



SOLVAY

asking more from chemistry®

新型清洗配方用可再生来源溶剂 New Renewable Source Solvents for Cleaning Application

索尔维公司张婷婷、李冰
Tingting Zhang/Steven LI, Solvay Coatis
Nov 24, 2017

Main Contents 议题

- Solvay and Coatis Background 索尔维公司介绍
- Augeo Family Solvents Augeo系列产品
 - Renewable source (可再生来源)
 - Green and safer choice (绿色及安全认可)
 - Applications (主要应用)
 - Cleaner (清洗)
 - Air care (空清)
- Comparison Test (Methodologies & Cleaning Efficiency) (清洗方法及清洗能力测试)
- Q&A

Introduction to Solvay and Coatis

SOLVAY

ASKING

MORE

from chemistry



150 years of innovation and much more to come.

We are a leading global group in the chemical industry, dedicated to the construction of a sustainable chemistry model. Our products serve diverse markets worldwide, from consumer goods to energy, with one main objective: to improve quality of life, and the client's performance.



Pro Forma numbers from 2016 including Cytec (not auditable)

Coatis Global Business Unit





Latin America's only
producer of **Phenol and
Derivatives**
is also the number one in
**Oxygenated
Solvents**

A LINE OF SUSTAINABLE SOLVENTS

ENVIRONMENTAL RESPONSIBILITY
AND ECONOMIC VIABILITY

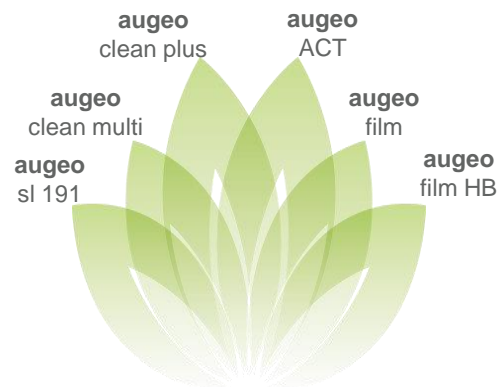


AUGEO is a line of innovative products made from renewable sources focused on sustainability and high performance.

-  Glycerin-based solvents made in Brazil.
-  A competitive alternative to petrochemical-based raw materials
-  Performance and high solubility in various application
-  Safer for the environment and human health



augeo



Green Solvents

Nexant Ranking

Special Report

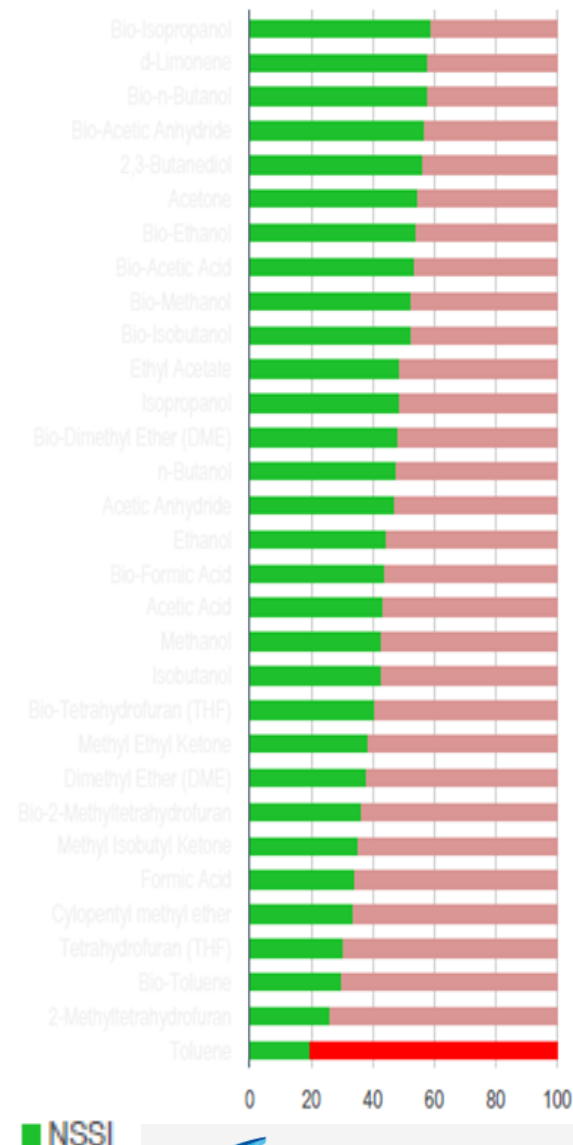
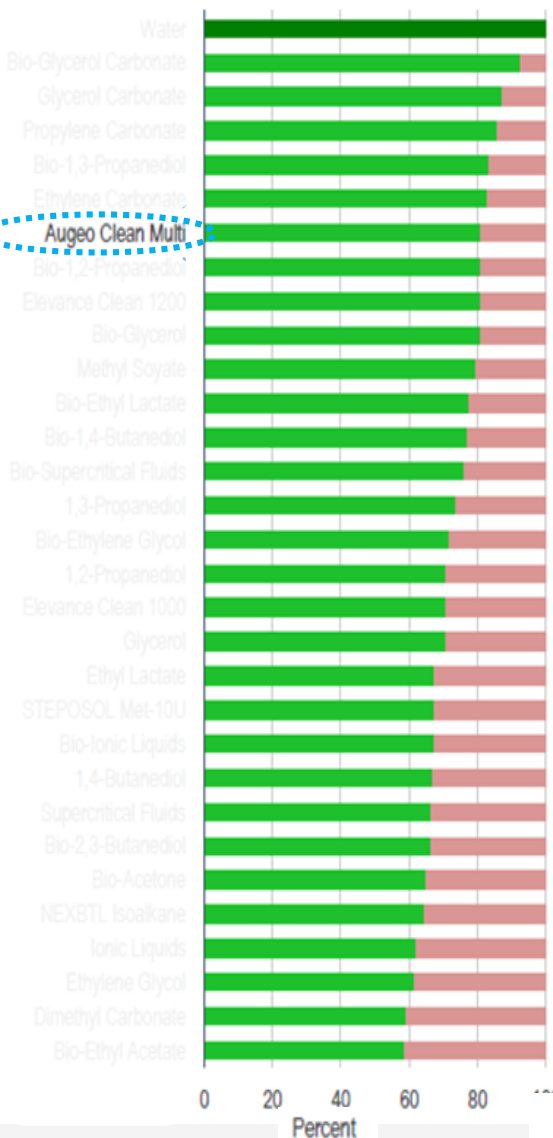
Green Solvents: An Ideal Solution?

September 2015

The higher the NSSI score, the “greener” the solvent is considered to be.



60°
Solvent
between 62
that were
analyzed



Source : Nexant Thinking Special Report Green Solvents: An Ideal Solution? September 2015

CONFIDENTIAL

Green Solvents

Nexant Solvent Sustainability Index

Special Report - *Green Solvents: An Ideal Solution?*

September 2015

Nexant developed the Nexant Solvent Sustainability Index (NSSI) to assess the greenness of a solvent.

There is no standard definition for green solvents.

This approach provides a good indication of the relative greenness/sustainability of a solvent product and provides a model that readers could use to weight solvent alternatives in their industry according to the performance and environmental priorities.

The NSSI analysis evaluated solvents in these eight parameters in order to determine the relative greenness of the solvents studied.

Weighting	Parameter	Key Objectives
10%	Feedstock	Provide bonus for renewable feedstocks
20%	Toxicity	Measure hazard potential for humans and the environment
15%	Biodegradability	Assess ease with which product biodegrades and its potential to bio-accumulate
10%	VOC	Consider VOC regulatory status
5%	Odor	Assess whether odor is unpleasant
12.5%	Fire Hazard	Measure flashpoints and fire safety regulations for process and consumer safety
12.5%	Vapor Pressure	Determine the ease with which the solvent enters the atmosphere
15%	Reactivity	Measure chemical reactivity considering risk of ozone formation and explosion

Nexant applied weightings to the importance of these factors, with the end result that fully green solvents (like water) scored near 100 percent, while less green alternatives were rated in a sliding scale down to zero.

The summarizes the results relative to water which is considered 100 percent green

Augeo Family Solvents

Augeo

Safer Choice



Augeo Clean Multi

Zero oral and inhalation toxicity

●	1-Dodecanol	112-53-8	Fragrances; Solvents
●	1-Methoxy-2-propanol	107-98-2	Solvents
●	1-Propoxy-2-propanol	1569-01-3	Solvents
●	1-Undecanol	112-42-5	Fragrances; Solvents
●	2,2-dimethyl-1,3-Dioxolane-4-methanol	100-79-8	Solvents
●	2-Methyl-2,4-pentanediol	107-41-5	Solvents
●	3-Methoxybutyl acetate	4435-53-4	Solvents
●	3-Methyl-3-methoxybutanol	56539-66-3	Solvents
●	4-Hydroxymethyl-1,3-dioxolan-2-one	931-40-8	Solvents
▲	9-Dodecenoic acid, methyl ester	39202-17-0	Solvents
	*Yellow due to hazard concerns, but allowed to provide functionality while meeting Safer		

<https://www.epa.gov/saferchoice/learn-about-safer-choice-label>
<https://www.epa.gov/saferchoice/safer-ingredients#searchList>

Applications: Cleaner



augeo

Clean Multi



Application: Cleaner

应用

- 窗户/玻璃清洗剂
- 多用途清洁剂
- 浴室清洁剂
- 家庭护理湿巾
- 厨房清洁剂
- 金属清洗剂
- 地板清洁剂
- 烤箱清洁剂

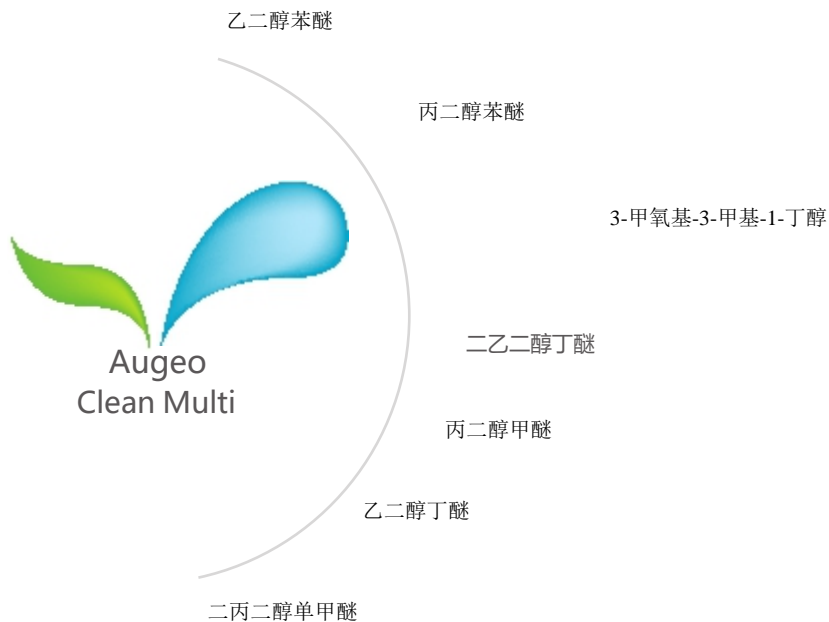


优点及特性

- 杰出的表面护理
- 作为偶联剂
- 配方温和并保证清洗效率
- 气味轻微利于透香
- 确保配方稳定
- 环境友好型产品
- 符合VOC立法*
- 低碳

*符合CARB和EPA可持续发展的性能、安全性和价值参数

替换目标



PRESERVING
THE ENVIRONMENT

Application: Cleaner


augeo
Clean Plus



Application: Cleaner

Applications 应用

- 工业用重油污
- 工业用油脂
- 机械及油污清洗
- 商业厨房及烤箱清洗

Benefits & Differentials 有点及特性

- 去油脂产品中表现优异
- 配方温和并仍保证清洗效率
- 保证配方稳定性
- 环境友好产品
- 符合VOC法规
- 低碳足迹
- 气味轻微利于透香

符合CARB和EPA可持续的性能，安全及数值的参数要求

替代目标



PRESERVING
THE ENVIRONMENT

Application: F&F



应用

香精稀释剂和载体
空气清新器
电子香氛
藤条熏香
电子及喷雾



优点

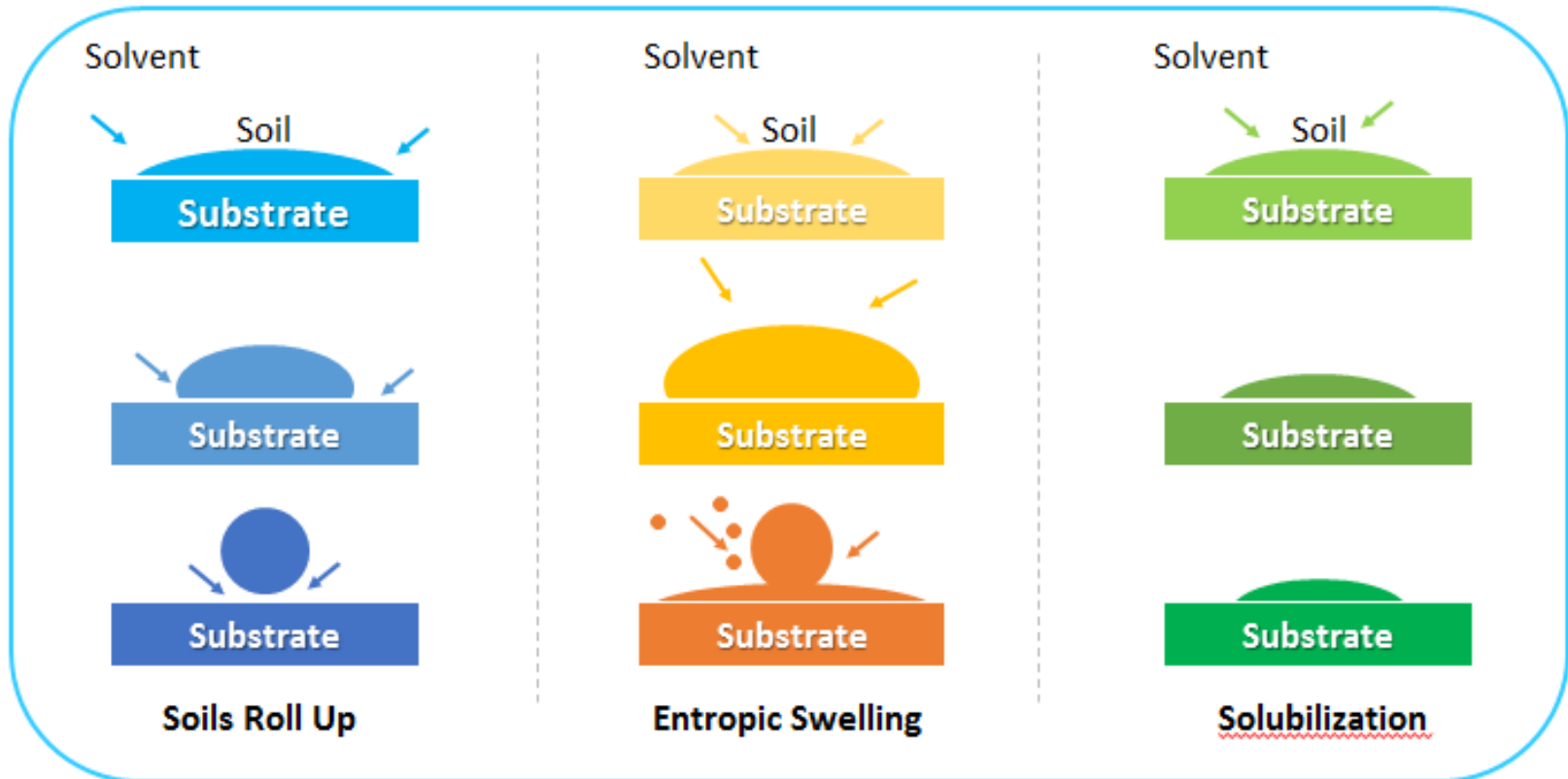
优点及特性 气味低,促进透香
符合VOC法规*
溶解能力
低碳足迹
对人类环境安全
环境友好产品



Water Based Cleaner / 水基清洗剂

- 
- 1 What's the Functionality of Solvent / 溶剂的作用机理
 - 2 How to Choose a Solvent / 如何删选溶剂
 - 3 Cleaning Methodologies Comparison / 测试方法的比较
 - 4 Methodologies in Lab / 实验室用的测试方法
 - 5 Test Results / 测试结果
 - 6 Q&A

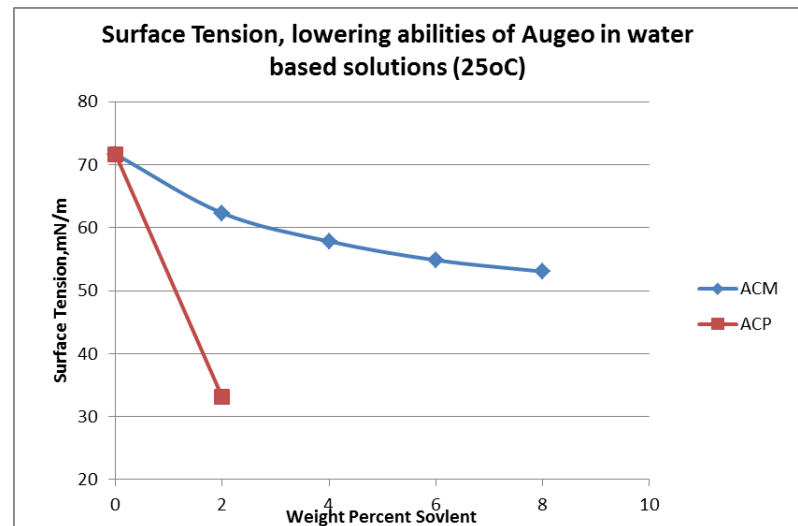
What is the Functionality of the solvent ? / 溶剂的作用机理?



Entropic Swelling is the typical phenomena in water based cleaners(Eg:Kitchen cleaner)

How to Select a Solvent? / 如何筛选溶剂?

- **Solubility / 溶解力**
 - Solubility parameters / 溶解度参数
 - Like dissolves like / 相似相容
- **Surface Tension / 表面张力**
- **Water Compatibility**
- **Evaporation rate**



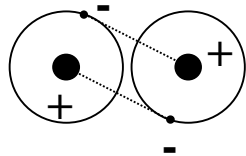
Solvent	% in water (w/w)
ACM	Miscible
ACP	3.9

Solvent	Evaporation rate, n-butyl acetate = 100
ACM	2.7
ACP	1.6

How to Select a Solvent? / 如何筛选溶剂?

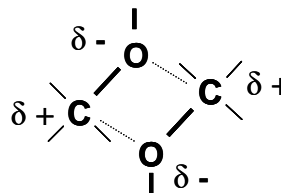
• Solubility Parameters 溶解度参数

- Predict if one material will dissolve in another and form a solution. Based on “like dissolves like”. / 相似相溶原理
- Specifically, each molecule is given three parameters:



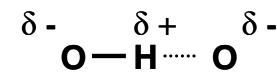
London interactions

δD (范德华力)



Polar interactions

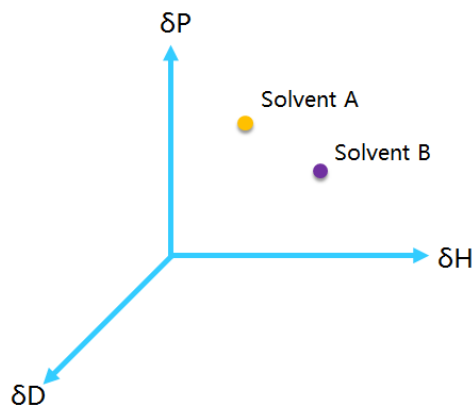
δP (极性键)



Hydrogen bonding interactions

δH (氢键)

- These three parameters can be treated as co-ordinates for a point in three dimensions. The nearer two molecules are in this three dimensional space, the more likely they are to dissolve into each other



How to Select a Solvent? / 如何筛选溶剂?

SOLSYS
(兼顾实际)

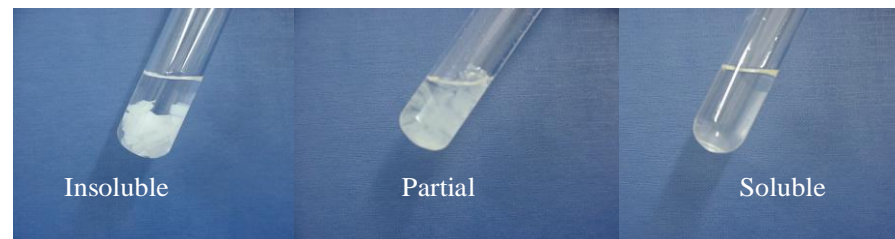
Mathematical Fit

Physico-chemical Properties 理化特性

Intra and Inter Molecular Interaction 分子间, 分子内相互作用力

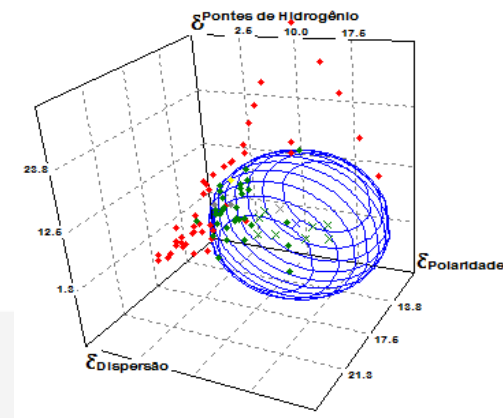
1. Solubility Evaluation in 36 Solvents:

- Specific concentration 特定浓度
- Room temperature 常温



2. Building Solubility Surface of the Solute (Polymer/Resin/Oils/Dirties/Etc.) in a tridimensional graphic:

- **Soluble:** inside the volume
- Partial:** on the edge of the volume
- Insoluble:** outside the volume



Methodologies 测试方法

指导意见/Guideline for method: Choice of soil / substrate and cleaning conditions should be by agreement between the testing laboratory and those using the data to evaluate cleaning performance relative to users experience

1) Scrub Washing 擦洗实验

- GB 9985-2000 (手洗餐具用洗涤剂), 油污的组成
- ASTM D5343-06 (Standard Guide for Evaluating Cleaning Performance of Ceramic Tile Cleaners)
- ASTM 4488 – 95 (Standard Guide for Testing Cleaning Performance of Products Intended for Use on Resilient Flooring and Washable Walls)

2) Pendulum Washing 摆洗实验

QBT 4348 - 2012

	ASTM D5346-06	ASTM 4488-95
Application 应用范围*	Bathroom 浴室瓷砖	Hard surface including floor, wall 地板、墙壁等硬表面
Soil composition 油污组成	Fig 1	Table 2
Substrate 基体	Ceramic tile 瓷砖	Masonite 纤维板
Methodology 测试方法	Scrub washing 擦洗试验	Scrub washing 擦洗试验
评估方法	Reflectometer 白度仪	Visual Evaluation/Reflectometer 目测 / 白度仪

* 以上两个方法的应用范围是相互作为补充

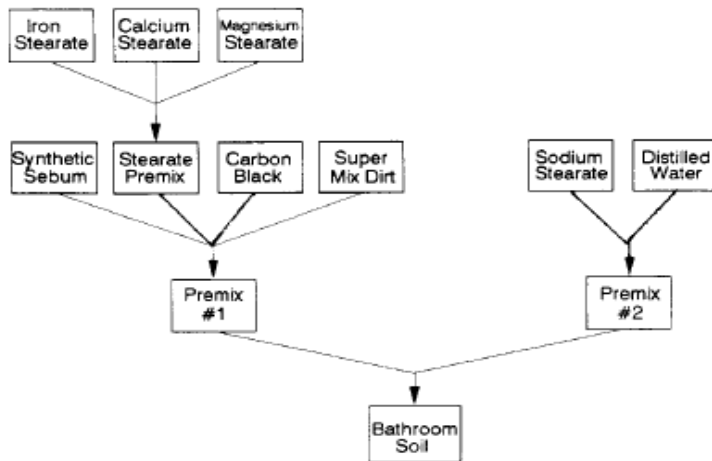


FIG. 1 Bathroom Soil Composition

Soil composition 油污组成	g克
Vegetable shortening 植物起酥油	33
Lard 猪油	33
植物油 Vegetable oil	33
炭黑 Carbon black	1

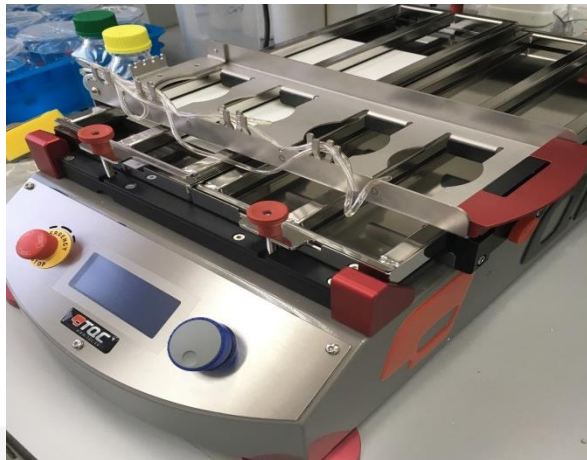
Table 2

	Scrub Washing 擦洗	Pendulum Washing 摆洗
Application 应用范围*	Kitchen 厨房油污	Kitchen / Industry 厨房油污/工业油污
Soil composition 油污组成	GB 9985-2000	QBT 4348 - 2012
Substrate 基体	Ceramic tile 瓷砖	Stainless steel 不锈钢
Evaluation 评估方法	Visual 目测	Weight lost 称重

Soil Application 油污板制备

Scrub Washing 擦洗: 指定质量的油污均匀涂抹于指定尺寸的瓷砖表面；150度下老化3小时

Pendulum Washing 摆洗: 油污均匀的上于不锈纲表面；常温老化20小时



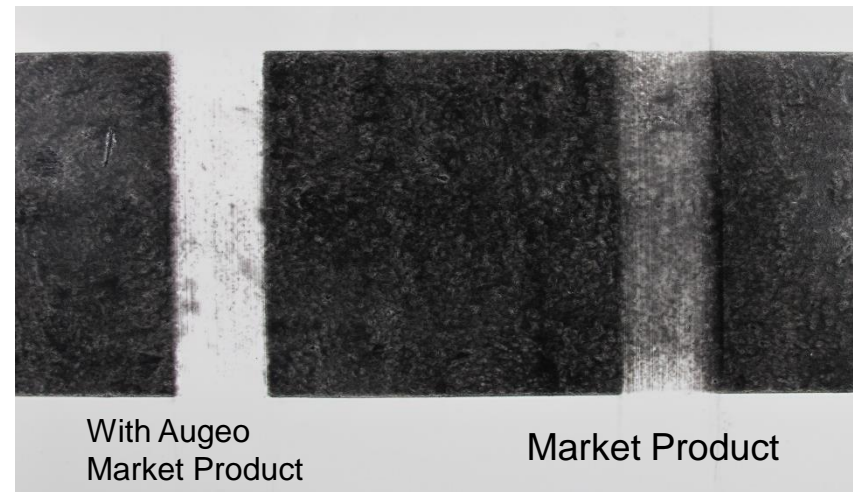
Augeo Formulation vs. Market Product (Scrub)

Augeo 配方 vs. 市面产品 (擦洗)

Reference Formulation 基础配方

Composition 成分 %

Surfactants 表面活性剂	0.5 – 2
MEA 乙醇胺	2.0
Solvents 溶剂	2 – 6
EDTA – 4Na	0.2
NaOH 50%	Min.
H2O 水	89.8 – 95.3

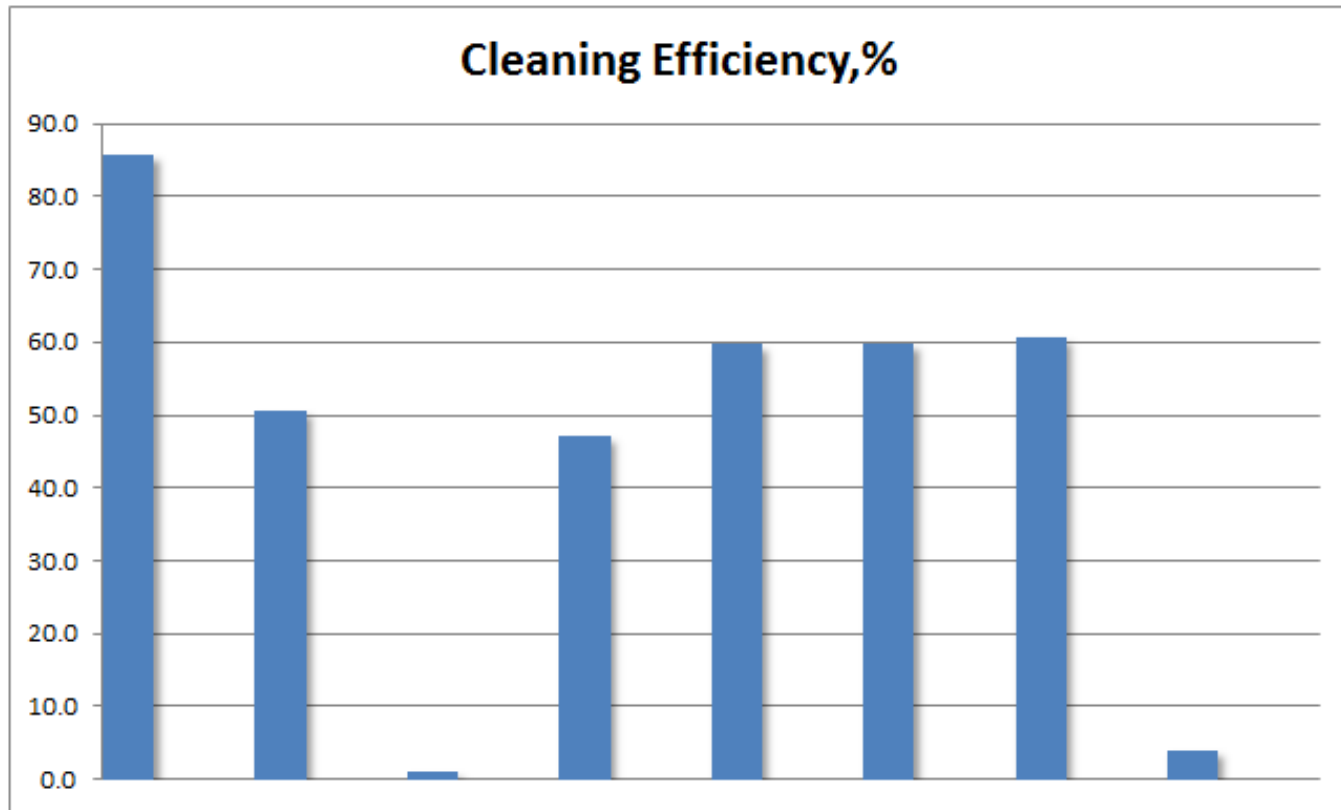


Solvents: Blend of Augeo Clean Multi & Augeo Clean Plus

- Augeo Clean Multi, works more as a coupling agent
- Augeo Clean Plus, excellent in cleaning power

Augeo Formulation vs. Market Product (Pendulum)

Augeo 配方 vs. 市面产品 (摆洗)



Augeo

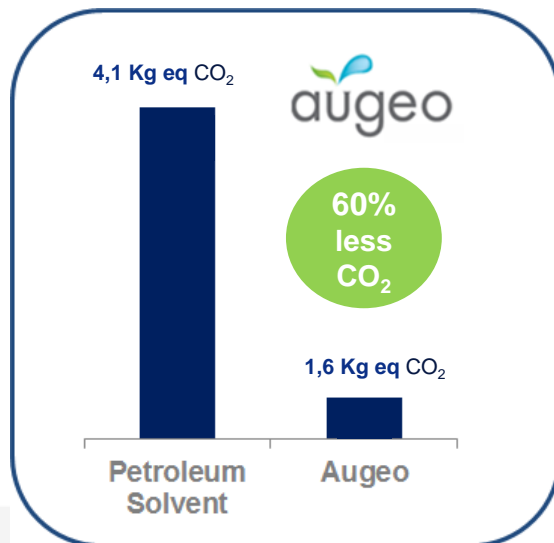
▶▶ Augeo Key Value Drivers

- VOC Compliant (LVP-VOC),
- Low Carbon Footprint: 1,64 Kg CO₂ eq,
- No inhalation or oral toxicity
- Top 6 Green Solvent (Nexant Company)

▶▶ Applications

- Fragrance diluent & carrier
- Air fresheners
- Plug in
- Reed Difusers
- Mecanical & Aerosol sprays

▶▶ CO₂ Footprint Comparison with Petroleum based Solvents



Lower Carbon Footprint

Petroleum based solvents replacement
New market for sustainable products

Carbon footprint 60% lower with Augeo Clean Multi
against actual solvents in the air care market

Thank you

相关咨询

- 李冰，手机号 13003199452
- 张婷婷，手机号 17321286131

www.solvay.com



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