

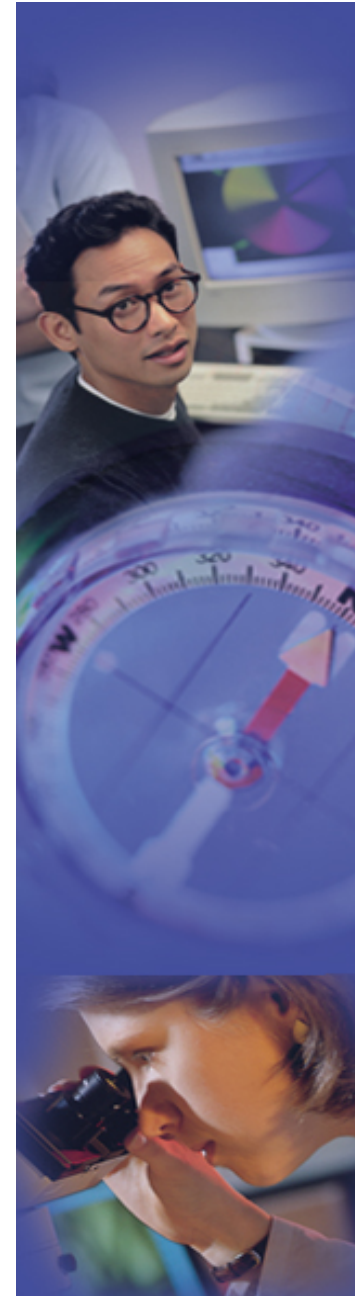
Surfactants based on Renewable Resources for Personal Care and Home Care

**Ansgar Behler
Cognis GmbH**

RSC Specialty Chemicals Symposium June 2008, Munich

Cognis in Brief

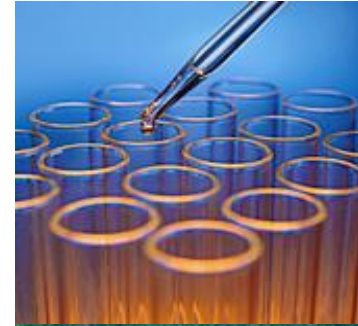
- **Leading global specialty chemicals company headquartered in Monheim, Germany**
- **Sales 2007: €3.518 billion**
Adjusted EBITDA 2007: €410 million
- **Approximately 8,000 employees operating production sites and/or service centers in about 30 countries**
- **Over 160 years' experience in oleochemicals**
- **Owners since Nov. 30, 2001 are private equity funds advised by: Permira / GS Capital Partners / SV Life Sciences**



The Cognis strategy

Focus on consumer orientation

- Our activities are focused on the global “wellness” and “sustainability” trends
- Modern high-performance chemicals produced using predominantly natural source and renewable raw materials
- Cognis enables its customers to develop and market sustainable solutions that are well positioned to achieve long-term success in the marketplace



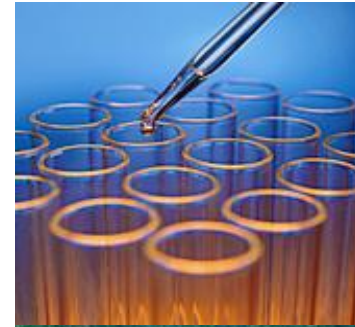
Drivers of the “sustainability” trend

Consumer needs

- Performance and convenience
- Natural sourced – renewable raw materials
- Biodegradable
- Toxicologically harmless
- No adverse effect on health, possible even caring properties

Production process

- Quality requirements
- Safety standards
- Environmental protection
- (Product) responsibility doesn't stop at the factory gate



Global Surfactant market (2006)

Worldwide production of surfactants: 12.5 M tonnes/y

Growth rate: appr. 0.5 M tonnes/y

Use of surfactants:

60 %	Household detergents
30 %	Industrial and technical appl.
7 %	Industrial and institutional cleaning (I&I)
6 %	Personal Care

Source: Focus on surfactants May 2006

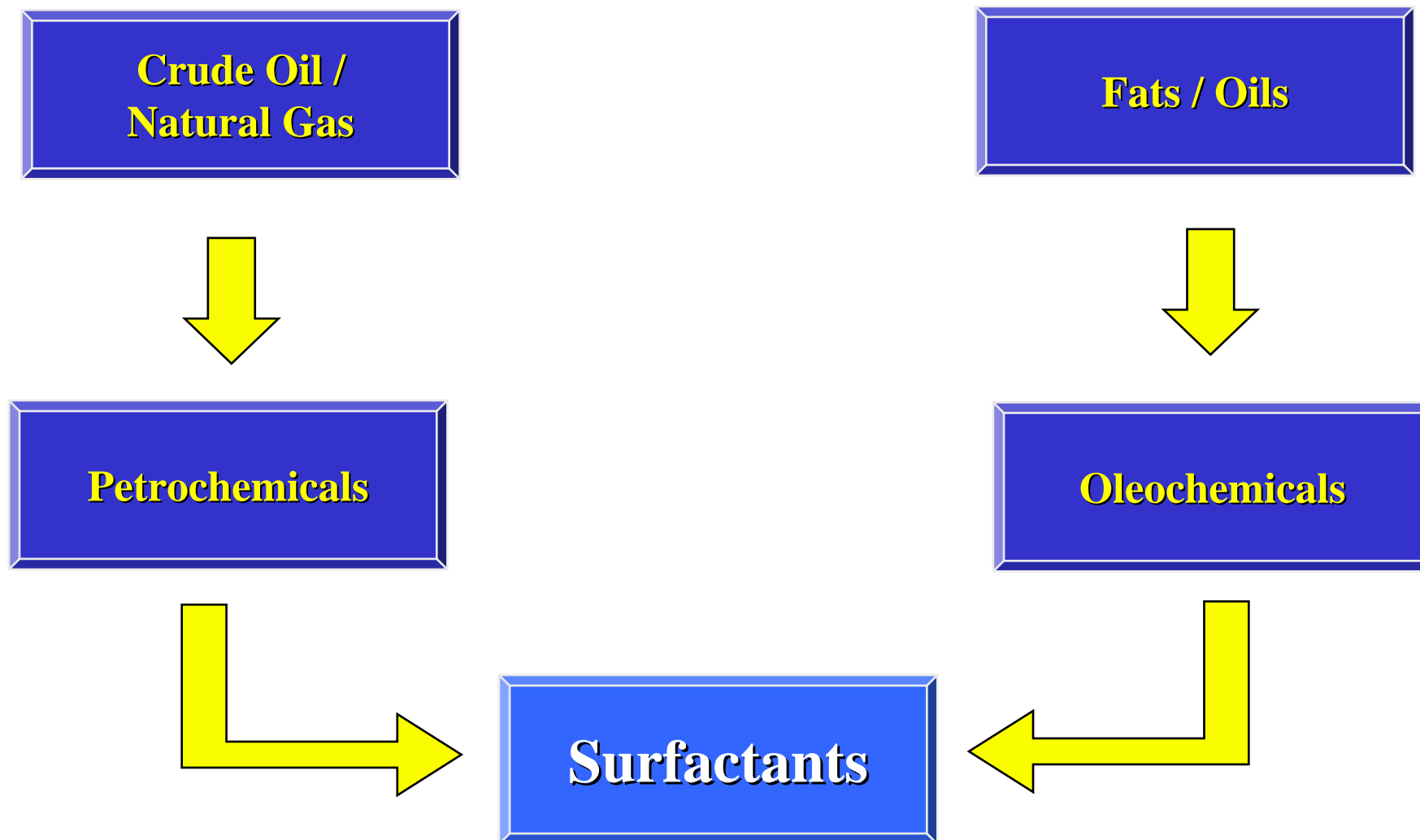
Surfactant market Western Europe (2006)

Consumption of surfactants: 2.99 M tonnes/y

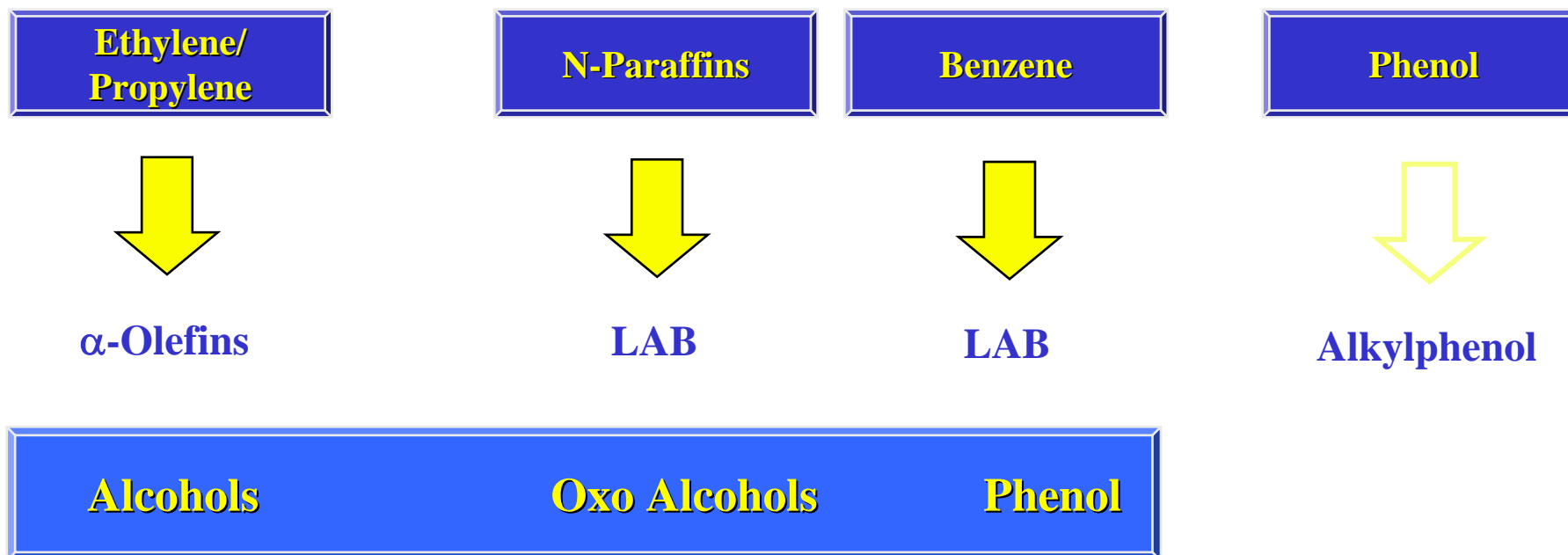
Anionic surfactants	41.0 %
Nonionic surfactants (ethoxylates)	42.6 %
Cationic Surfactants	9.2 %
Other nonionic surfactants (e.g. alkanolamides)	4.5 %
Amphoteric surfactants	2.7 %

Source:Cesio

Surfactant Raw Materials

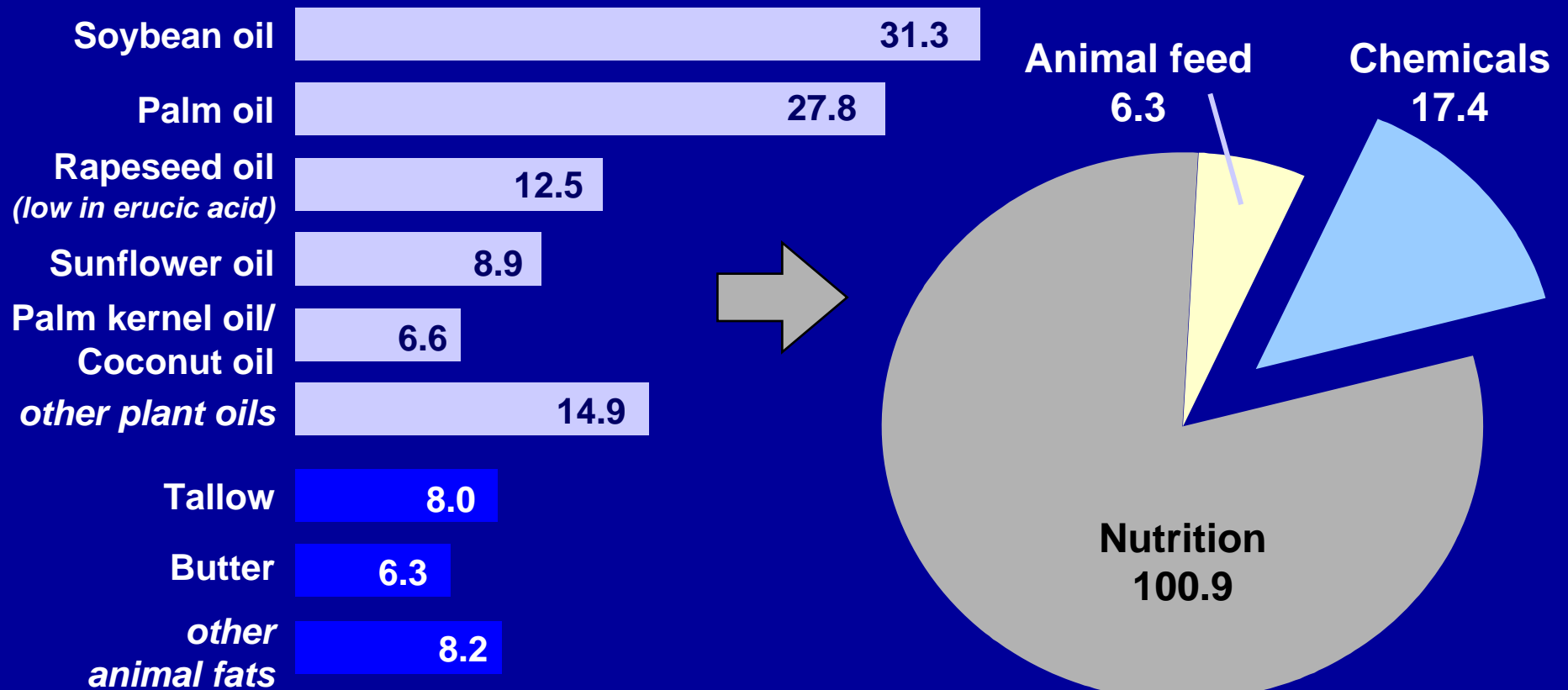


Petrochemical Surfactant Raw Materials



Ethylene Oxide
Propylene Oxide

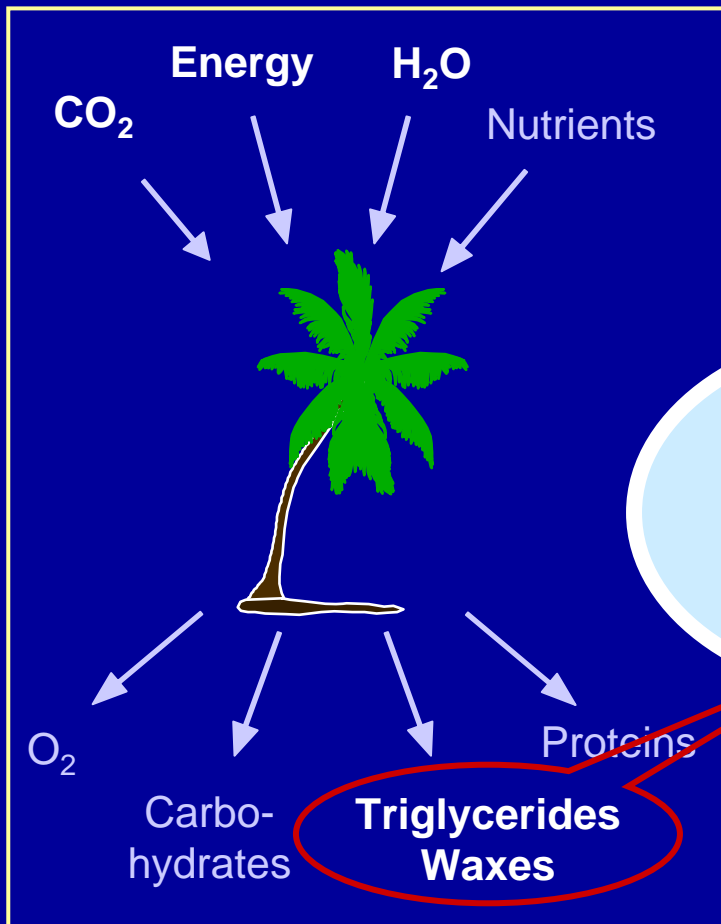
World production of oils and fats in 2003 (in million tonnes) and main uses



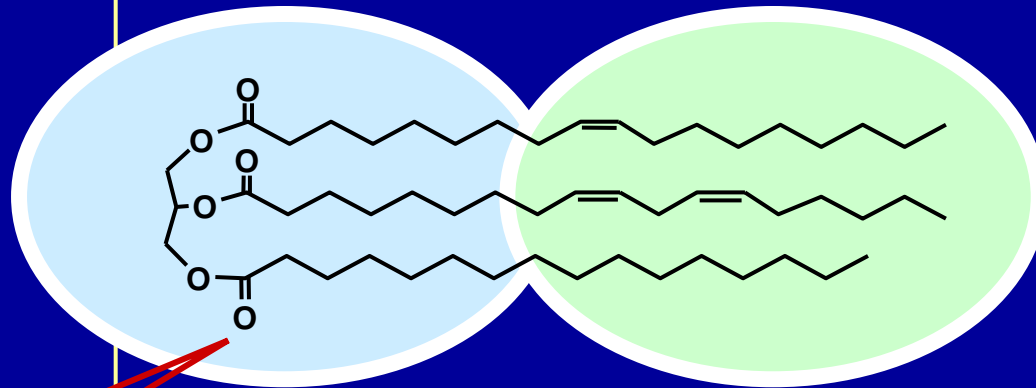
(source: Oil World)

Raw Materials

Natural Generation of Triglycerides



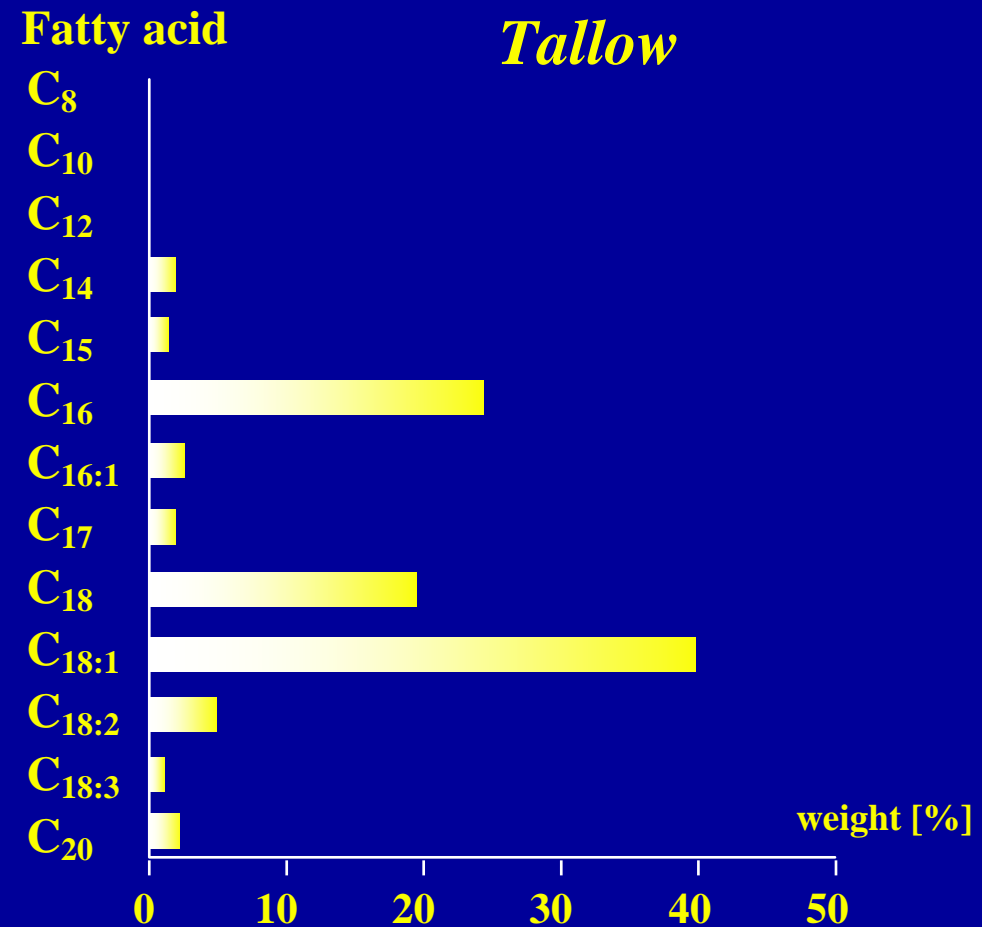
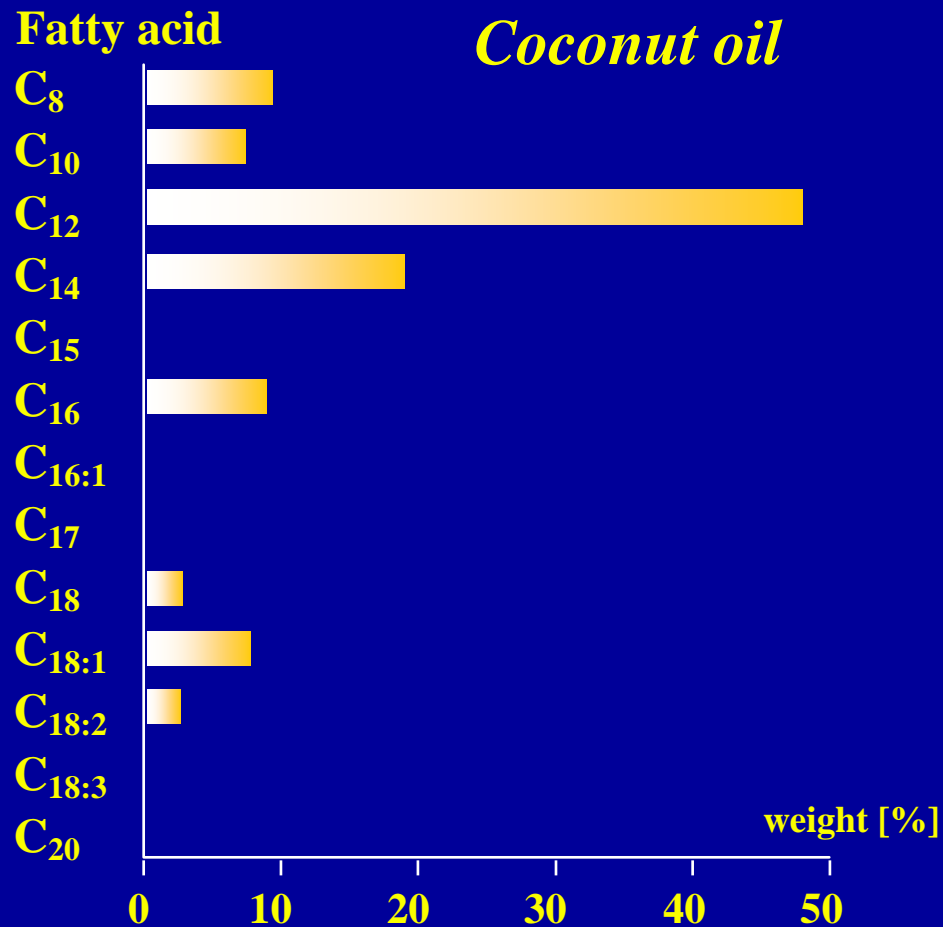
- Surfactants
- Emollients and Waxes
- Lubricants
- Various auxiliaries, e.g. triacetin



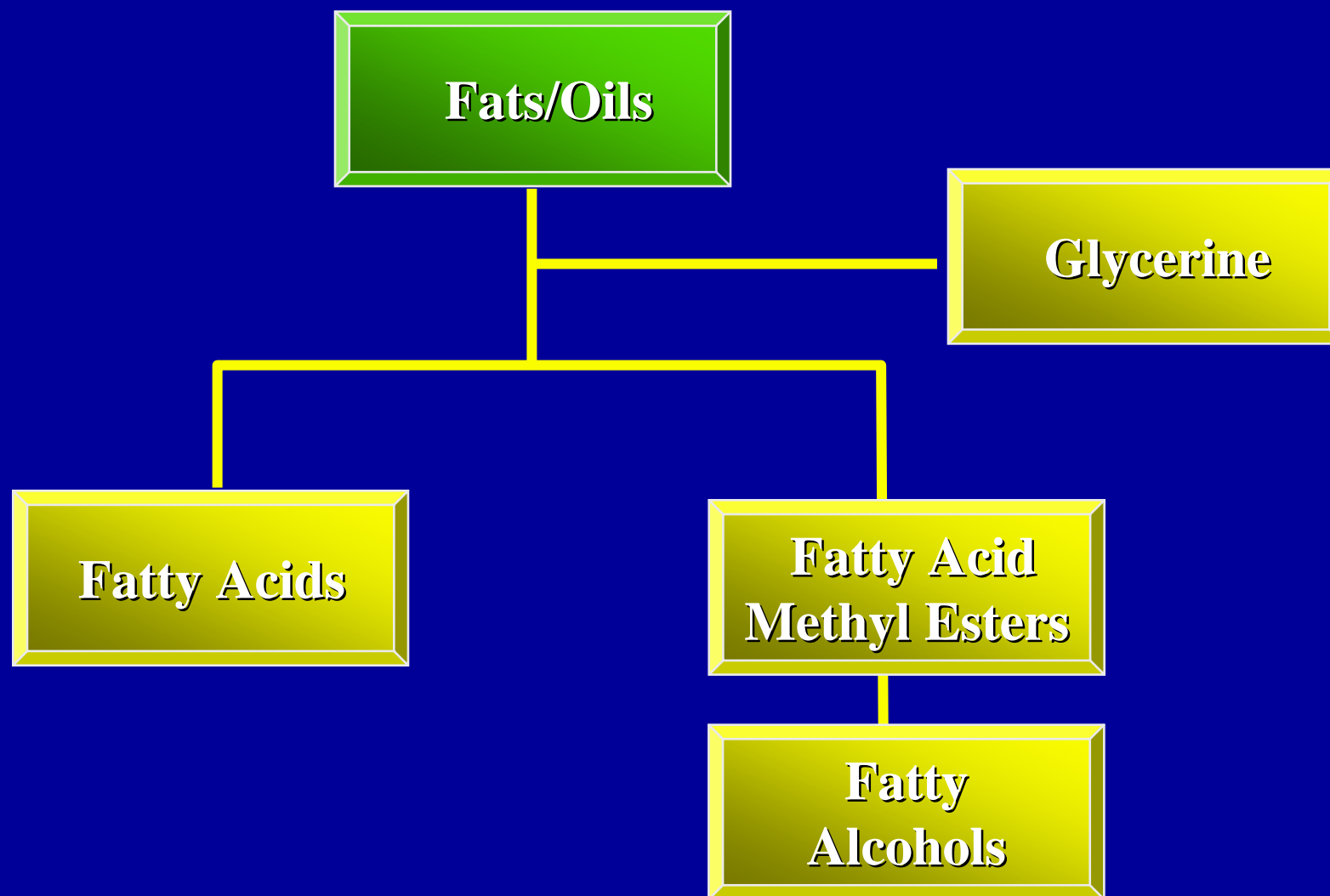
- New materials for polymers
- Conjugated fatty acids for nutrition (CLA)



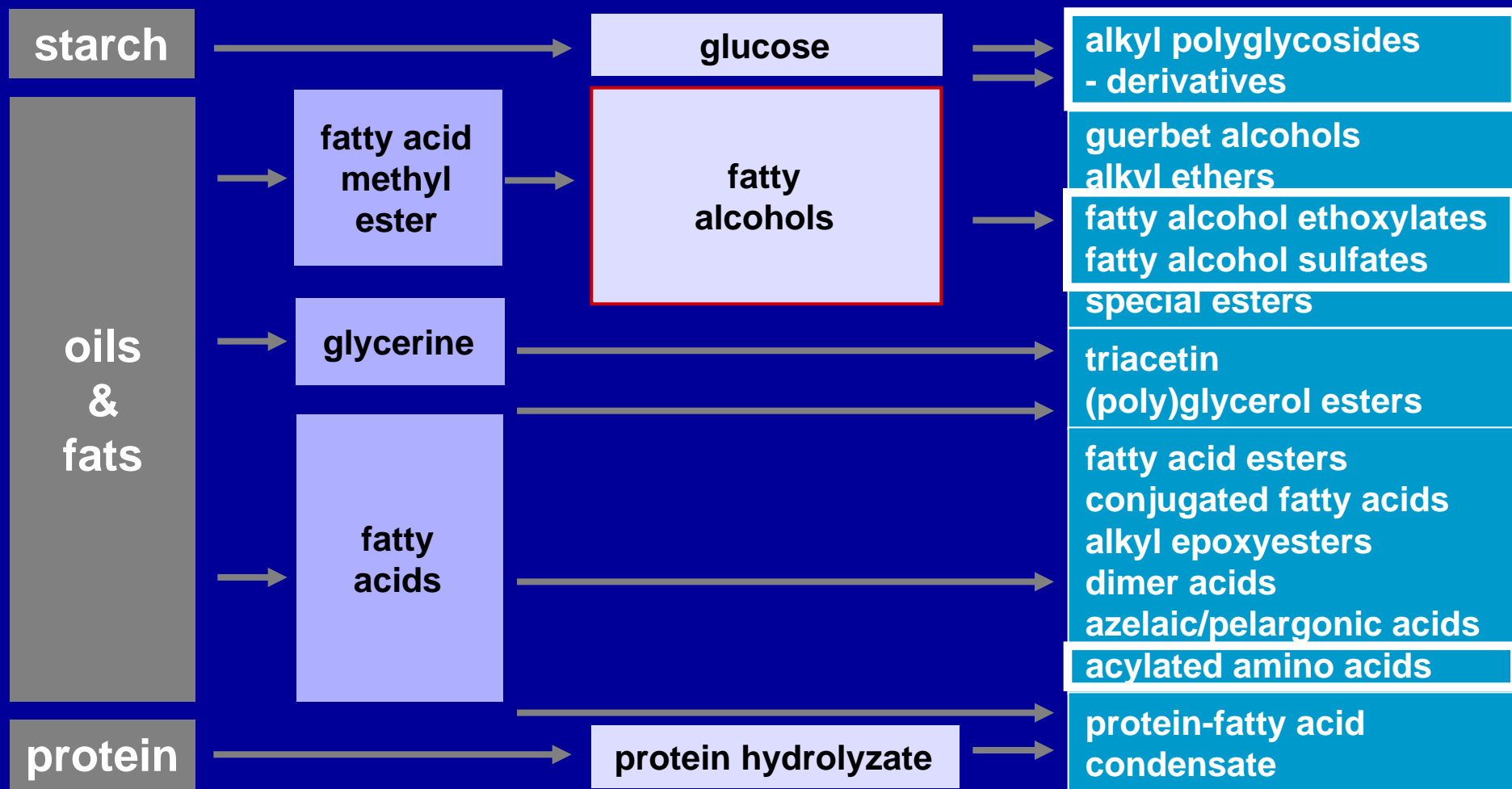
Fatty Acid Composition of Coconut Oil and Tallow



Route to Basic Oleochemicals



Industrial processing of natural, renewable raw materials and selected product derivatives



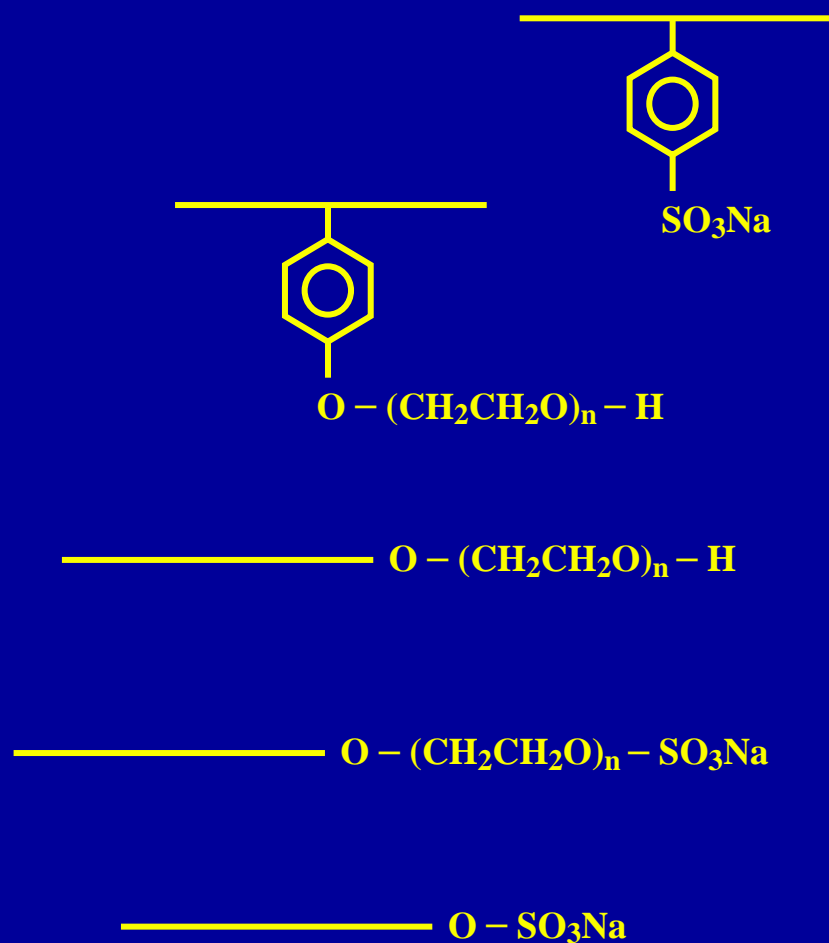
Western Europe Consumption by main surfactants (2006)

Total: appr. 1.35 mill tonnes

Linear alkylbenzenesulfonate (LAS)	31 %
Alkylethoxylates (AE)	35 %
Alkylethersulfate (AES)	28 %
Alkylsulfate (AS)	4 %
Alkylphenoethoxylates (APE)	2 %

Source:CAHA

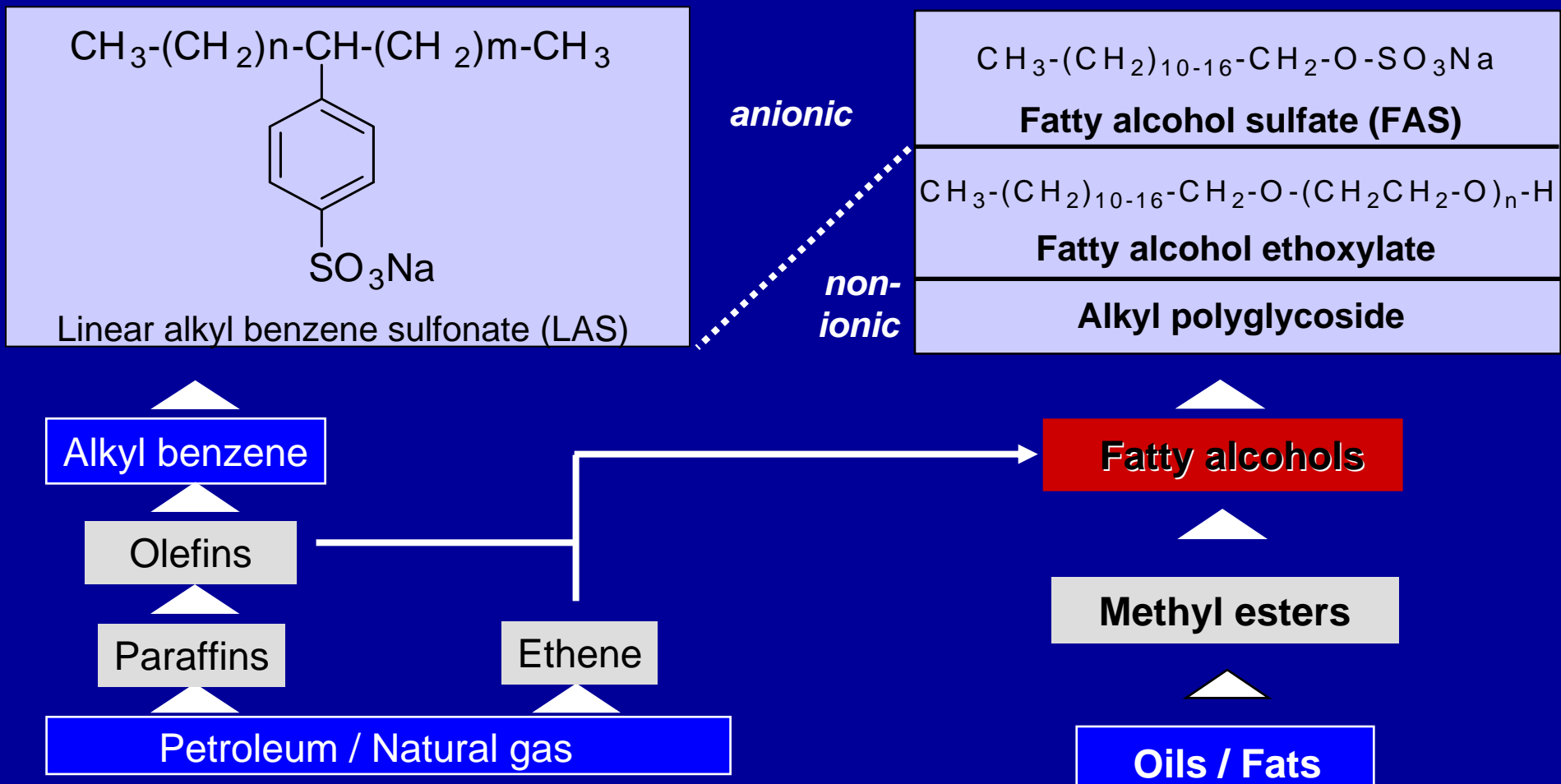
Major Surfactant Types



Source

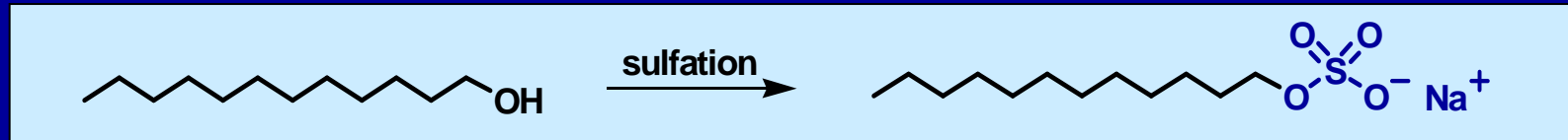
LAS	petrochemical
APE	petrochemical
AE	petrochemical/ oleochemical
AES	petrochemical/ oleochemical
AS	petrochemical/ oleochemical

Production of surfactants and examples of products



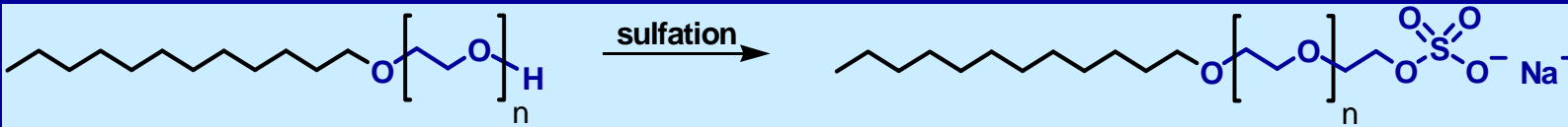
Surfactants

Fatty Alcohol Sulfates (FAS)



- anionic surfactant
 - good foaming power
 - insensitive to water hardness
 - high cleansing power
- basic surfactants for home and personal care applications, e.g. detergents

Fatty Alcohol Ether Sulfates (FAES)



- anionic surfactant
 - very good foaming power
 - insensitive to water hardness
 - very good water-solubility
- basic surfactants for home and personal care applications, e.g. body wash and shampoo



Production of surfactants and examples of products

Life Cycle Analysis of FAS petroleum vs. veg. oils based

results for vegetable oils based:

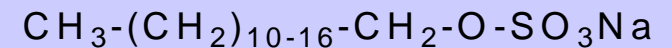
70% less use of fossile ressources

50% less emissions to the atmosphere

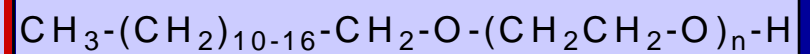
15% less waste

50% more emission to water

(low toxic waste water from small,
decentralized oil plants)



Fatty alcohol sulfate (FAS)



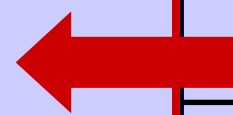
Fatty alcohol ethoxylate

Alkyl polyglycoside

Fatty alcohols

Methyl esters

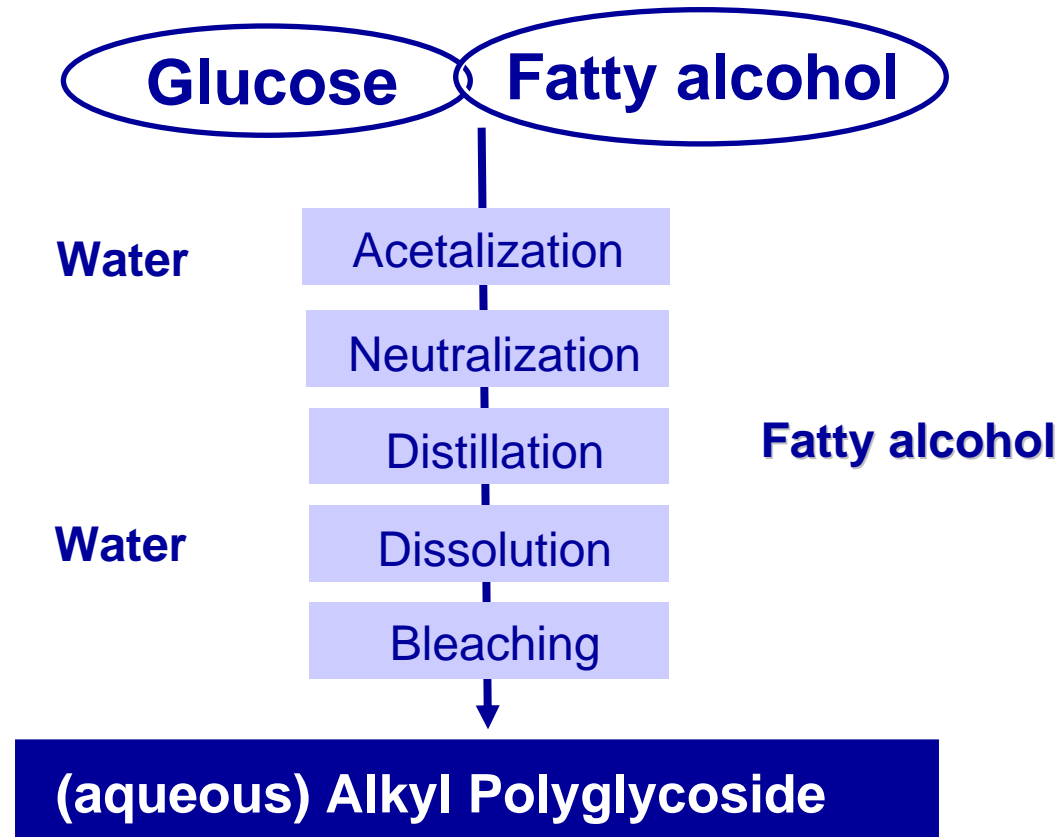
Oils / Fats



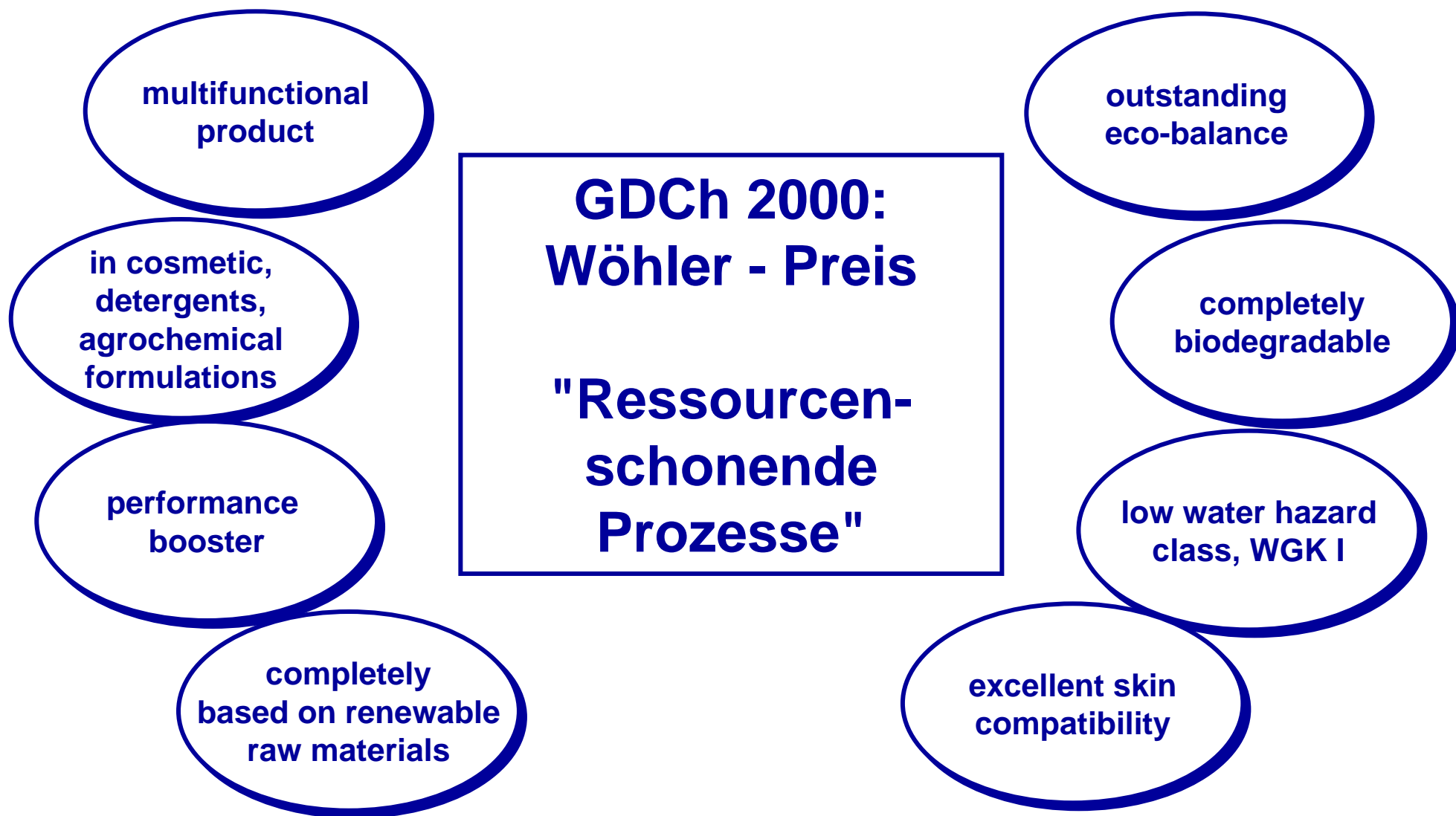
Manufacturing processes for Alkyl Polyglycosides

→ **Solvent free process**

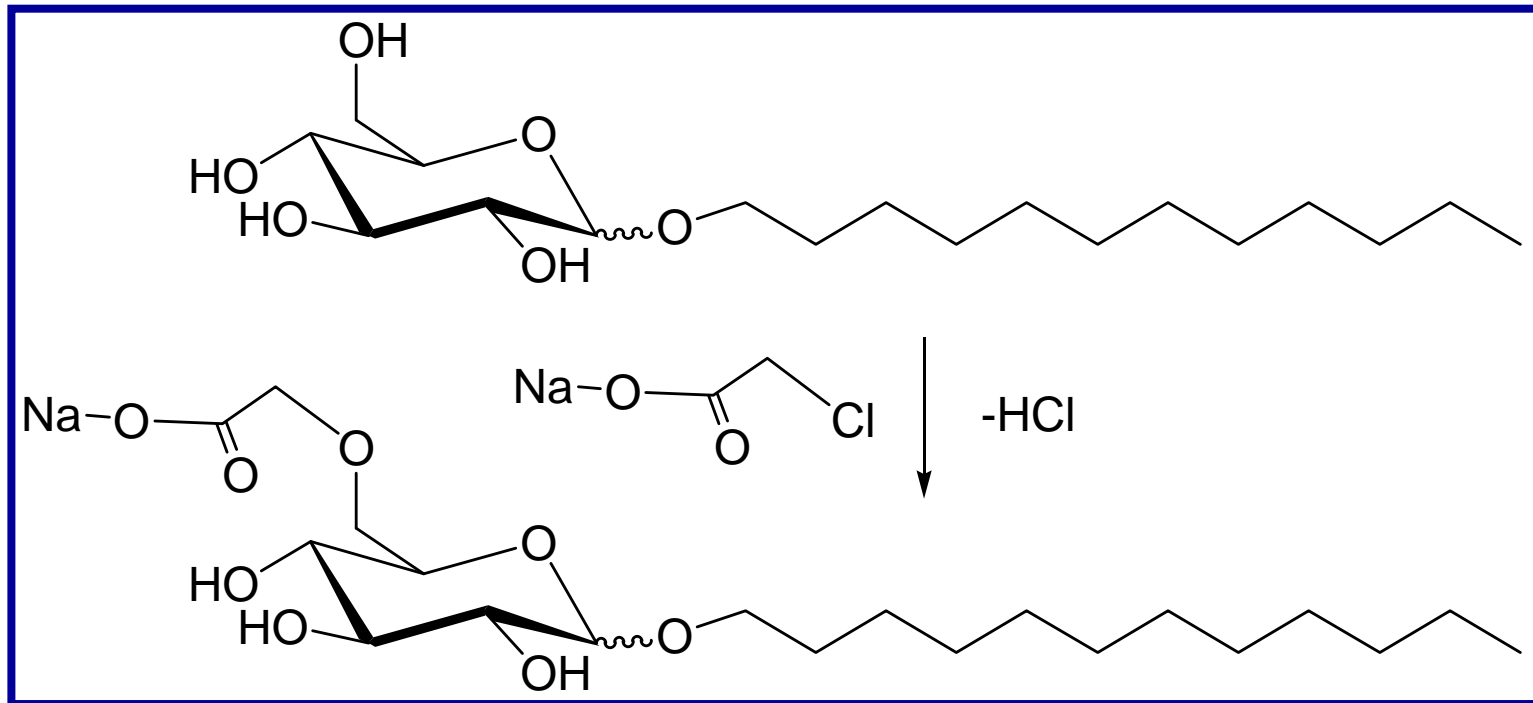
→ **Very low emissions**



Alkyl Polyglycosides



Surfactant based on Glucose and Fatty Alcohol: Alkyl Polyglycoside Carboxylate



Surfactant based on Glucose and Fatty Alcohol: Alkyl Polyglycoside Carboxylate

Alkyl Polyglycoside Carboxylate - Plantapon[®] LGC

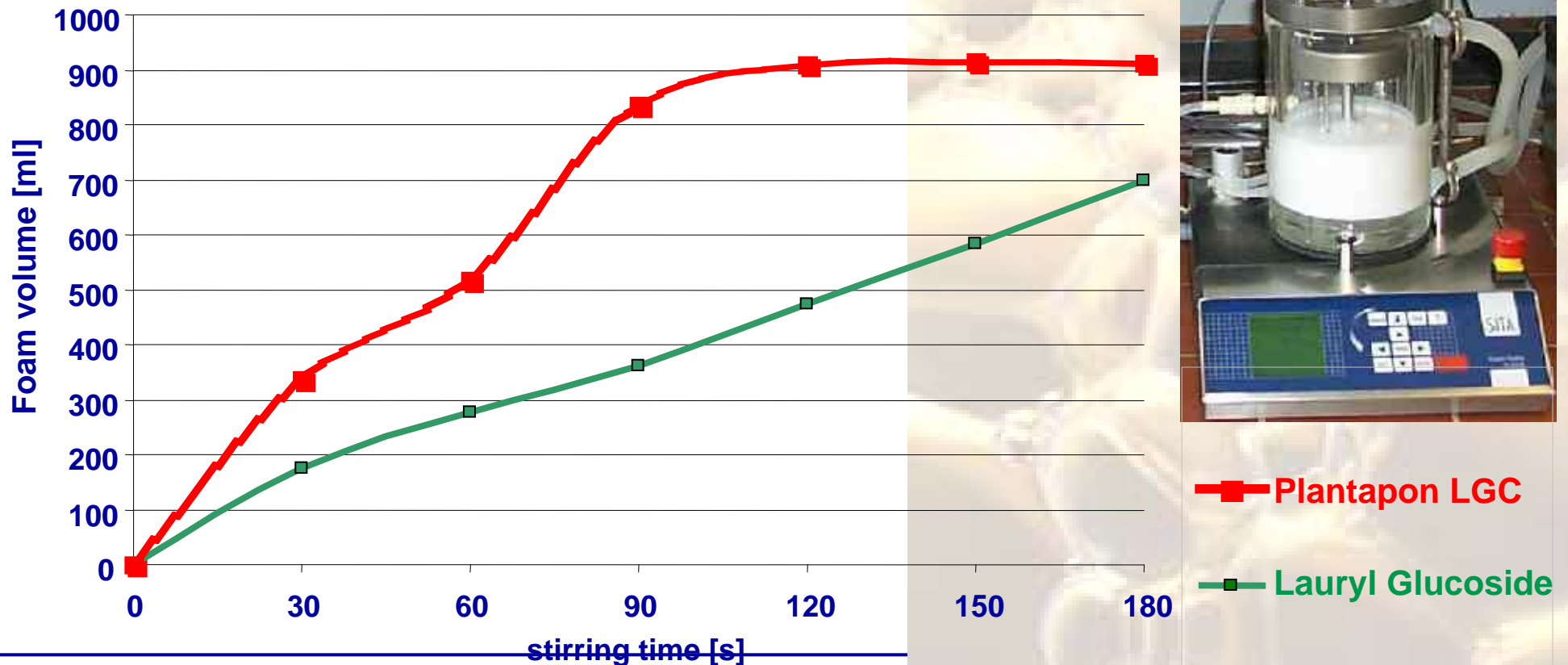
INCI:	Sodium Lauryl Glucose Carboxylate (and) Lauryl Glucoside
Appearance:	clear, yellow liquid
Active matter:	28.5 – 34.0%

preserved with 0.5% sorbic acid, foam stable at
pH 4-10, non sensitizing, biodegradable

Foaming behavior of Plantapon® LGC in comparison to APG® surfactant

SITA - rotor foam

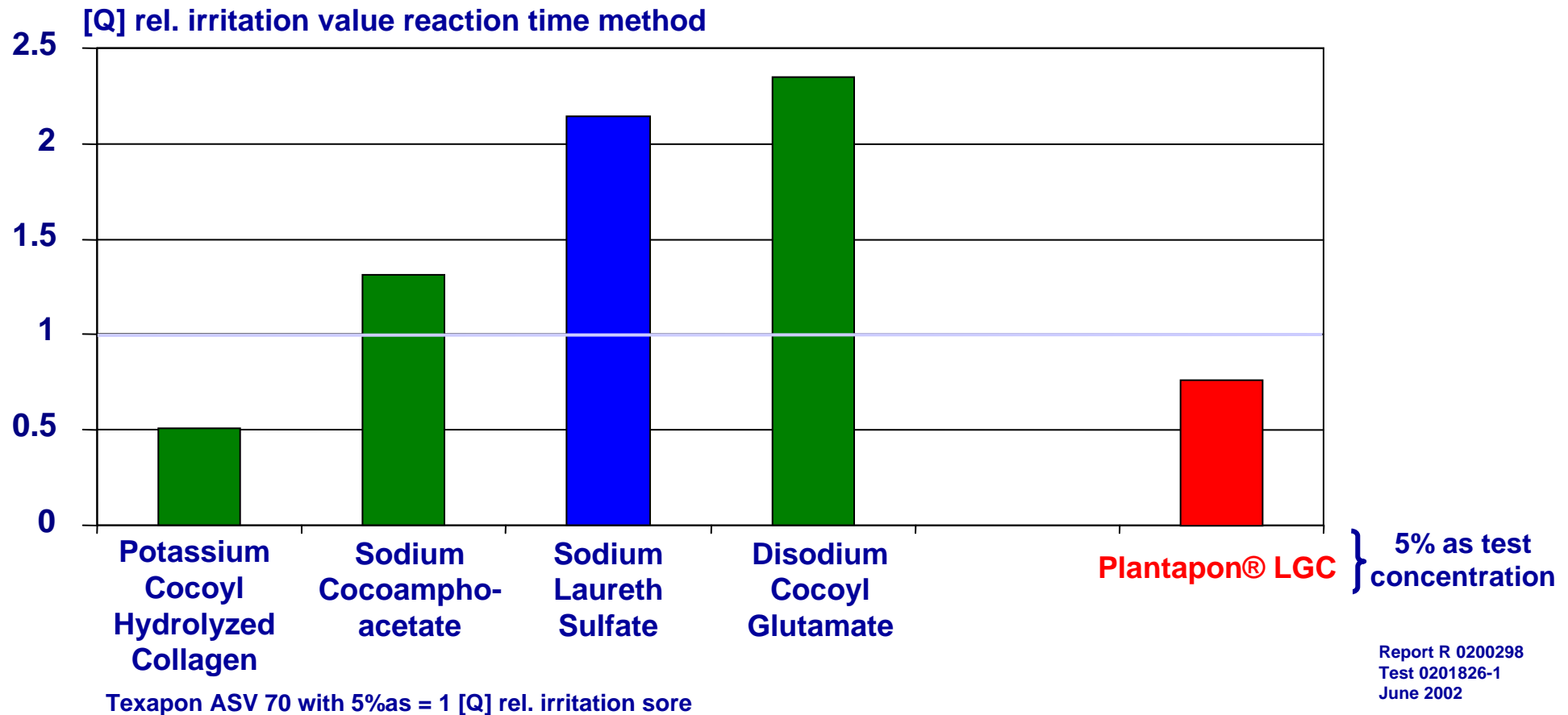
0.5 g/l AS, 15 °gH, 40 °C, 1300 rpm, pH 6



■ Plantapon LGC
■ Lauryl Glucoside

Plantapon® LGC - Dermatological effects

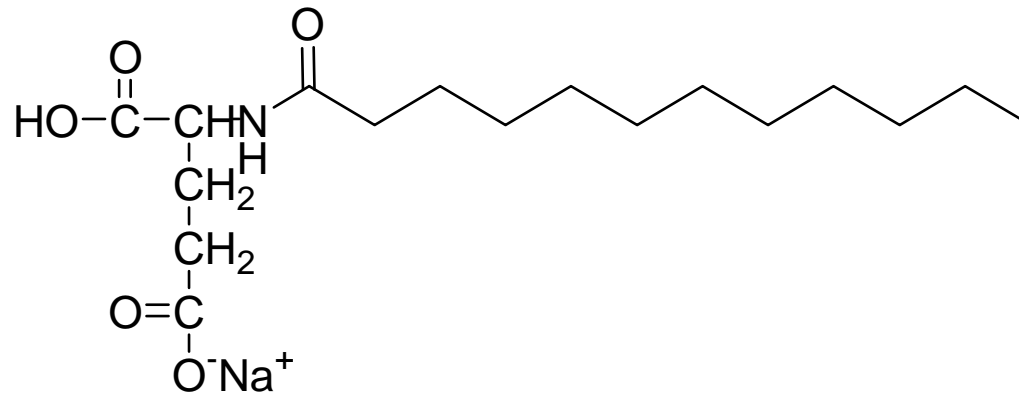
Mucous Membrane Compatibility - In vitro test



Emulsifier based on Aminoacid and Fatty Acid: Sodium Stearyl Glutamate

Sodium Stearyl Glutamate - Eumulgin[®] SG

INCI:	Sodium Stearoyl Glutamate
Appearance:	free flowing white powder
Properties:	high performing O/W emulsifier, EO-free, highly electrolyte compatible
Use level:	0.25 – 2.0 %



Summary of Sodium Stearyl Glutamate - Eumulgin® SG

- **Strong O/W emulsifier at low concentration**
- **High compatibility with electrolytes including water-soluble UV filters**
- Supports formation of lamellar gels
- Low concentration allows easy adjustment of sensorics with emollients, waxes and polymers
- High flexibility in formulations regarding commonly used raw materials
- Strong emulsifier for modern Face Care concepts, as well as for Body and Sun formulations

**Eumulgin® SG – the strength of a diamond
for modern formulations of the cosmetic market**

