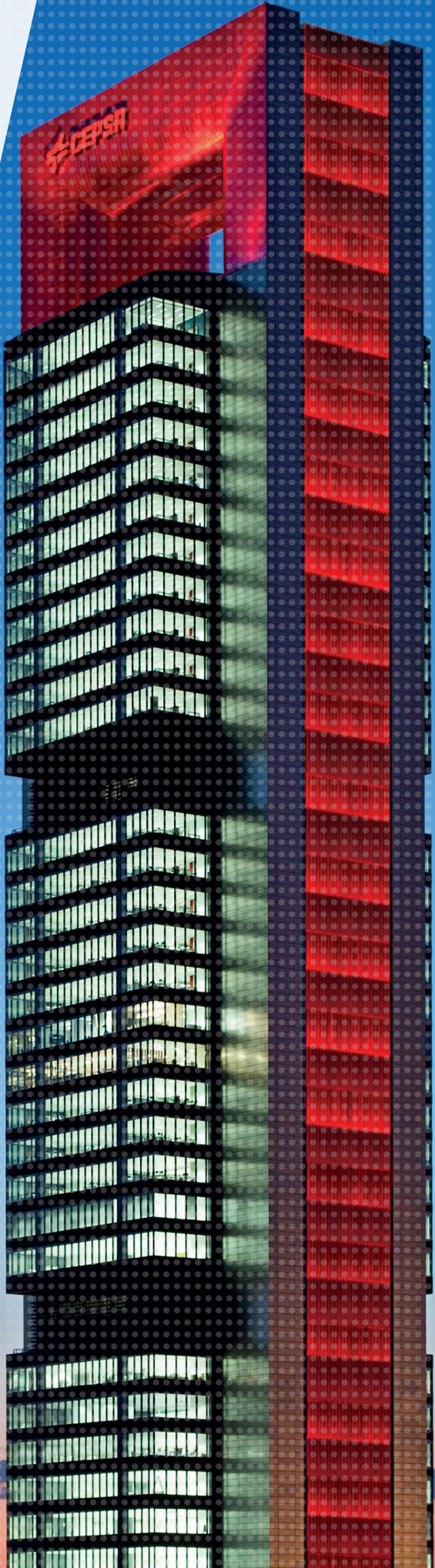


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CHAPTER 1

 Cepsa





Our aim is to achieve a powerful position in the global energy market.

We are a global energy company, 100% owned by the Mubadala Investment Company, which is active in all stages of the oil and gas value chain of: exploration and production, refining, transport and marketing of derivatives, bio-fuels, cogeneration and marketing of electricity, with close to 10,000 professionals and a presence on five continents.

We have developed an important chemicals division, which is closely integrated with the oil refining activities, where we manufacture and market raw materials to make high value added products.

With the dynamic and innovative spirit that characterizes us, we pursue continuous improvement in the search for new goals and challenges, while maintaining our firm commitment to maximum customer satisfaction.

Thanks to our integrated business model, our technical excellence and ability to adapt, we have consolidated our position as a leading company, and our aim is to achieve an important position in the global energy market.



Around the world

“We are an integrated energy company with nearly 10,000 experienced professionals present in all phases of the petroleum and gas value chain.”



-  UPSTREAM
-  EXPLORATION
-  PRODUCTION
-  REFINING
-  DISTRIBUTION AND MARKETING
-  CHEMICALS
-  GAS AND POWER
-  CORPORATE HEADQUARTERS
-  TRADING AND BUNKER





CHAPTER 2

 Chemicals at Cepsa



Cepsa Chemicals is fundamental to the internationalization and growth of the Company.

Chemicals is one of the engines that is driving our internationalization and one of the areas where we are growing the most. All of that is thanks to the full integration with other areas such as refining.

At our chemicals plants we transform crude into end products and raw materials for other industries with no end of applications: next generation plastics, cosmetics, shampoos, biodegradable detergents, paints, electronic components, pharmaceutical products and much more.

Our plants in Canada, Brazil and Spain have made us the world leading producer of alkylbenzene, the raw material

used to make biodegradable detergents.

We are also the leading producer of cumene and the second in phenol and acetone, thanks to our plants in China and Spain.

We sell the solvents produced at our plants in Spain globally.

Thanks to our recent expansion in chemicals plants in Indonesia and Germany, through our Sinar Mas Cepsa joint venture, we have diversified our raw materials business with fatty alcohols from vegetal sources, a basic ingredient in the production of detergents and personal care product.



Global presence of chemicals business at Cepsa

(Plants capacities and ownership)



Becancour (Canada) - 100% Cepsa
LAB: 120 kt



Palos de la Frontera (Spain) - 100% Cepsa
Cumene: 1,000 kt Phenol: 600 kt
Acetone: 370 kt AMS: 24 kt



Camaçari (Brazil) - 72% Cepsa
LAB: 260 kt LABSA: 120 kt



Shanghai (China) - 75% Cepsa
Cumene: 360 kt Phenol: 250 kt
Acetone: 150 kt



Dumai (Indonesia) - 50% Cepsa
Fatty alcohols: 160 kt



Puente Mayorga (Spain) - 100% Cepsa
LAB: 220 kt LABSA: 80 kt N-Paraffins: 400 kt



Genthin (Germany) - 50% Cepsa
Surfactants: 100 kt

- **Sales offices:**
Netherlands, Belgium, UK, Italy, USA



CHAPTER 3

➤ LAB/LABSA
Bussines
Unit





3.1. Industrial Sites:

	LAB (kt/y)	LAS (kt/y)	HAB (kt/y)	n-par (kt/y)
SPAIN	220	80	6,8	400
CANADA	120		3,6	-
BRAZIL	260	120	9,5	-

Cepsa Química Puente Mayorga (Spain)

One of the largest sites single LAB production sites, integrated with the adjacent Cepsa Refinery.

UOP HF Technology based on the hydrogen fluoride Alkylation. Define unit to reduce the di-olefin content.

Falling Film Reactor (FFR) sulfonation units for the production of Linear alkylbenzene Sulfonic Acid (LABSA).

Production of n-paraffin used as raw material in the three LAB Cepsa production sites.

Heavy alkylate (HAB), a paraffinic-aromatic oil based primarily on dialkylbenzenes, as a by-product in LAB manufacture process.

By 2020 the plant of Puente Mayorga will be the first LAB plant in the world which change from HF to Solid Bed Alkylation (SBA) technology.

Cepsa Química Bécancour (Canada)

It started up in 1995 and was the first LAB plant based on Detal™ technology, the state of the art process for making LAB, jointly developed with UOP and Cepsa.

Cepsa Química Bécancour loaded in 2017 a new generation of SBA catalysts becoming the first LAB plant in the world capable of manufacturing not only high 2-phenyl but also low 2-phenyl LAB (HF-like product).

Cepsa Química Bécancour also produces Heavy alkylate (HAB).

Deten Química (Brazil)

The largest LAB plant in the world. It employs UOP technology, based on the hydrogen fluoride catalyst and use a Define unit to reduce the di-olefin content.

Falling Film Reactor (FFR) sulfonation units for the production of Linear alkylbenzene sulfonic acid (LABSA).

Production of Heavy alkylate (HAB).



3.2. Logistic facilities

Cepsa Química has developed a broad and international network of storage locations all over the world to fulfill the needs of our customers to assure the delivery of our products on time.



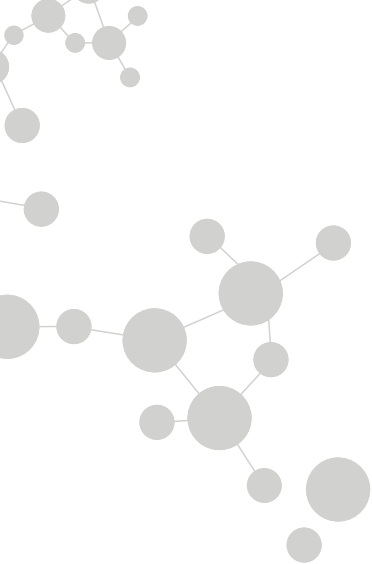


Storage facilities in:

**United Kingdom, Belgium, Spain, Mexico,
Colombia, Chile, Brazil, Kenia, Turkey and South Africa.**

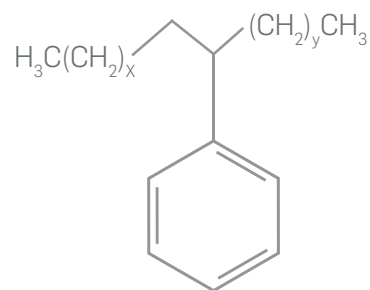


- Headquarters in Spain
- Commercial office in Belgium



3.3. LAB at A Glance - Simplified Chemistry

- **Chemical name:**
C10-C13 Linear alkylbenzene
- **Physical properties:**
Melting point: $< -70^{\circ}\text{C}$
Boiling point: $278 - 314^{\circ}\text{C}$
Density: 0.8603 g/cm^3 (15°C)
- **Molecular weight:**
240 g/mol (average)
- **Molecular structure:**

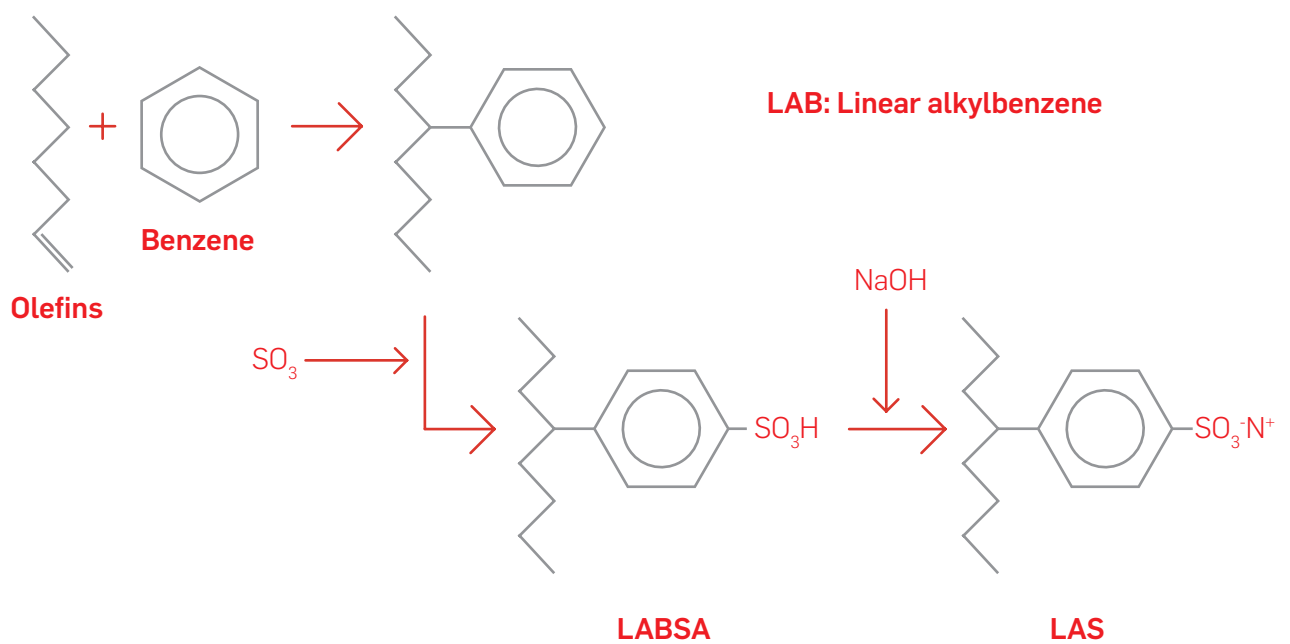




3.4. Manufacturing process

Linear alkylbenzene (LAB) is the result of the catalytic alkylation of benzene, with linear mono-olefins obtained from n-paraffin dehydrogenation process, extracted from a hydrotrated kerosene cut.

LABSA is produced by sulphonation of LAB with sulfur trioxide (SO_3).

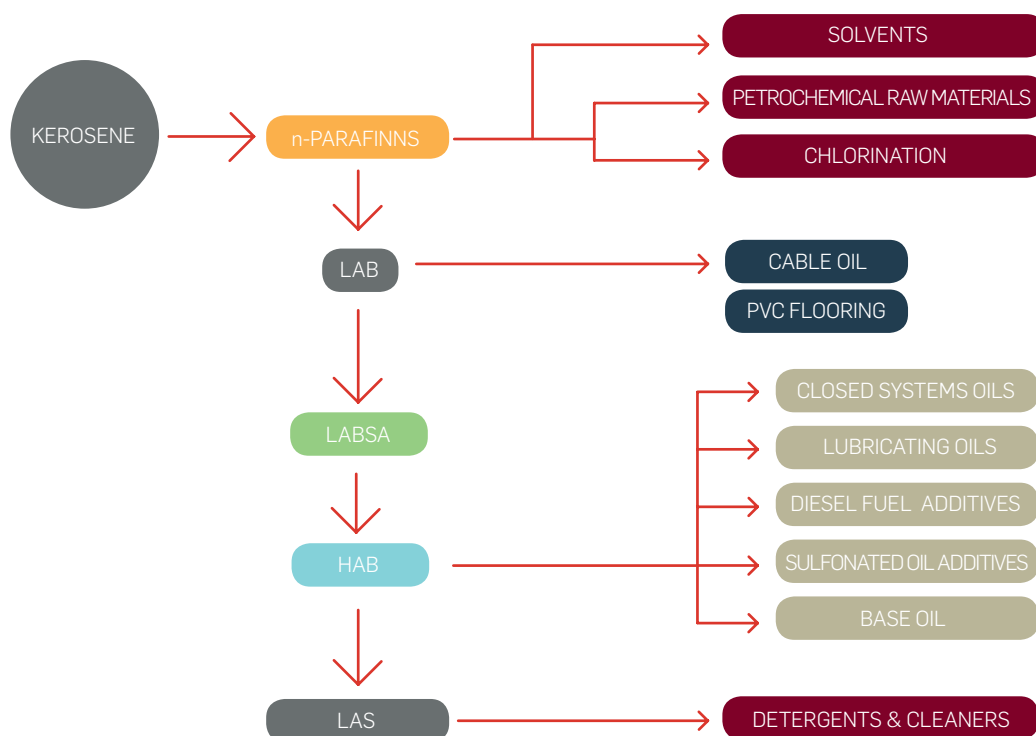


3.5. Industrial Applications:

LAB is mainly used as a raw material to produce Linear alkylbenzene sulfonic acid (LABSA) via sulfonation reaction and then Linear alkylbenzene sulfonate (LAS) via neutralization.

for household detergents, such as laundry powders, laundry liquids, dishwashing products and allpurpose cleaners, as well as other minor applications in a wide range of different sectors.

LAS is one of the major anionic surfactants used on the market



LAB: Linear alkylbenzene
HAB: Heavy Alkylate bottom
LABSA: Linear alkylbenzene Sulfonic Acid
LAS: Linear alkylbenzene Sulfonate



3.6. Research Center:

12.000 m², 9.000 m² for labs

50 Research Projects

Activities in:

- Refining
- Chemicals
- Exploration and production

Continuous improvement is one of our strongest values and is particularly evident in our Research and Development area. We are driven to advance and innovate in all we do. We search for new business opportunities, improve our processes, and develop ever more advanced new products.

Since 1975 we have worked with Cepsa's Research Center. Here we not only develop important research projects for our

production centers and commercial units, but we also provide technical support to our customers.

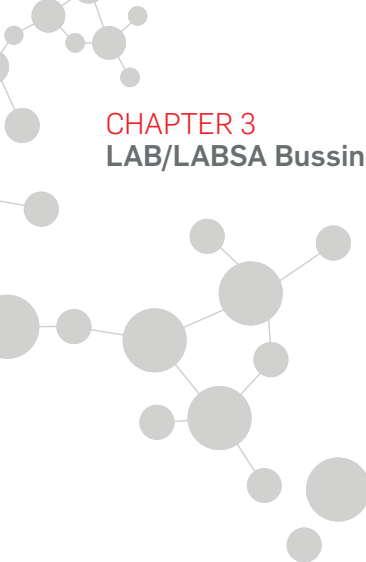
We have laboratories, state-of-the-art machinery and pilot plants capable of reproducing the processes that we carry out at our production centers, principally in refining and chemicals. This has enabled us to create more efficient and environmentally friendly processes, develop new products and promote added value projects.

The Research and Development projects are often carried out through collaboration with different entities such as universities and technological centers.

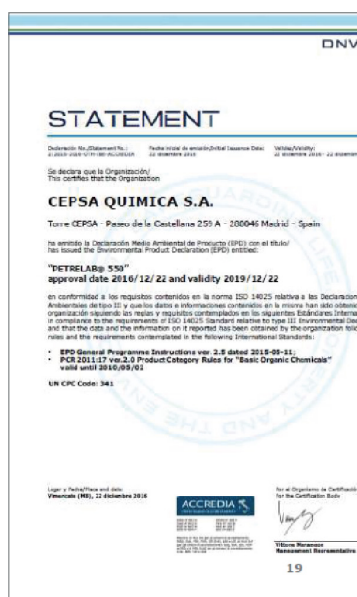
Among the most noteworthy initiatives within the LAB/ LAB business unit it should be

highlighted the development and subsequent improvements of the most modern and efficient technology (Detal™) for making LAB. The launching of Detal meant a milestone in the detergent industry allowing the substitution of HF by non-dangerous and easier to manipulate solid catalyst. The first commercial Detal-based plant came on stream in 1995 (Cepsa Chimie Bécancour, formerly known as Petresa Canada International). Since then, 85% of new added LAB capacity is based on Detal.

Our technical activities go beyond the process area and enter the application field. The surfactant and detergency laboratory of the research center undertake a variety of projects: works for customers, quality improvement, evaluation of raw materials, new products, etc.



CEPSA Química becomes the first and only LAB manufacturer to achieve the EDP (Environment Product Declaration).



3.7. Cepsa and the environment:

Preventing, minimizing and mitigating our impacts on the environment.

We are aware of the impact of our activities on our surroundings and we assume the implications involved for the development of our processes. We defend the compatibility between development and the environment.

We are committed to sustainability and the optimization of our activities with the lowest possible impact.

The basic tools that we have to ensure the excellence in environmental performance are the following:

- Basic Environmental Regulations.
- Environmental Policy.
- Certified Environmental Management Systems in our major industrial facilities.

- An unified ISO 14001 certification for all production sites in Cepsa.
- Environmental Declarations at our refineries and chemical plants.
- Specific training in environmental matters.
- Specific strategies.

Cepsa Química has historically contributed to study the fate and effects of LAS in the environment, being author of some key studies and international publications.

Cepsa Química is member of groups such as the LAB/LAS Consortium ECOSOL (European Council on Studies on LAB/LAS), CLER (Council of LAB Research, USA), CESIO (Comité Européen des Agents de Surface et leurs Intermediaries Organiques), AEPSAT (Asociación Española de Productores de Sustancias para Aplicaciones Tensioactivas) as well as other groups consortium related to regulatory affairs.



3.8. Product portfolio:

CEPSA Química produces several grades of Linear Alkylbenzene (LAB), the corresponding sulfonic acid derivative (LABSA) and also

Heavy alkylate (HAB).

The list of commercial products is showed in the following table:

Product	Commercial name	% 2 phenyl	LAB type	Site
LAB	PETRELAB® 550	low	C12	Spain
	DetLAB® 240	low	C12	Brazil
	PETRELAB® 550-QL	low	C12	Canada
	PETRELAB® 500-QL	low	C11	Canada
	PETRELAB® 500-Q	high	C11	Canada
	PETRELAB® 550-Q	high	C12	Canada

Product	Commercial name	% 2 phenyl	LAB type	Site
LABSA	DetLAS® 320	low	C12	Brazil
	PETRESUL® 550	low	C12	Spain
	PETRESUL® 550-Q	high	C12	Spain
	PETRESUL® 500-Q	high	C11	Spain

Product	Commercial name	Average MW	Site
HAB	PETRENE® 900	335	Spain
	DetALP® 360	340-350	Brazil
	PETRENE® 900-Q	380-390	Canada

Latest product specifications, MSDS and standard declarations available upon request.

Alcohols Bussines Unit

Cepsa is no longer a mere petrochemical producer but a global chemical player after our successful entry into the Fatty Alcohol business in 2014.

Sinar Mas Cepsa is a joint venture between Cepsa and Golden Agri-Resources (GAR), one of the largest palm oil plantation companies in the world.

Sinar Mas Cepsa is currently operat–ing a world class fatty alcohol plant in Indonesia and produces Sodium Lauryl Sulfate (SLS) and Sodium Lauryl ether Sulfate (SLES) in Germany for the EMEA region.

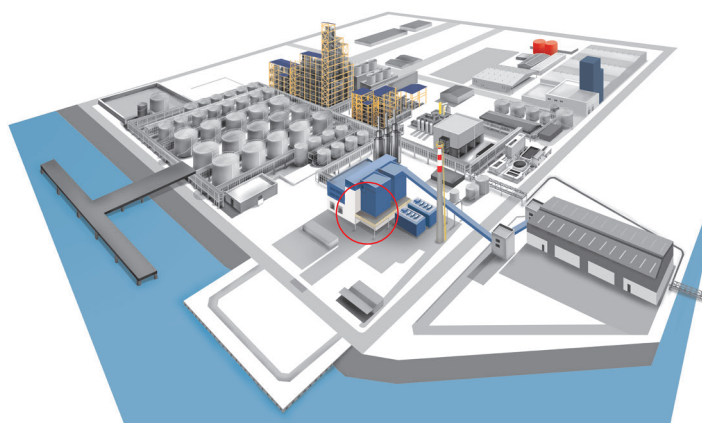
THE MANUFACTURING PROCESS



TWO PLANTS STRATEGICALLY LOCATED FOR A GLOBAL MARKET



INDONESIA PLANT

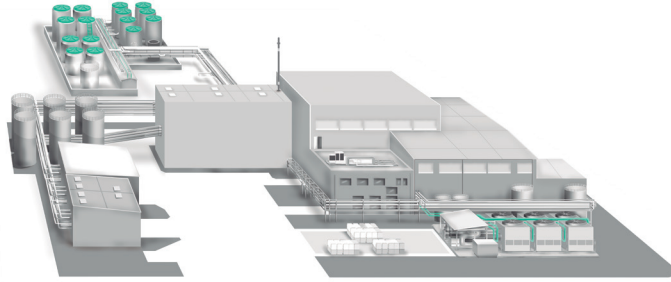


Key facts for Indonesia plant

- Location: Dumai, Sumatra.
- Plot: 22 hectares.
- 8.5 million construction direct man-hours.
- Steel structure: 6,814 MT.
- Capacity: 160,000 MT/YR Fatty Alcohols.
- Main markets: Asia, Europe, Middle East.
- Stand-alone plant.



**GERMANY
PLANT**



Key facts for Germany plant

- Location: Genthin, Germany. Strategic location for Central and Eastern Europe.
- Capacity: 100,000 MT/yr of surfactants.
- Plant flexibility: able to produce Surfactants from both main intermediates LAB and Fatty Alcohols.

FINAL APPLICATIONS FOR OUR PRODUCTS

COSMETICS



CREAMS,
PERSONAL CARE
PRODUCTS.



HYGIENE



SHAMPOOS,
GELS,
TOOTHPASTE.



DETERGENTS



DETERGENTS,
DISHWASHING,
CLEANING
PRODUCTS.



OTHER APPLICATIONS



PLASTICS,
GREASES & LUBES,
ADHESIVES,
CANDLES, WAXES,
AGROCHEMICALS,
FRAGRANCES &
FLAVORS.



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