RESET
Interreg Europe

European Good Practices in Smart textiles and new ways of production

Smart textiles with odour absorption properties

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Next technology Tecnotessile (Italy)

4th RESET Seminar on
"Smart textiles and new ways of production"
Chemnitz, 20th June 2017

European Union
European Regional
Development Fund

Good practice operational context

RESET
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fidertessile
Tradizione ed Innovazione nei Tessuti per l'Arredamento
100% Made in Italy

- Leading company in home interior and contract textiles sector
- Located in Prato district
- Based on export commerce

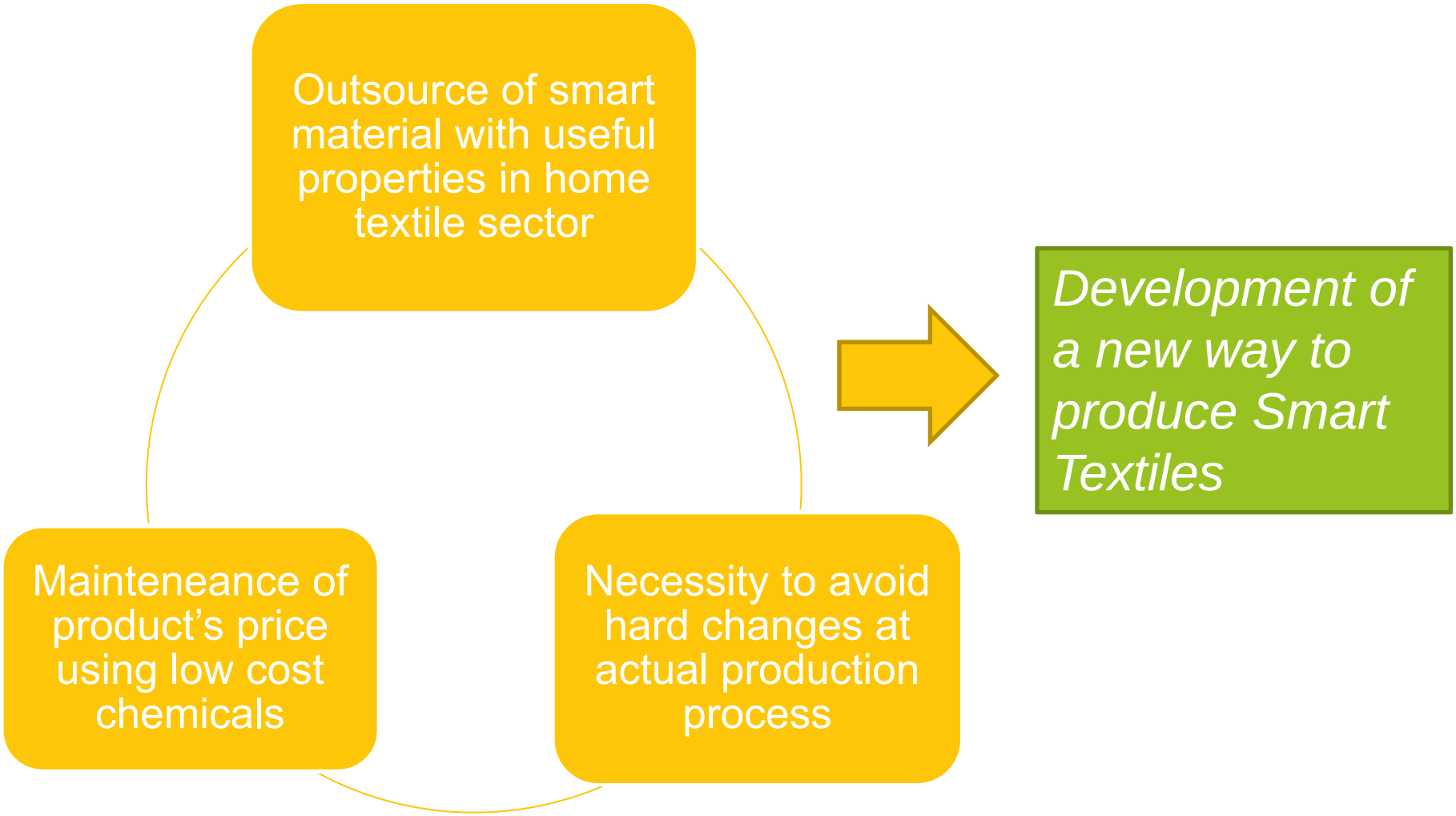
Necessity of innovative textile, to have a strong impact on market

NEXT TECHNOLOGY
TECNOTESSILE
SOCIETÀ NAZIONALE DI RICERCA R. L.

- R&D textile center
- Long experience in process innovation
- Proposing wide range of textile functionalization technologies

Good practice operational context

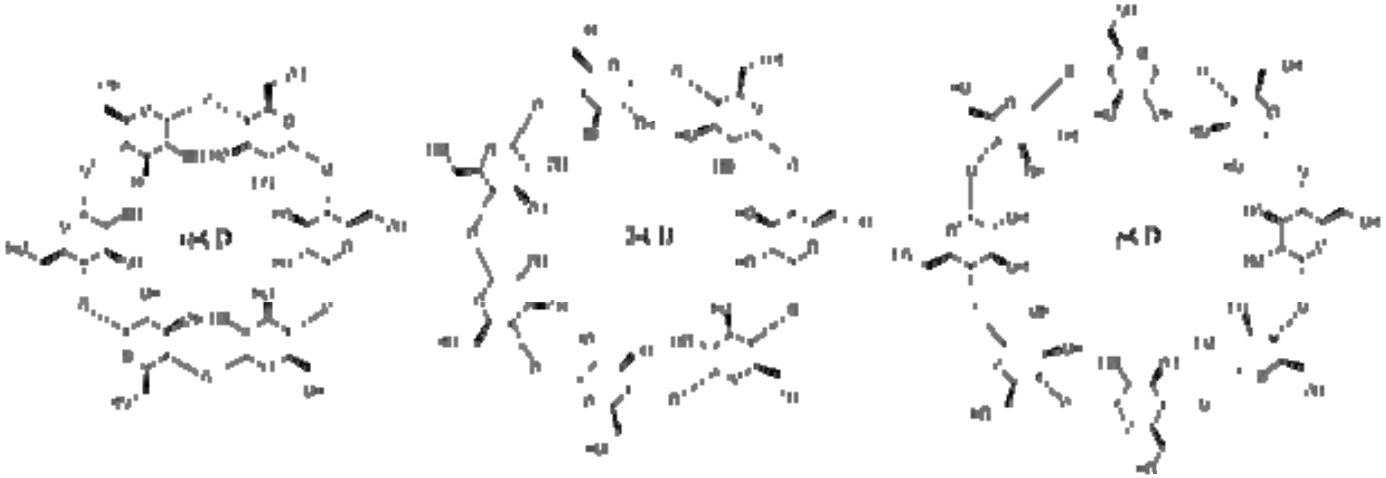
Proteclo guidelines



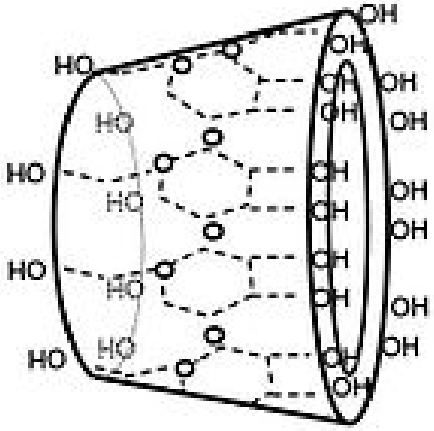
Smart properties

Which need could be satisfied by smart textiles in home living?

Clean-odor Technology

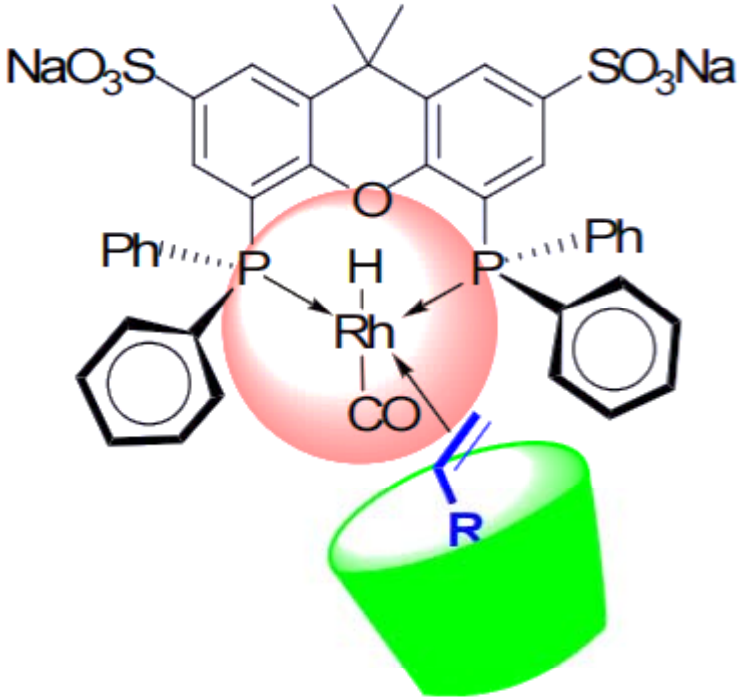


Cyclo-dextrins



- Sustainable production from biomass
- Hydrophillic external structure guarantees soft processing conditions
- Basket case structure permits to CD to entrap molecules
- Low cost!!

Cyclodextrins applications



- **Medicine**
  Advanced drug delivery systems
- **Food**,
  Emulsion stabiliser, taste-masking
- **Chemistry**
  Catalysis, chromatography
- **Cosmetic and Hygiene**
  Deodoriser, shampoo

Process development

Product's requirements

Mechanical properties

- High Martin-Dale value
- High abrasion resistance
- Low elasticity
- Low pilling
- High resiliency

Chemical properties

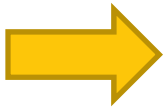
- Anti-odour properties
- Hydro/oleo repellency

First Trials: reactive cyclodextrine

- **Covalent bonding to textile**

- **Functionalization process:**

1) Treatment with high quantity of Glauber's salt
2) T= 60°C by heating at 2.5°C/min
3) Treatment with sodium carbonate for 20 minutes after reaching 60°C.
4) Washing cycles with acetic acid necessary after CD applcation



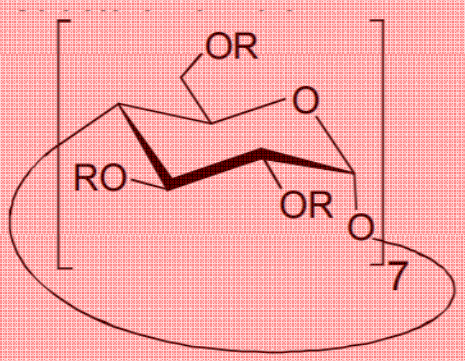
- ❑ **High cost raw materials**
- ❑ **Hardly upscalable**

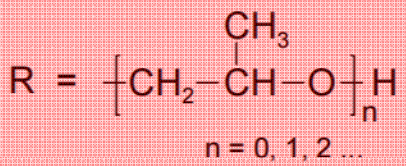
Process development

Physical immobilization tests

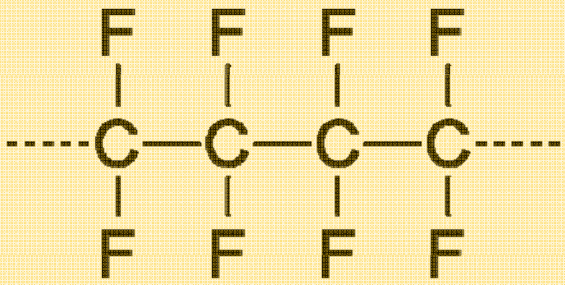
hydroxypropyl-beta-cyclodextrin

- Great water solubility
- Lower cost
- Already employed in deodorant and skin care products





Fluoro-carbon resin



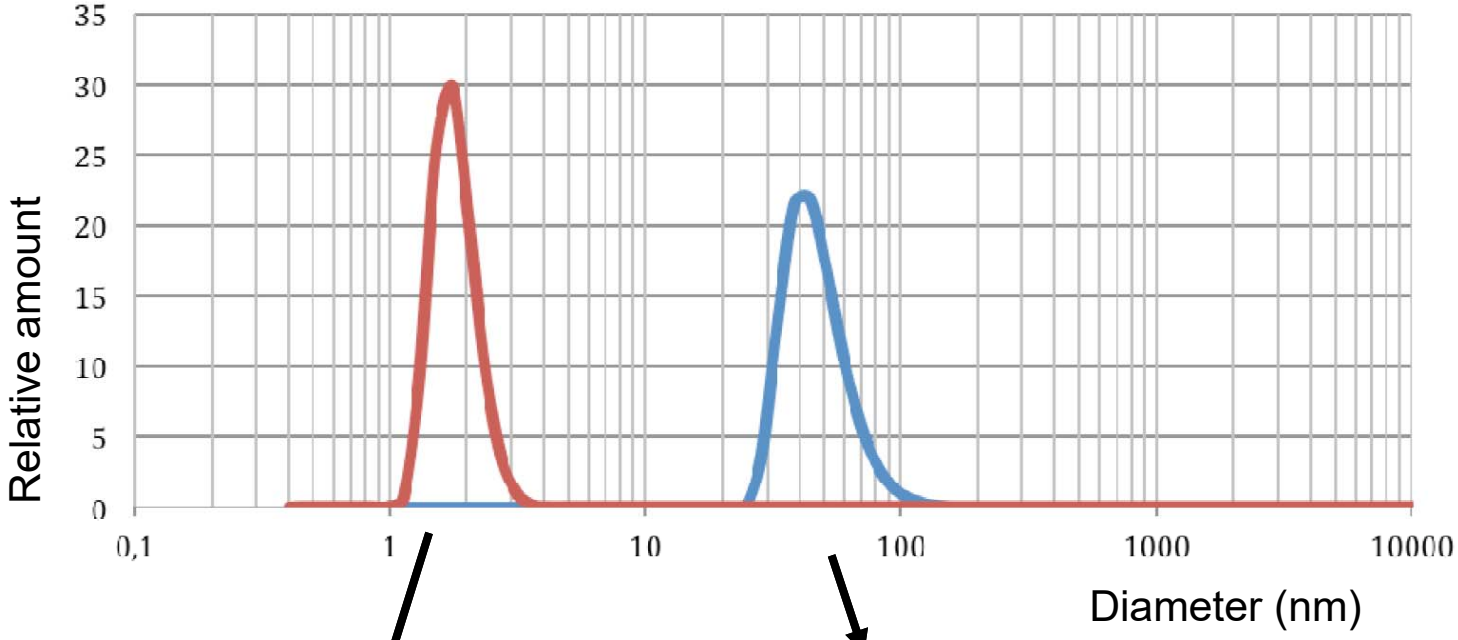
able to:

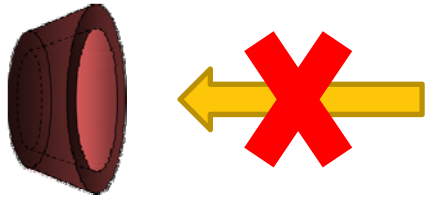
- Guarantee both Hydro and oil repellency
- Physically bond cyclodextrin to textile surface

Process development

Physical immobilization tests

Dynamic light scattering analysis





W7HP

Resin macro-molecules

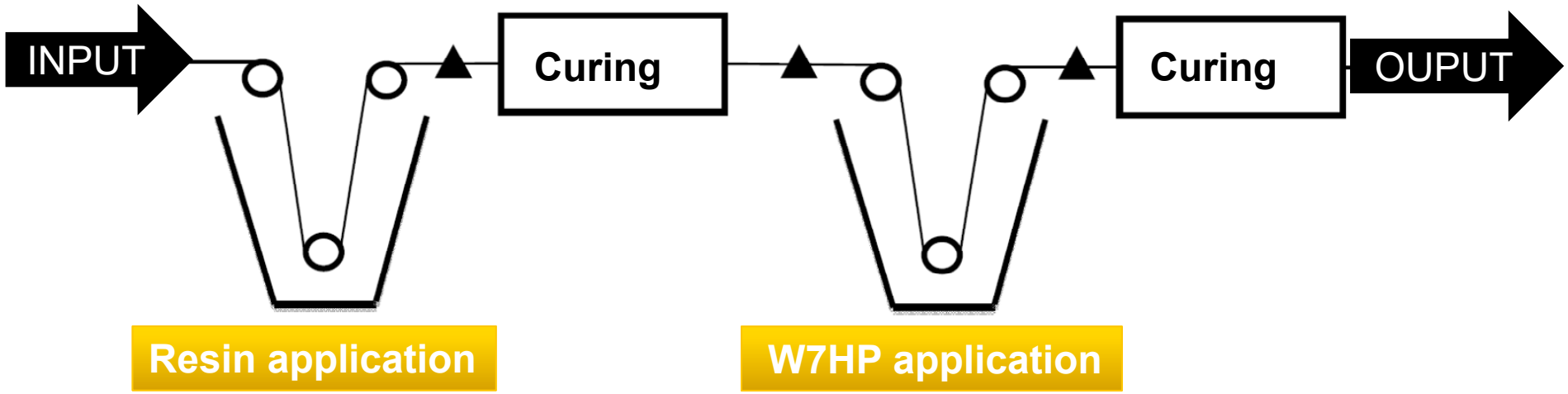
There's no risk of cavity saturation by fluoro-carbon resin

Process development

Process' parameters optimization

- Application technique
- Resin and CD concentration
- Curing temperature
- Flocculation avoidance
- Waste minimazation

Strong cooperation between R&D center and Industrial companies managed to overcome technical problems



Product's characterization

Drop tests: evaluating β-CD effect on hydro/oleophobic properties

Hydrophobicity: tested with water/isopropanol solutions
INDA Standard Test 80

Hydrorepellency value	Standards composition	
	Isopropanol	Water %
1		
2		
3		
4		
5		
6		

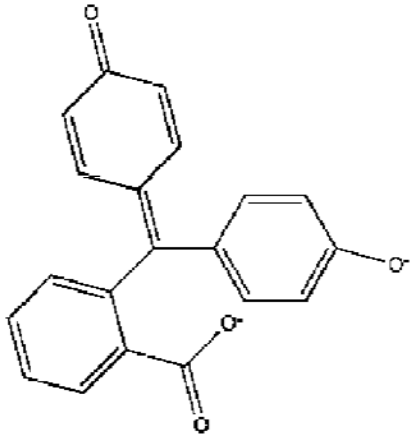
Oleophobicity: tested with hydrocarbons
AATCC Standard Test Method 118

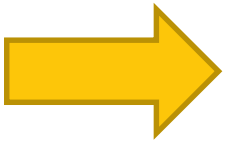
Oleo repellency value	Standards composition
1	Nujol
2	Hexadecane
3	
4	
5	
6	
8	Heptan

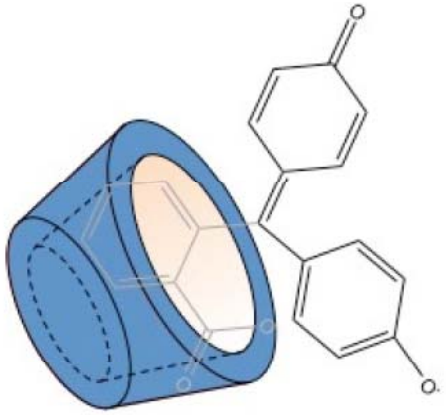
Sample	Hydrorepellency value	Oleorepelency value
Fluorocarbon resin treated textile	5/6	7/8
CD + resin treated textile	5/6	7/8

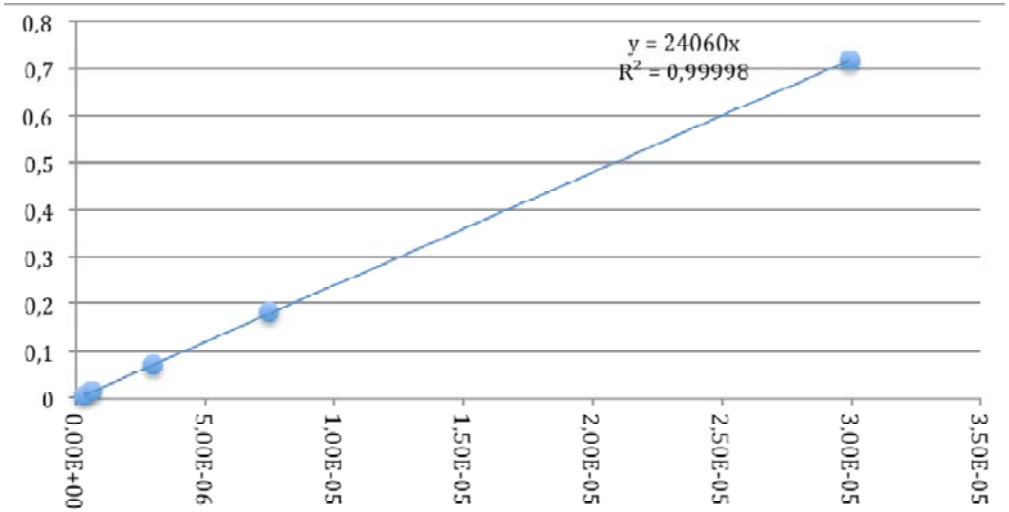
Product's characterization

Fixed cyclodextrin's inclusion properties









UV analysis of phenolphtalein managed to determine the fraction of CD cavities available on the surface of textile after curing treatment

Product's characterization

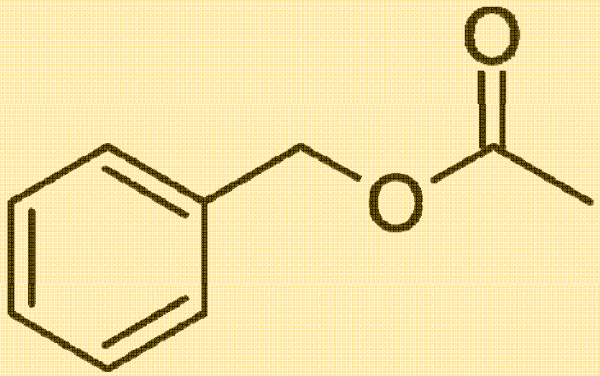
Anti-odour properties

Odour test development

- Simple, low cost
- Directly applicable in sofa stores
- High impact on the costumer

Technical parameters

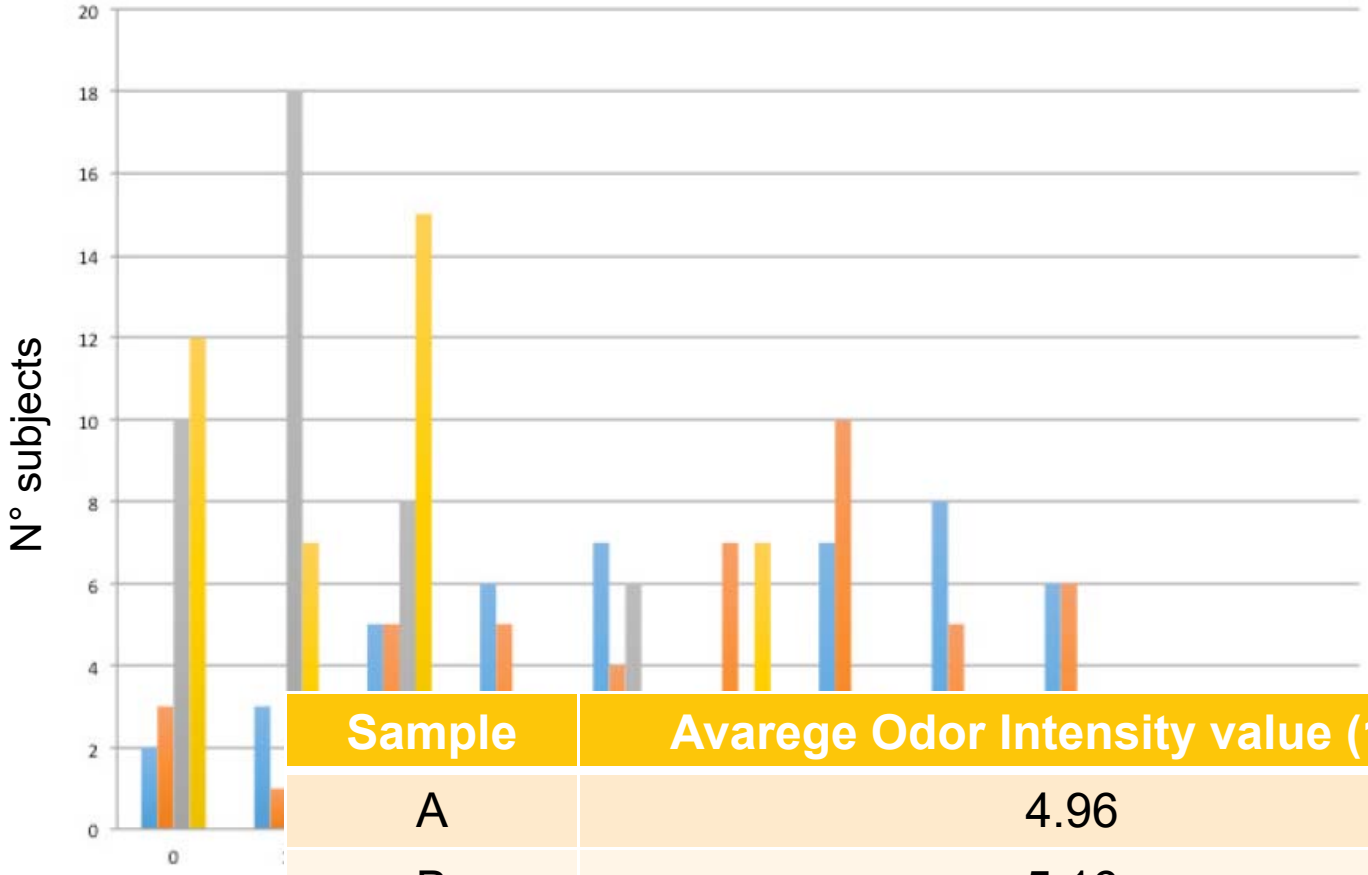
- Statistical method
- Type of solvent
- Concentration
- Application method
- Test timing



Benzyl acetate

Jasmine fragrance, used in perfumes.
Completely atoxic, food grade certification.

Product's characterization



Sample	Avarege Odor Intensity value (1-10)
A	4.96
B	5.16
C	1.88
D	2.32

Marketing

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Thank you!

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