

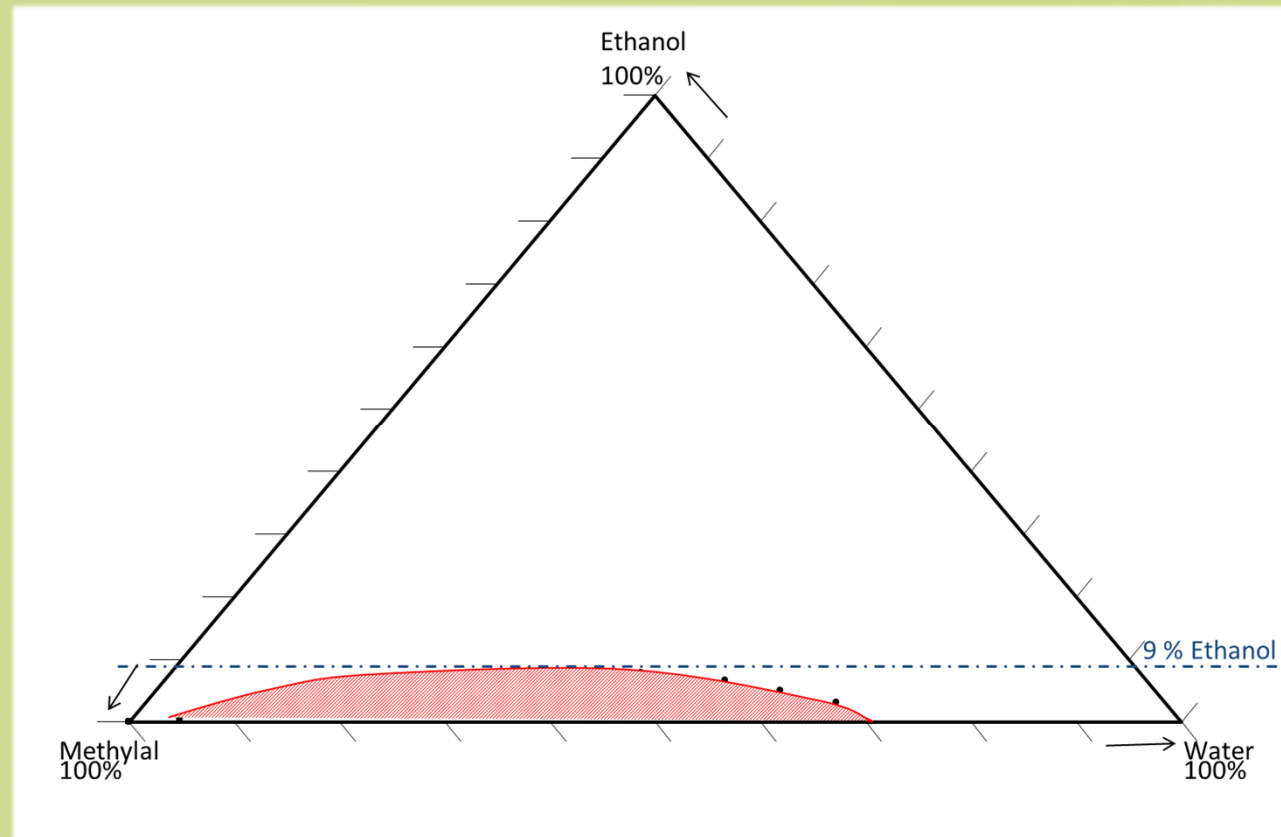
Acetals in Aerosols

**Methylal, the ideal solvent for
aerosol's formulas**

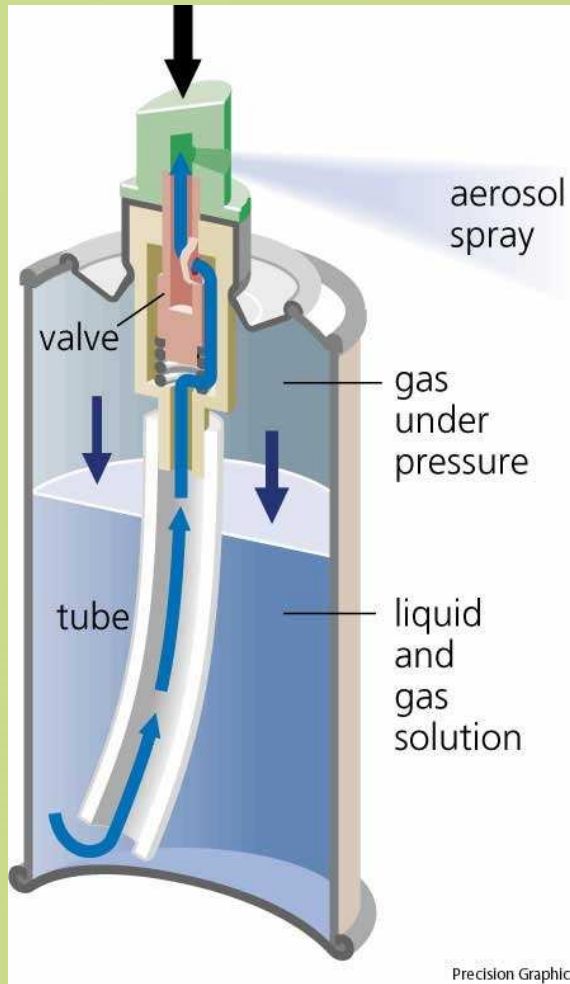
DESCRIPTION OF METHYLAL

- $\text{CH}_3\text{O-CH}_2\text{-OCH}_3$
- Solvent
- Acetal (not Ether)
- Boiling Point $42,3^\circ\text{C}$
- High evaporation rate
- High solvent power (comparable to MeCl)
- Miscible with water
- Flammability comparable to Acetone

- Methylal in Water : Limit of miscibility of 33%
- Methylal – Water – Ethanol: fully miscible in presence of 9% Ethyl Alcohol



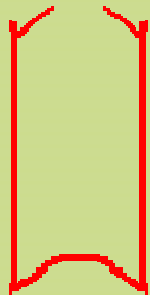
What is an aerosol?



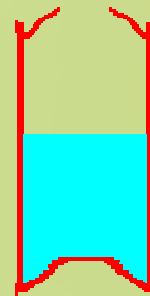
How an aerosol is filled in?



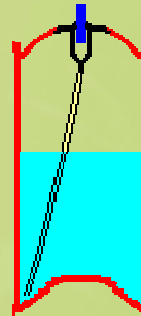
EMPTY CAN



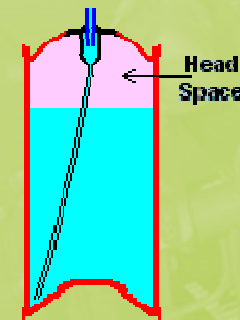
ADD PRODUCT



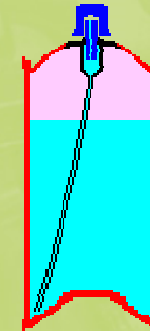
FIT VALVE



ADD PROPELLANT



FIT ACTUATOR



Aerosol container:

- Tin plate
- Aluminium
- Glass

Product:

Usually liquid
Contains all active ingredients, except propellant

Valve:

To be crimped

Propellant :

- Liquid gas
- Compressed gas

- Actuator
- Dust cap
- Batch code

Benefits of Methylal

- I. Solubilisation of ingredients
- II. Water miscibility
- III. Compatibility with propellants
- IV. Reduction of particles' size
- V. Optimisation of drying time

SOLUBILISATION OF INGREDIENTS

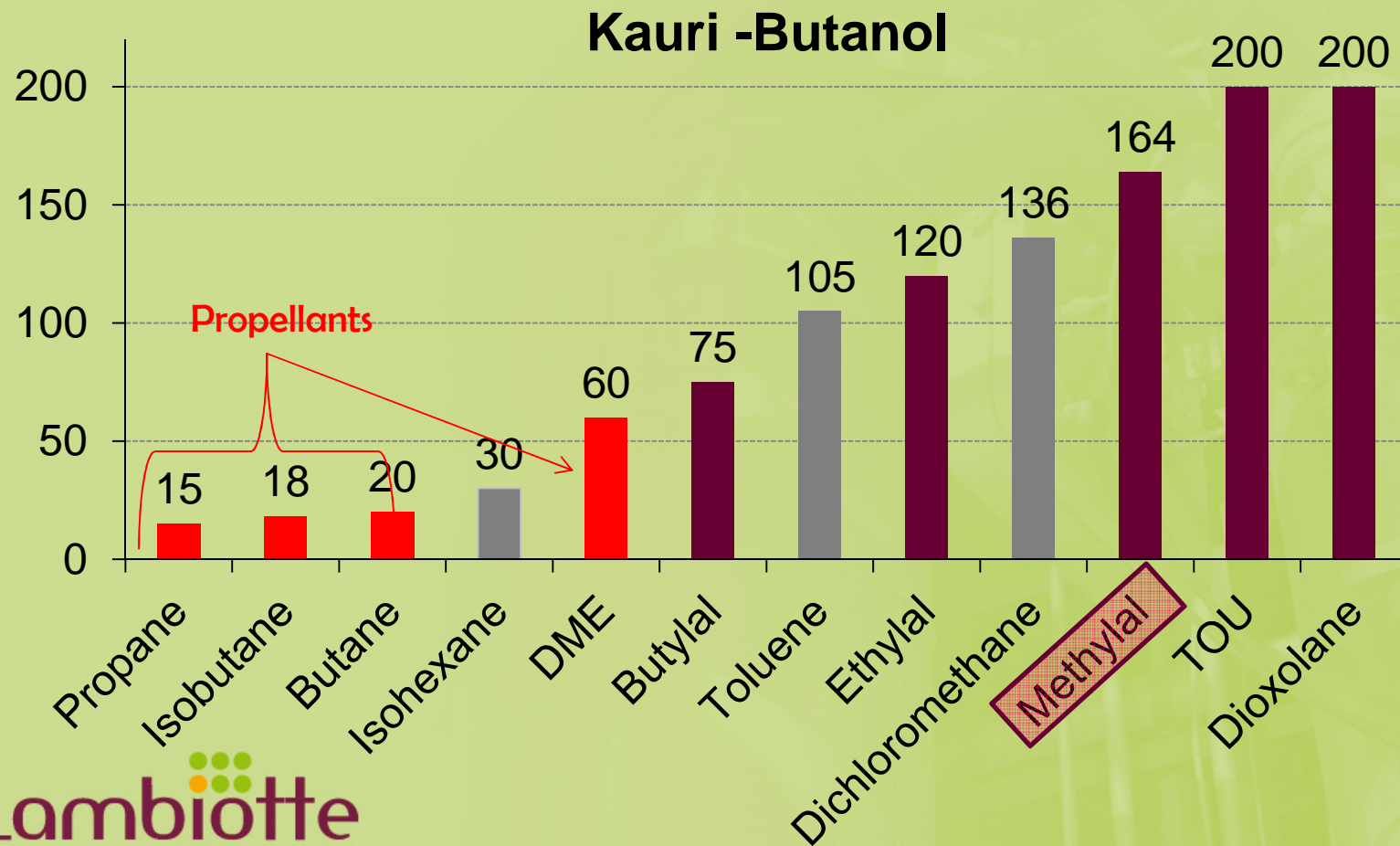
Solubilisation of ingredients

In the container:

- Active ingredients (resins, perfumes, insecticides...)
- Solvents
- Propellant:
 - If Hydrocarbons : Low solvent power
 - ↪ Instability
 - ↪ Precipitation
 - ↪ Obstruction

Solubilisation of ingredients

Solvent Power



Solubilisation of ingredients

Solvent Power

Benefits of High Kauri Butanol values:

- No precipitation in the dip tube while filling with the propellant
- Lower cloud point

Solubilisation of ingredients

Solvent Power

Methylal vs Pentane (e.g. hair spray)

METHYLAL



STUDY ON DRYING TIME

COMPOSITION **F** :

3.00	RESIN 28-1310/LUVICET CA66
0.24	AMP
0.03	PERFUME
50.00 - 20.00	ETHYL ALCOHOL
15.00	PENTANE
35.00 - 65.00	DIMETHYL ETHER
<hr/>	
100.00	

COMPOSITION **G** : AS F WHEREBY PENTANE IS REPLACED BY METHYLAL ME15

Solubilisation of ingredients

Solvent Power

Methylal vs Pentane (e.g. hair spray)

METHYLAL



STUDY ON SOLVENCY POWER

COMPOSITION F :

	PENTANE			METHYLAL		
% ALCOHOL	50	35	20	50	35	20
ASPECT 20°C	← CLEAR	→ CLOUDY		← CLEAR		→
ASPECT -20°C	← CLEAR	→ CLOUDY		← CLEAR		→

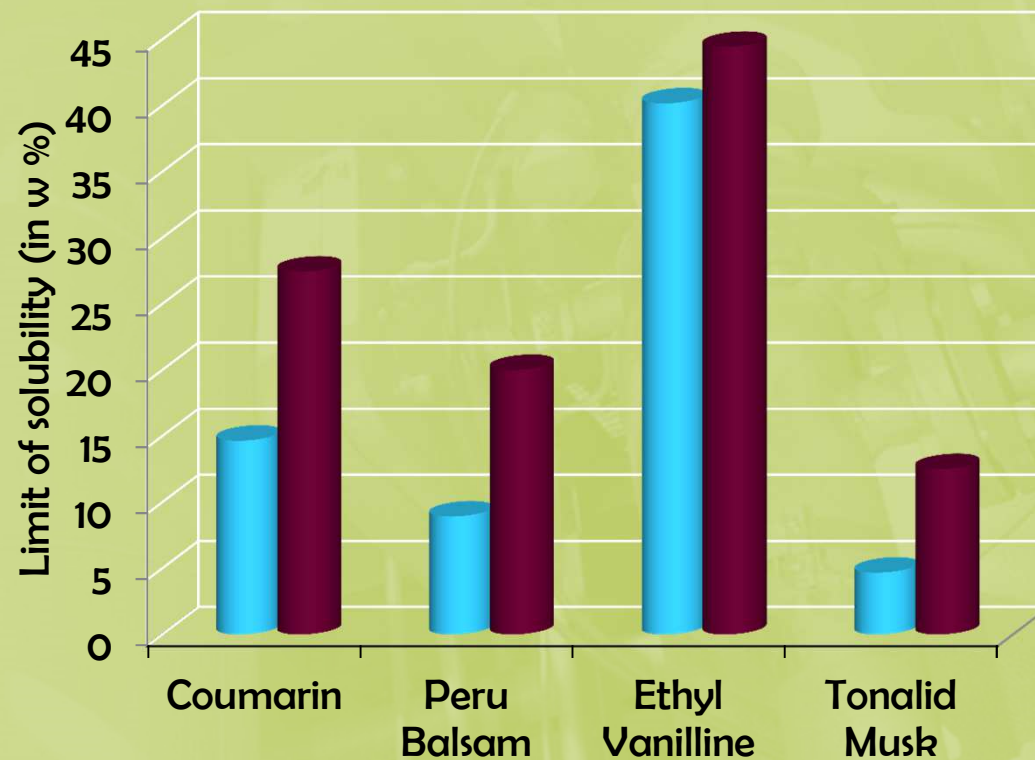
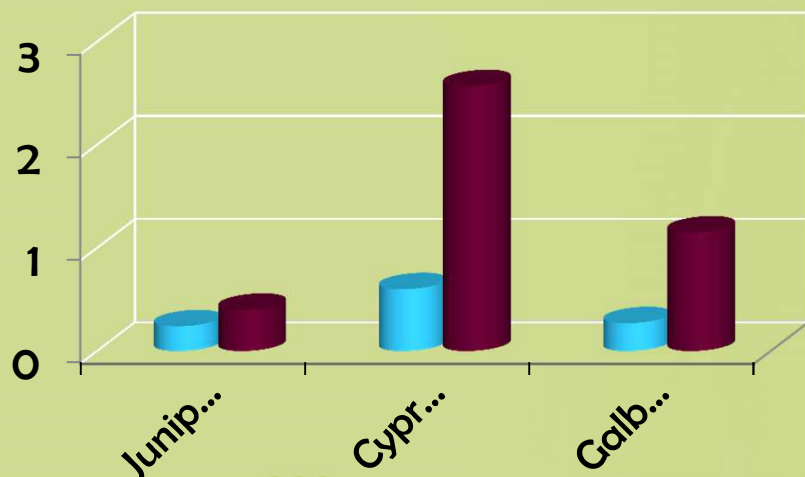
ME16

Solubilisation of ingredients

Methylal versus Ethanol

■ Water 20%
Ethanol 80%
Methylal 0%

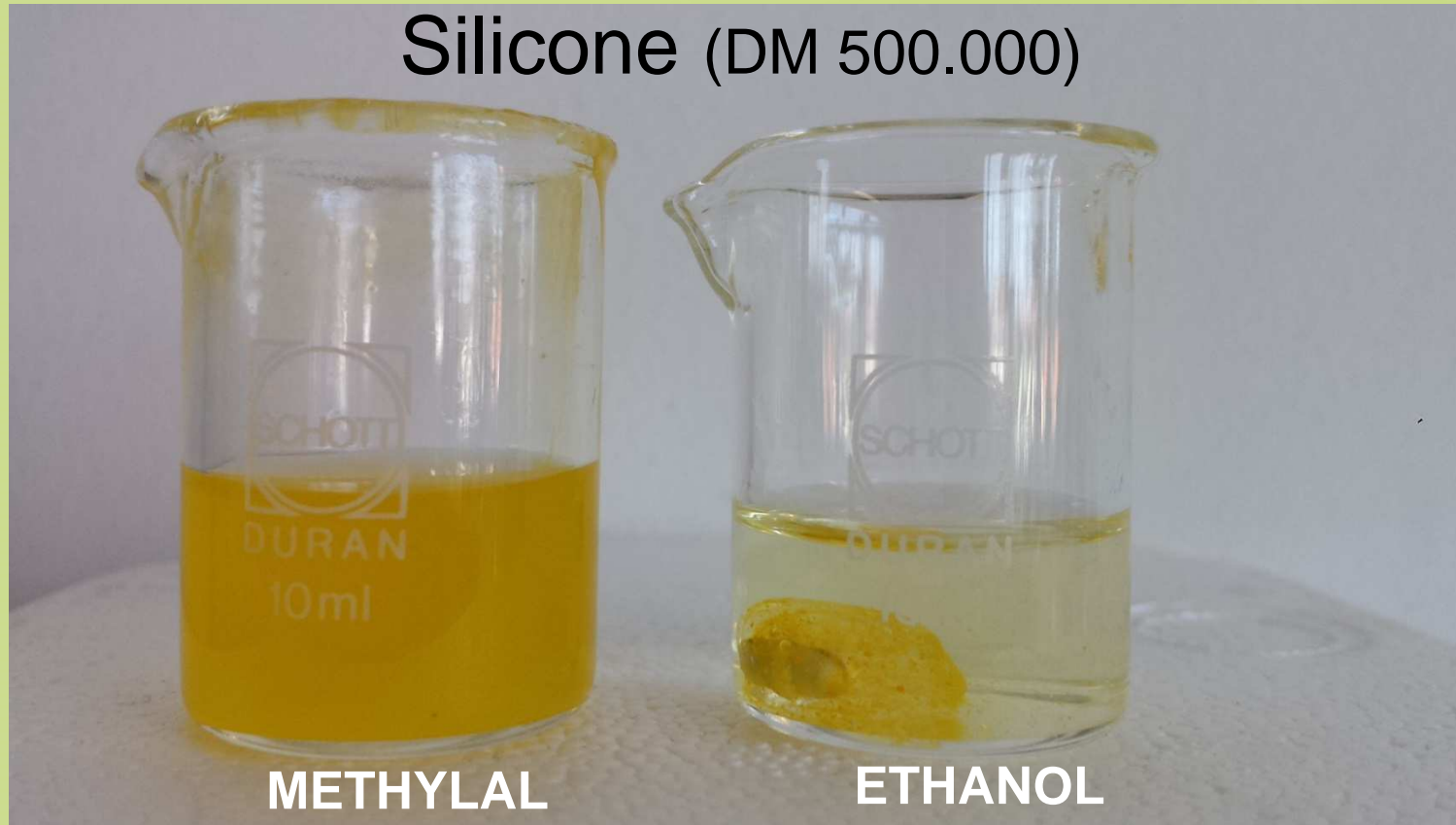
■ Water 20%
Ethanol 30%
Methylal 50%



Solubilisation of ingredients

Methylal versus Ethanol

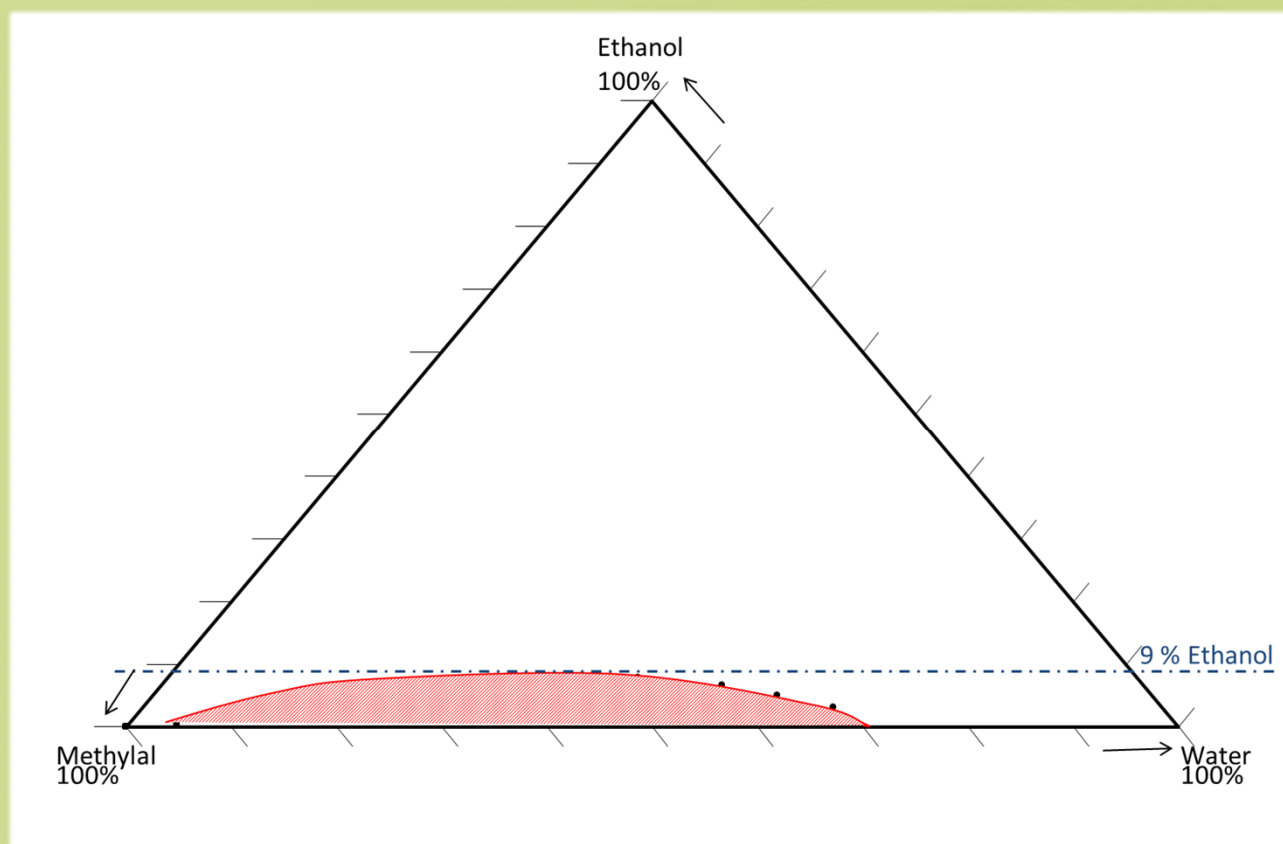
Silicone (DM 500.000)



WATER MISCIBILITY

Water Miscibility

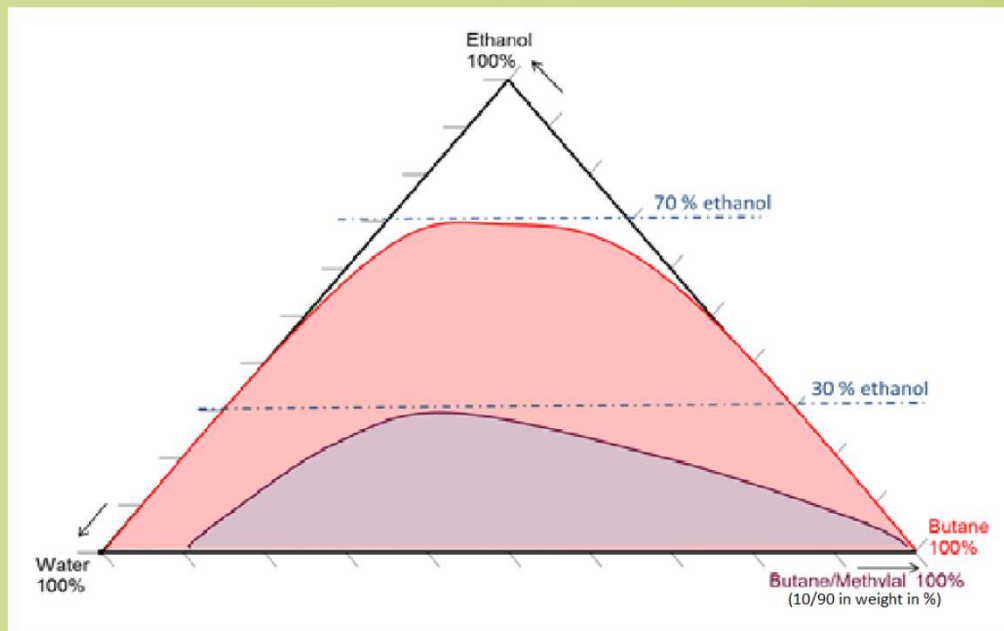
- Methylal in Water : Limit of miscibility of 33%
- Methylal – Water – Ethanol: fully miscible in presence of 9% Ethyl Alcohol



Water miscibility with hydrocarbons

Influence of methylal

- **System: Water – Ethanol – Butane**
 - Without Methylal: single phase with 70% of ethanol
=> only room for 30% of water/hydrocarbons
 - With Methylal: single phase with 30% ethanol
=> much bigger room for water/hydrocarbons



COMPATIBILITY WITH PROPELLANTS

Compatibility with propellants

Methylal is compatible with propellants

- **Liquid propellants:**
 - Hydrocarbons' blends (iso-butane, n-butane, propane)
 - Dimethylether (DME)
 - Fluorocarbons (HFC-152 α , 134 α)
- **Compressed gases:**
 - CO₂
 - N₂O

Compatibility with propellants

Bunsen Coefficient for main solvents

Solvent	Bunsen Coef
Methylal	9,5
Dioxolane	7,6
Acetone	5,3
Ethanol	2,6
Isopropanol	2,3
Toluene	2,15
Isohexane	1,7
Water	0,82

Compatibility with propellants

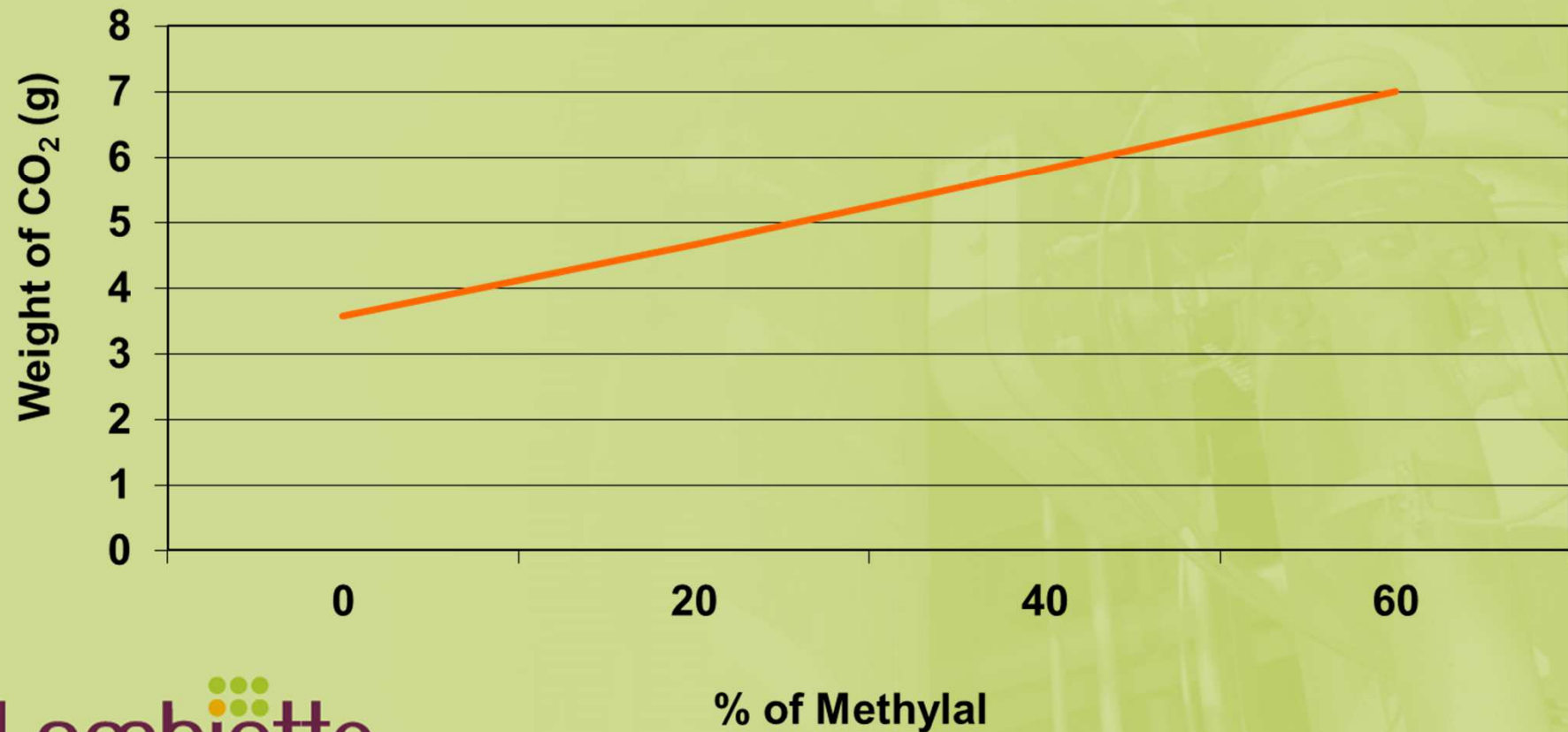
CO₂ solubility in hydroalcoholic blends

Influence of methylal

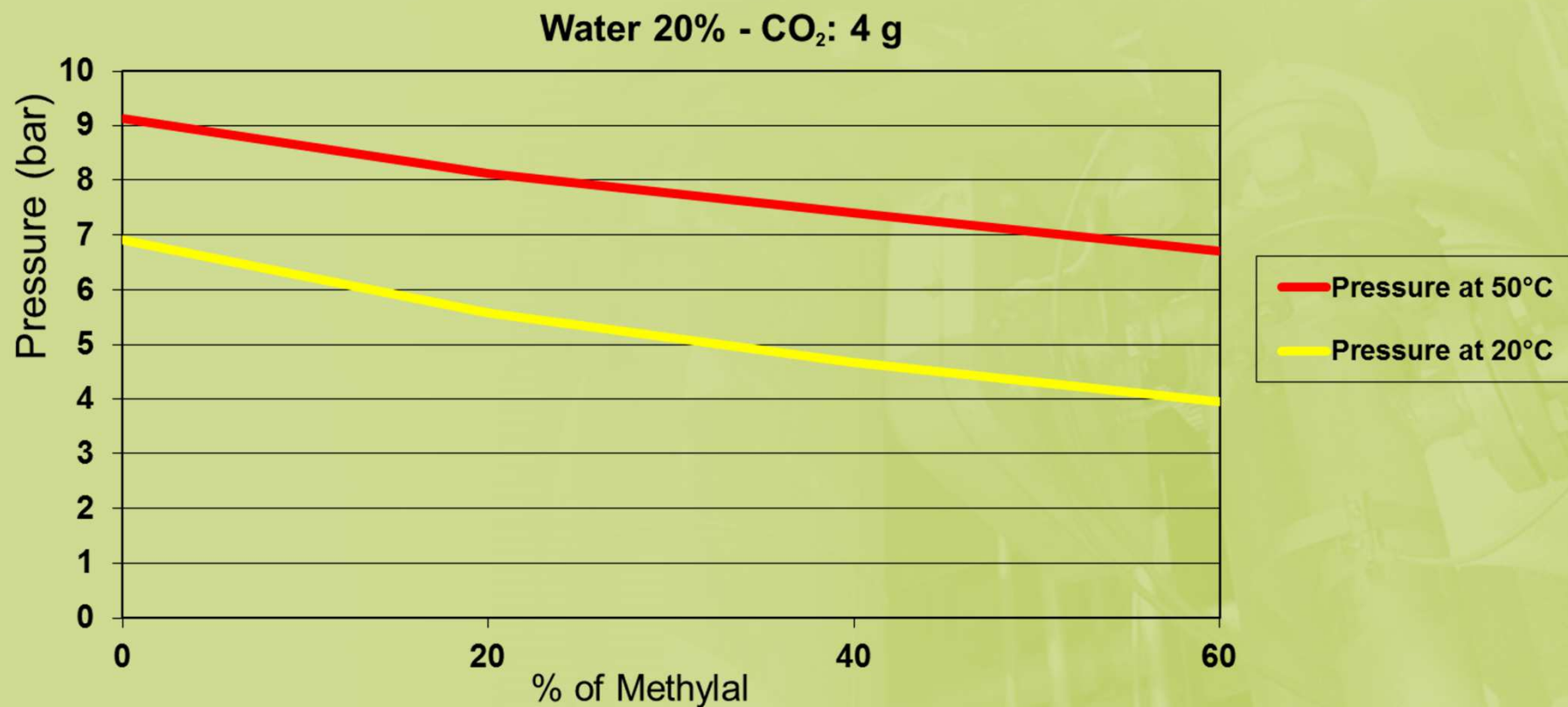


Influence of Methylal on the solubility of CO₂ in hydro-alcoholic mixtures at a constant pressure

Increase of solubility of CO₂
Water 20% - Pressure (20°C) 6 bar



Influence of Methylal on the pressure generated by CO₂ in hydro-alcoholic mixtures with constant amount of CO₂



PARTICLES' SIZE

Particles' Size

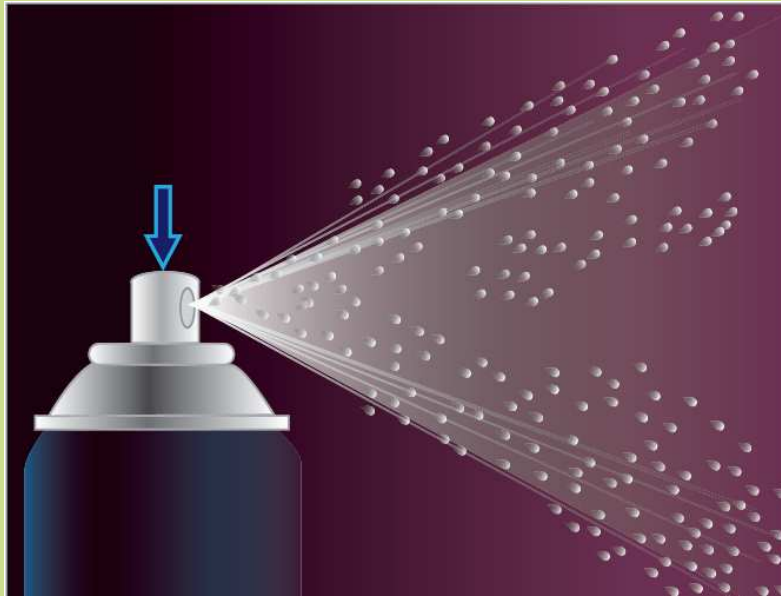
Viscosity and Surface Tension

	Dynamic viscosity 20°C (cp)	Surface Tension (mN/m)
Methylal	0,3	21,1
Ethanol	1,2	22,1

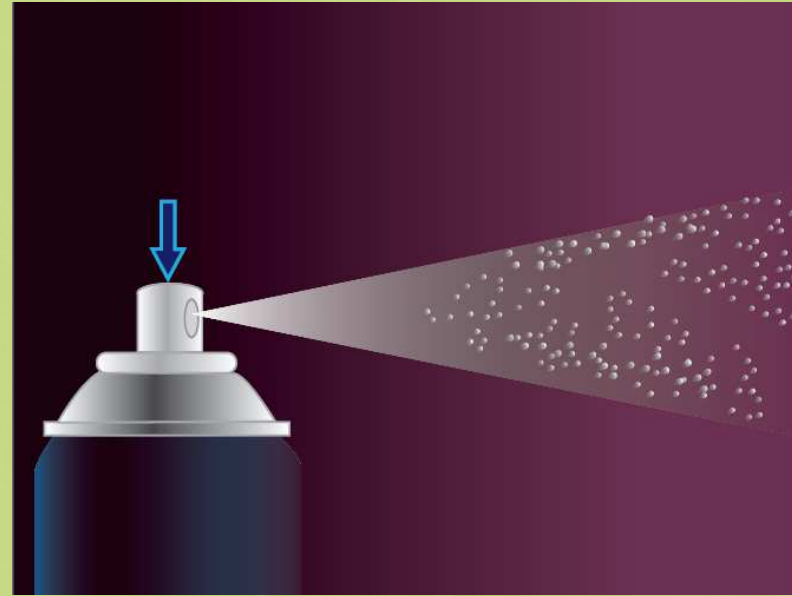
Particles' Size

Influence of methylal

Without methylal

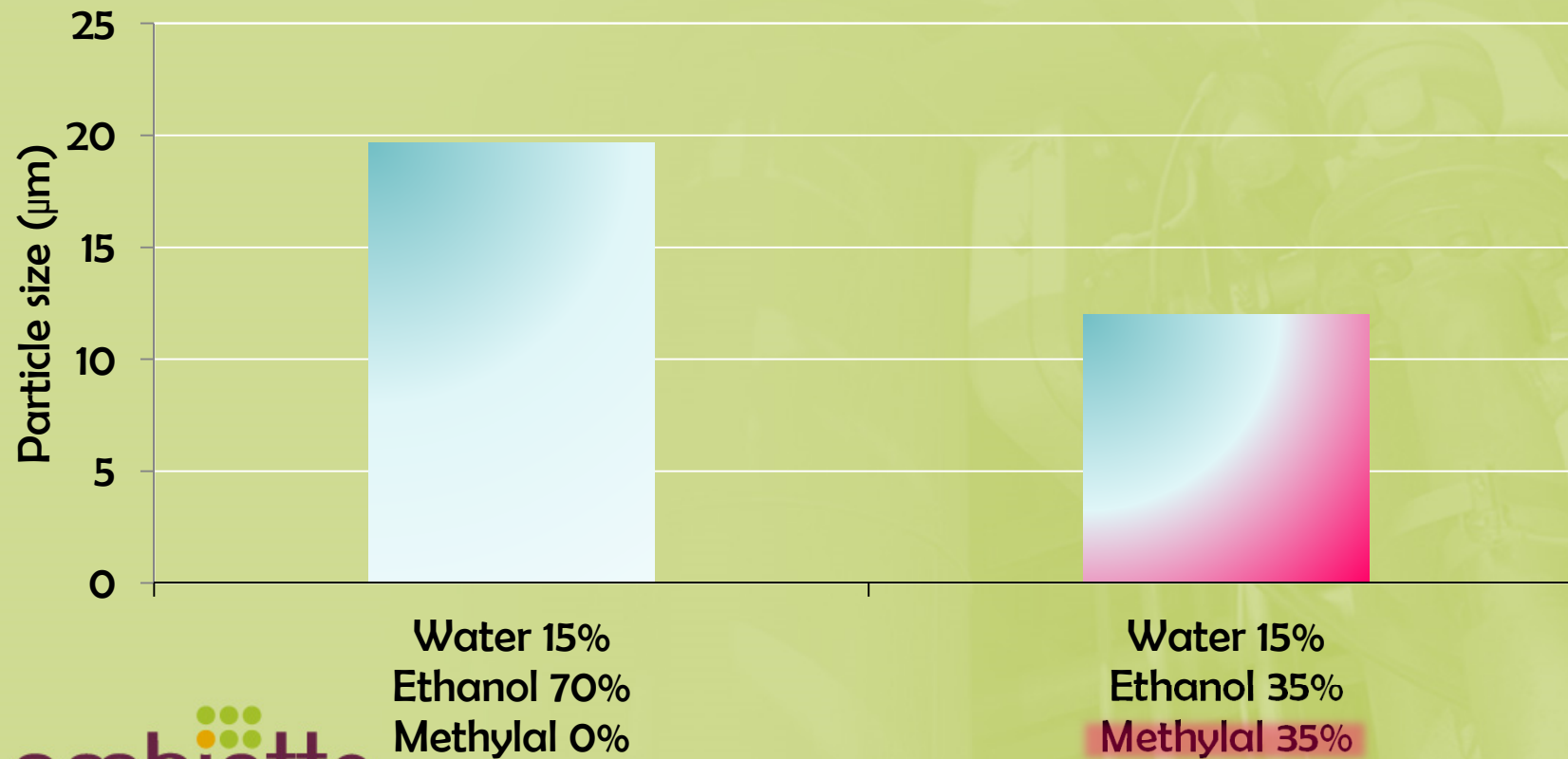


With methylal



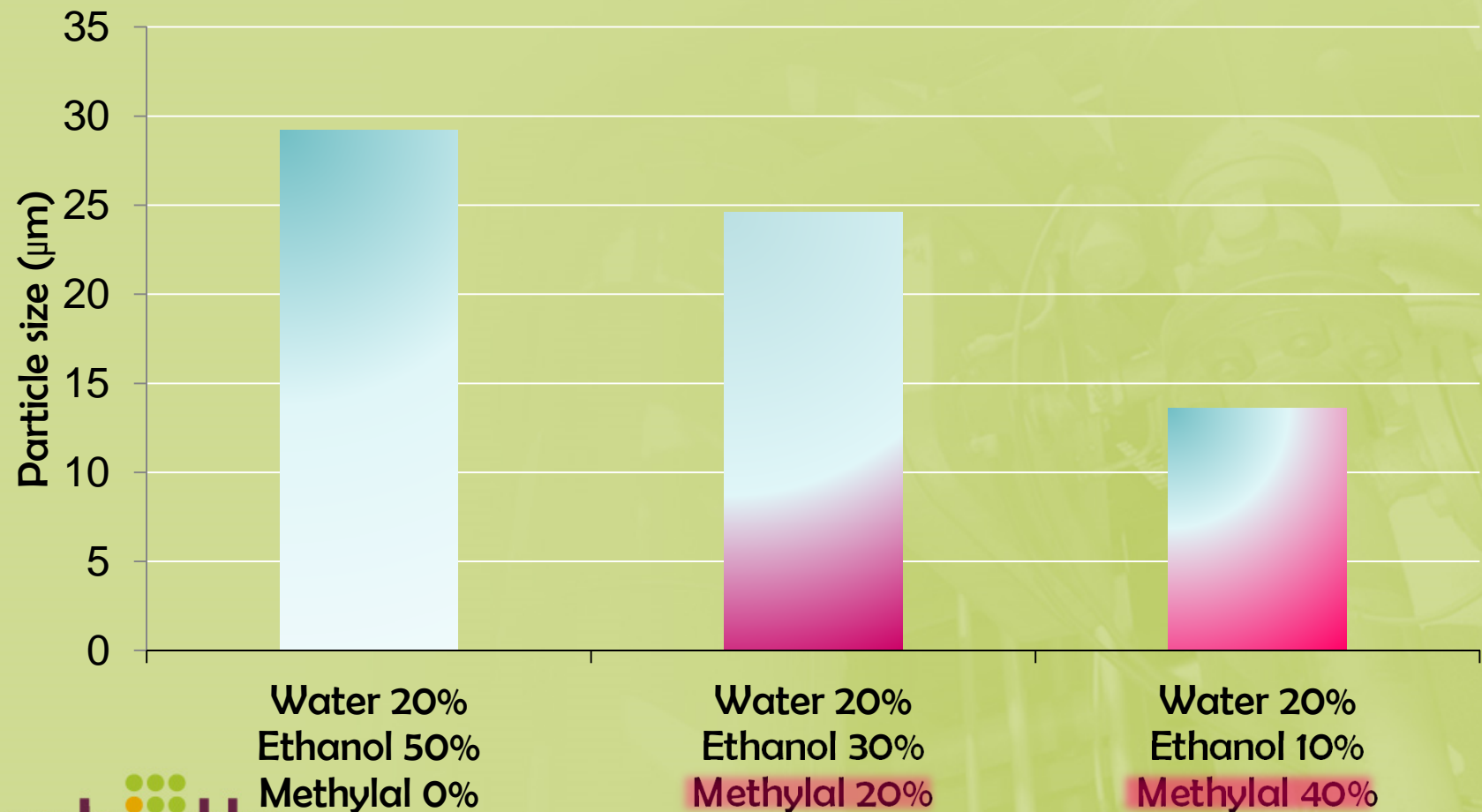
Particules' Size

Influence of methylal with 15% hydrocarbons



Particles' Size

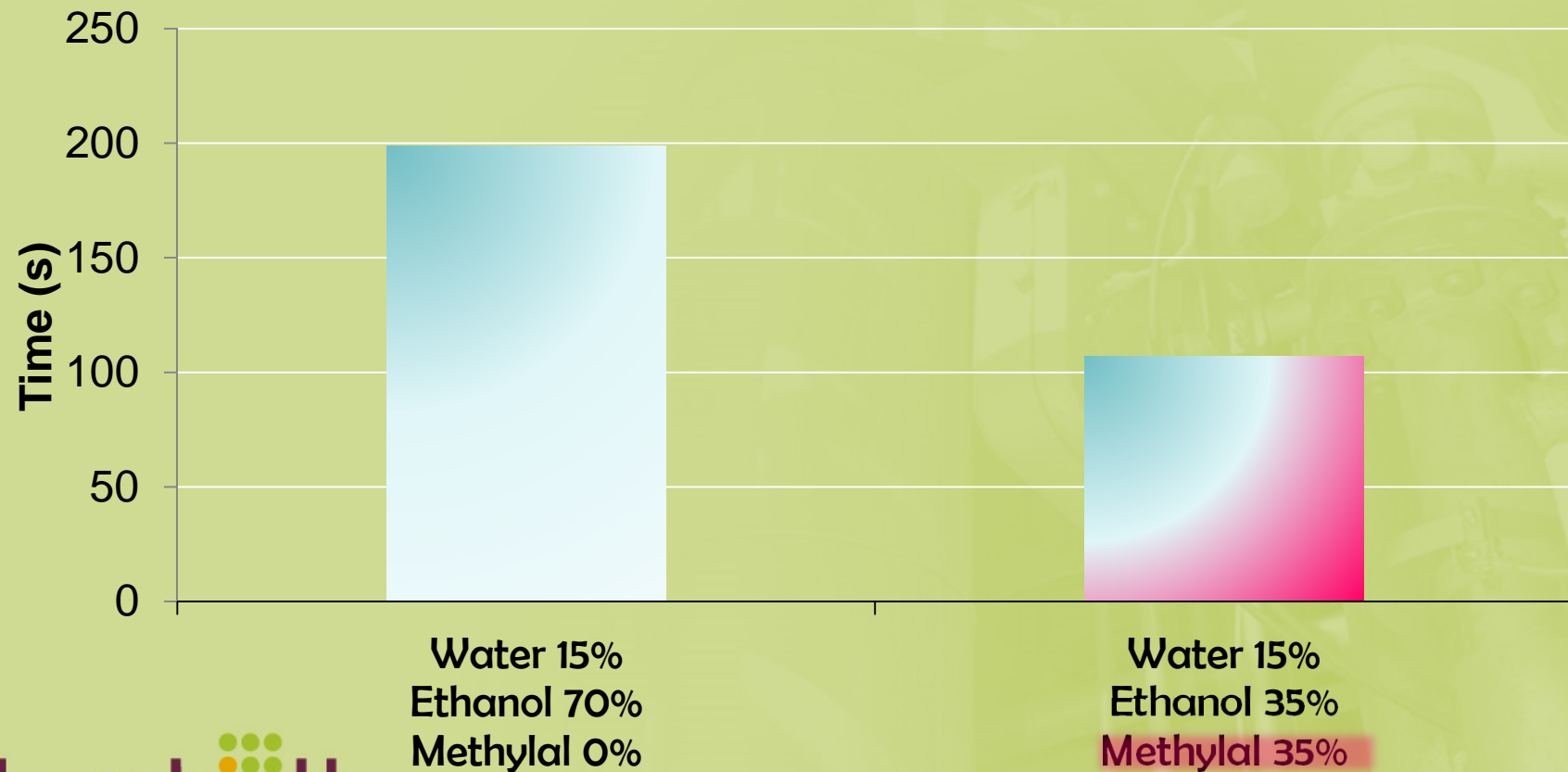
Influence of methylal with 30% DME



DRYING TIME

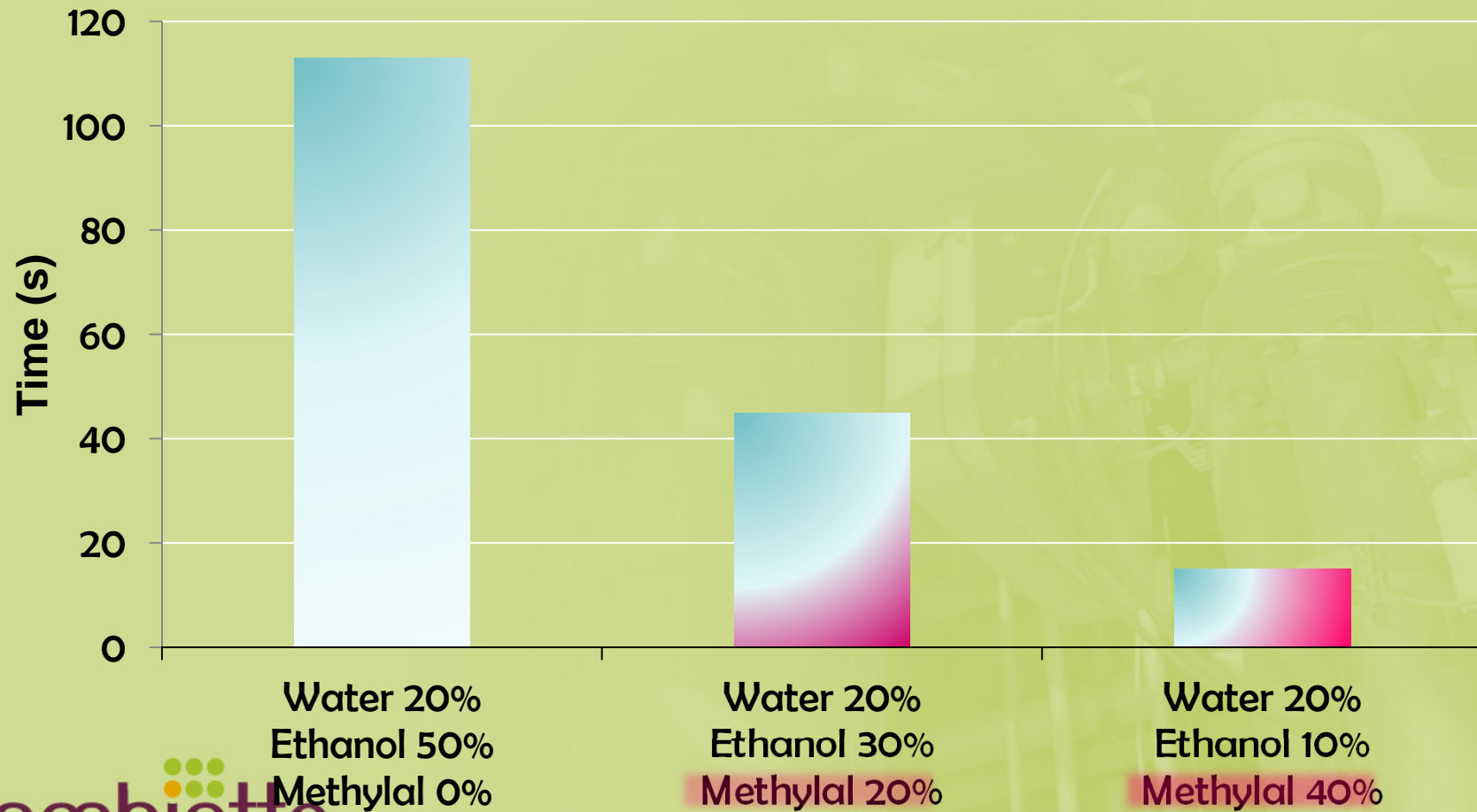
Drying time

Influence of methylal with 15% hydrocarbons



Drying time

Influence of methylal with 30% DME



Applications

❑ Cosmetic

- Hair Care: Hair spray..
- Toiletries: Alcohol free deodorants...

❑ Para pharmaceuticals

- Cooling spray
- Bandaging spray..

❑ Household

- Insecticide
- Cleaner
- Air freshener
- Adhesive

❑ Technical

- Paint
- Paint Stripper, Graffiti Remover
- Glue
- Lubricant, Grease, Deblocking oil...

❑ Automotive

- Brake, Engine, Rim cleaners
- Lubricant / Oil / Silicone.....

COSMETICS

HAIR SPRAY

Product on the market : Hair spray



COSMETICS

BODY DEODORANT

COSMETICS

BODY DEODORANT

- Methylal enhances the compatibility between essential oils, ... and water
- Methylal improves the spray quality by reducing the particles' size
- Methylal increases the drying velocity of water-based products
- Methylal allows to formulate Alcohol-free deodorants

PARAPHARMACEUTICALS

- Cooling spray
- Plaster spray
- Haemostatic spray
- Insect repellent

...

Cooling spray



COMPOSITION :

Butane, Isobutane, Propane, **Methylal**, Parfum.

Foot deodorant

COMPOSITION DU PRODUIT

Butane, methylal, propane, alcohol denat., talc, magnesium trisilicate, boric acid, silica, parfum, myristalkonium saccharinate, aluminium chlorohydrate, hexyl cinnamal, linalool, amylicinnamal, limonene, alpha-Isomethyl Ionone, citronellol, geraniol.



Haemostatic spray



AVSNITT 3: Sammensetning/angivelse av bestanddeler

Bestanddel	CAS-nr	EC-nr.	Vekt%	Klassifisering
Butan	106-97-8	EINECS 203-448-7	1 - 50	F+:R12 - Note C (EU) Flam. Gas 1, H220; Komprimert gass, H280 - Note C,U (CLP)
Propan	74-98-6	EINECS 200-827-9	1 - 50	F+:R12 (EU) Flam. Gas 1, H220; Komprimert gass, H280 - Note U (CLP)
Dimetoksymetan	109-87-5	EINECS 203-714-2	35 - 45	
MDOC (Kalsium og natriumsalt av oksidert cellulose)	Ingen		1 - 10	
Propan-2-ol	67-63-0	EINECS 200-661-7	1 - 5	F:R11; Xi:R36; R67 (EU) Flam. Liq. 2, H225; Eye Irrit. 2, H319; STOT SE 3, H336 (CLP)

Plaster spray



Biogaze® Plaster spray contains following ingredients :

- * Chlorhexidine digluconaat
- * Glycolisch aloëextract
- * Cellulose-acetopropionaat
- * Di-adipaat
- * 2,2,4-Trimethyl-1,3- Pentaandiol di-isobutyraat
- * Ethyloleaat
- * Isopropylalcohol
- * Isobutylalcohol
- * **Methylal**
- * 1,1,1,2-Tetrafluoroethaan

HOUSEHOLD

- Air fresheners
- Insecticides
- Spot removers
- Oven cleaners
- Waxes
- ...

HOUSEHOLD *INSECTICIDE*

INSECTICIDES

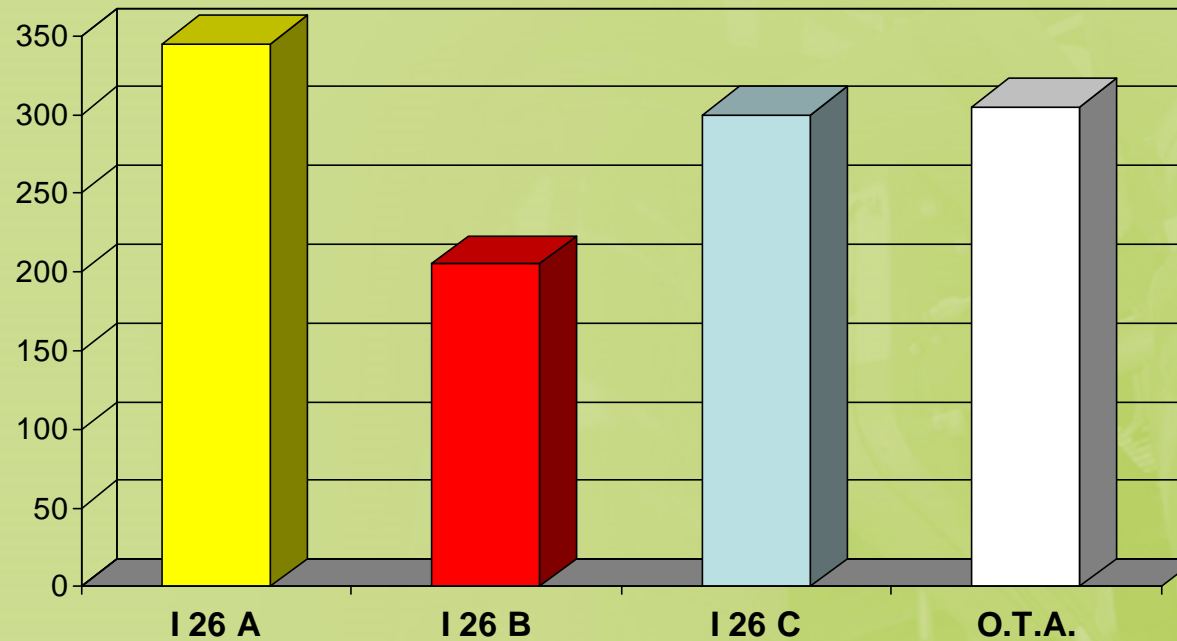
Specific advantages of Methylal:

- Higher knock-down in solvent-based aerosol insecticides
- Single phase water-based aerosol formula
(no shaking required before use)
- Boosts the efficiency of water-based formulations by improving the penetration of actives into the insect's hydrophobic secretions
- Possibility of CO₂ aerosol formulation
- Pump spray insecticides

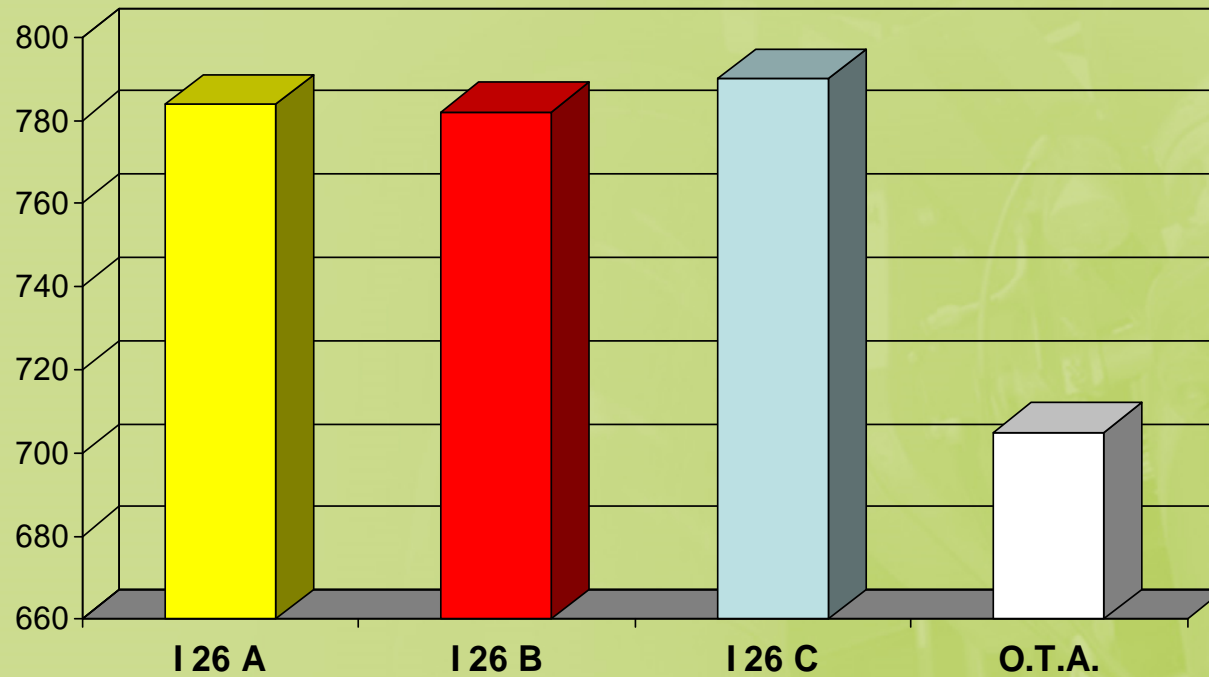
Ex: Solvent-based Insecticide formulations for flying insects

	I26 A (w/w %)	I26 B (w/w %)	I26 C (w/w %)
Bioallethrine	0,075	0,075	0,075
Tetramethrine	0,25	0,25	0,25
Permethrine	0,075	0,075	0,075
Piperonyl butoxide	0,75	0,75	0,75
Methylal	38,85	0	19,42
Isopar C	0	38,85	19,42
Propane butane	60	60	60

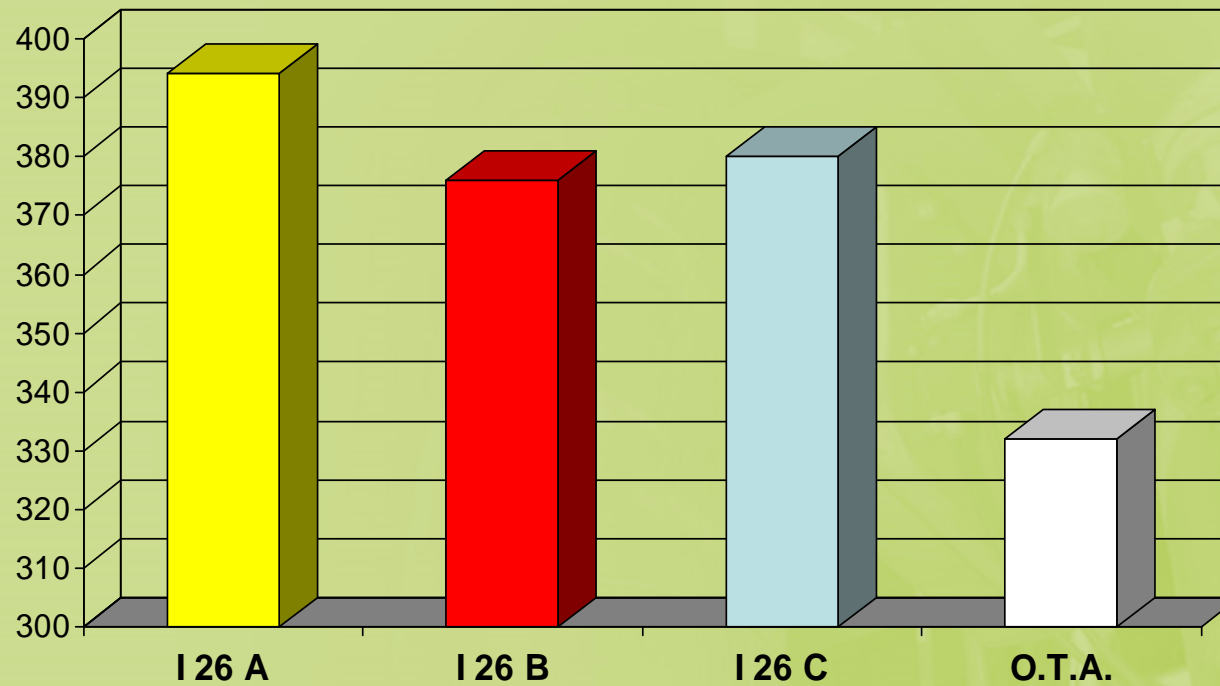
Knock-down trials on 800 flies after 5 minutes



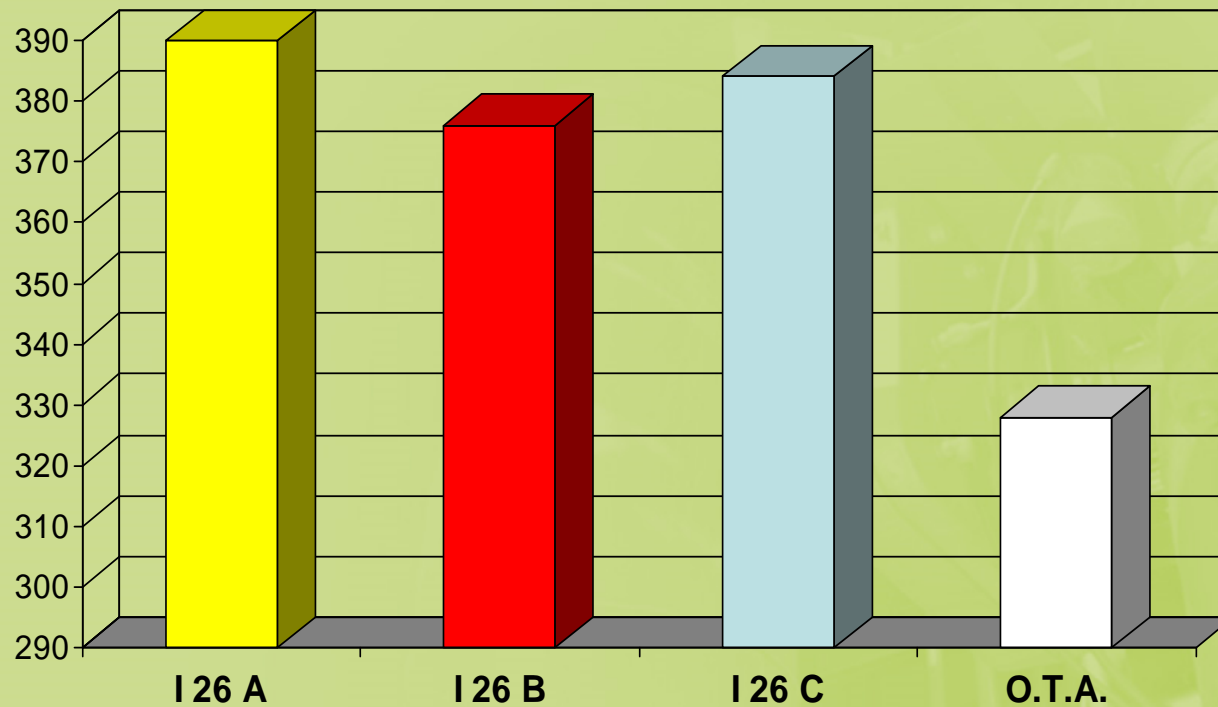
Mortality trials on 800 flies after 24 hours



Knock-down trials on 400 mosquitoes (after 15 minutes)



Mortality trials on 400 mosquitoes (after 24 hours)



Insecticide



3 COMPOSITION / INFORMATION ON INGREDIENTS (SEE ALSO BOX 16)

% w/w	Common*/Chemical Name, ELINCS/EINECS & CAS No. of Ingredients	EC 1999/45 Classification
0.03	Permethrin* / 3-phenoxybenzyl (1RS, 3RS ; 1RS, 3RS)-3-(2,2-dichlorovinyl)-2,2-dimethyl cyclopropane carboxylate EINECS : 258-067-9 CAS : 52645-53-1	X _n : R20/22 : R43 N : R50,53
0.14	Tetramethrin* / cyclohex-1-ene-1,2-dicarboximidomethyl(1RS)-cis-trans-2,2-dimethyl-3-(2-methylprop-1-enyl) cyclopropanecarboxylate EINECS : 231-711-6 CAS : 7696-12-0	N : R50,53
≤1.0	Piperonyl butoxide* / 2-(2-butoxyethoxy)ethyl 6-propylpiperonyl ether EINECS : 200-076-7 CAS : 51-03-6	N : R50,53
>25.0 ≤50.0	Aerosol propellant* / liquefied petroleum gas EINECS : 270-704-2 CAS : 68476-85-7	F+ : R12
>2.5 ≤10.0	Odourless kerosene EINECS : 232-366-4 CAS : 8008-20-6	X _n : R10 : R65
≤1.0	Methylal* / Dimethoxymethane EINECS : 203-714-2 CAS : 109-714-2	F : R11
≤1.0	Sodium nitrite EINECS : 231-555-9 CAS : 7632-00-0	O : R8 T : R25 N : R50

Adhesive spray

3. Composition/information on ingredients

chemical characterization (preparation)

description: This preparation does not contain harmful substances and/or substances hazardous to the environment in accordance with the substance directive 67/548/EEC (incl. 31 ATP) or substances to which occupational exposure limit values are allocated.

Dangerous ingredients:

EC-no.:	Identification of the hazard:	Classification	% by weight
CAS-No.:	R phrases:	remark:	
204-065-8	dimethyl ether	F+	25 - 50
115-10-6	12	*	
204-112-2	Triphenylphosphat	N	< 0,5
115-86-6	50/53		
203-714-2	Methylal	F	5 - 10
109-87-5	11	*	
247-693-8	diphenyl cresyl phosphate	N	< 0,5
26444-49-5	51/53		



Water-stop spray



* **3 Zusammensetzung/Angaben zu Bestandteilen**

- **Chemische Charakterisierung**
- **Beschreibung:** Imprägniermittel in Kohlenwasserstoff-Lösemitteln, mit Treibgas abgefüllt
- **Gefährliche Inhaltsstoffe:**

CAS: 64742-49-0 EINECS: 265-151-9	Naphtha (Erdöl), mit Wasserstoff behandelt, leicht, < 0,001 % Benzol ☒ Xi, ☒ Xi, ☒ F, ☒ N; R 11-38-51/53-65-67	50-100%
EINECS: 203-448-7	Butan < 0,1 % 1,3-Butadien ☒ F+; R 12	25-50%
EINECS: 200-827-9	Propan ☒ F+; R 12	2,5-10%
CAS: 109-87-5 EINECS: 203-714-2	Dimethoxymethan ☒ F; R 11	2,5-10%
CAS: 123-86-4 EINECS: 204-658-1	n-Butylacetat R 10-66-67	< 2,5%

(Fortsetzung auf Seite 2)

Spot remover

SECTION 2 — HAZARDOUS INGREDIENTS

COMPONENT(S)	CAS #	% by Weight
Pentane	109-66-0	45-55%
Methylal	109-87-5	<5%
Hydrated Amorphous Silica	112926-00-8	<5%
Propane/n-Butane Blend	68476-86-8	25-35%



FUN SPRAY

- Christmas snow
- Silly string
- Carnival foam
- Glitter sprays

Snow spray



3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name ⁽¹⁾	Einecs Cas	Concentration %	Symbol	Phrases R
<u>Dimethoxymethane</u>	203-714-2 109-87-5	5 < 10	F	R11
Gas of melted and softened petroleum, petroleum gas ⁽²⁾	68476-86-8	1 < 5	F+	R12
1,1-difluoroethane	200-866-1 75-37-6	5 < 10	F+	R12

AUTOMOTIVE

- Lubricant / oil / silicone
- Engine cleaner
- Brake cleaner
- Rims cleaner
- Wax cleaner
- Resin from trees (pine sap)
-

Brake cleaner

2. COMPOSITION/INFORMATION ON INGREDIENTS

NAME	EINECS Nr.:	CLASSIFICATION	CONTENT
ALIPHATIC HYDROCARBON CAS No.: 265-151-9	64741-84-0	Xn;R65. F;R11. N;R51/53.	30-60 %
DIMETHOXYMETHANE CAS No.: 203-714-2	109-87-5	F;R11.	5-10 %
PROPAN-2-OL CAS No.: 200-661-7	67-63-0	F;R11 Xi;R36 R67	30-60 %



Air Filter Oil



1. Identification de la substance / préparation et de la société / entreprise.

Utilisation commerciale :	Huile pour filtre à air.
Nom / raison sociale du fournisseur :	YACCO SAS
Adresse physique :	Avenue des Petits Prés - Z.I. de l'Oison - BP 2 - 76320 Saint Pierre-lès-Elbeuf
Téléphone / Télécopie :	02.32.96.00.00 / 02.35.78.81.87
N° d'appel d'urgence :	ORFILA - 01 45 42 59 59

2. Composition / information sur les composants de la préparation

Nature chimique :	Produit d'origine pétrolière, gaz propulseur neutre ininflammable.		
Composants contribuant aux dangers :	Diméthoxymethane	>30%	N°CAS 109-87-5 Symbole : F, R11.
	Naphta lourd hydrotraité	<15%	64742-48-9 Symbole : Xn. R65/66

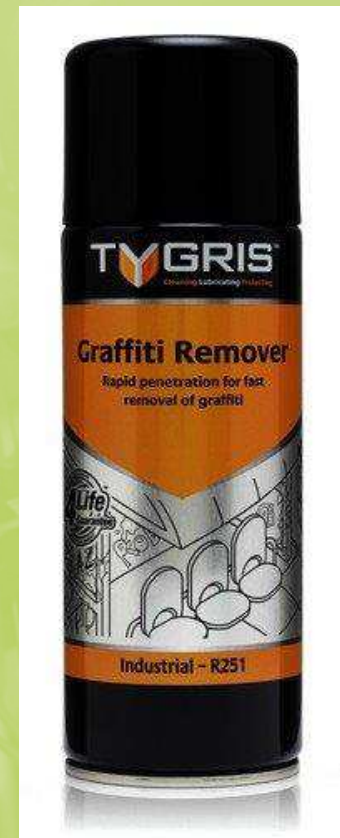
TECHNICAL

- Paint stripper
- Graffiti remover
- Lubricants
- Mould release agents
- Glues
- Cleaners
- ...

Graffiti remover

3 COMPOSITION/INFORMATION ON INGREDIENTS

Name	EC No.	CAS-No.	Content	Classification
2-METHOXY-1-METHYLETHYL ACETATE	203-603-9	108-65-6	5-10%	R10 Xi,R36
ACETONE	200-662-2	67-64-1	10-30%	F,R11 Xi,R36 R66 R67
BUTANE	203-448-7	106-97-8	5-10%	F+,R12
BUTYL ACETATE -norm	204-658-1	123-86-4	10-30%	R10 R66 R67
FATTY ALCOHOL ETHOXYLATE			1-5%	Xi,R41.
ISOBUTANE	200-857-2	75-28-5	1-5%	F+,R12
METHYLAL	203-714-2	109-87-5	5-10%	F,R11.
PROPANE	200-827-9	74-98-6	10-30%	F+,R12



Gasket remover



2. COMPOSITION/INFORMATION ON INGREDIENTS

Nature

Solvent-based gasket remover

Hazardous Components in Product for EC

Component Name	CAS / EINECS	Concentration	R Phrases	Classification
Ethanol, Denatured	64-17-5 200-578-6	5.00 - 10.00	R11	F
Methyl ethyl ketone	78-93-3 201-159-0	1.00 - 3.00	R11, R36, R66, R67	Xi, F
Propane	74-98-6 200-827-9	5.00 - 15.00	R12	F+
Dimethoxymethane	109-87-5 203-714-2	30.00 - 60.00	R11	F
1,3-Dioxolane	646-06-0 211-463-5	5.00 - 15.00	R11	F
Isopropanol	67-63-0 200-861-7	5.00 - 10.00	R11, R36, R67	F, Xi
Ethanolamine	141-43-5 205-483-3	1.00 - 3.00	R20, R36/37/38	Xn
Aliphatic hydrocarbon solvent	64742-48-9 265-150-3	0.50 - 2.00	R10, R65, R66	Xn

Lubrifiant

	Cas	Concentration	Symbole(s) Phrase(s)
Alcanes C7- C10	90622-56-3	$30 < C \leq 40$	Xn R :10-65-66-52- 53
Methylal	109-87-5	$30 < C \leq 40$	F Xn R :11-20-21- 22-68
Dioxyde de carbone	124-38-9	$1 < C \leq 5$	



Release agent



SANSIL LUBORFLON MS 20
Release Agents

Hazardous ingredient	CAS-nr	EINECS	w/w %	symbol	R-phrases*	Notes
methyal	109-87-5		30-60	F	11	B
carbon dioxide	124-38-9	204-696-9	5-10	-	-	A,G
Naphtha (petroleum), hydrotreated light (benzene<0.1%)	64742-49-0	265-151-9	30-80	F,Xn,N	11-38-51/53-65-67	B,P
propan-2-ol; isopropyl alcohol ;isopropanol	67-63-0	200-661-7	<20	F,Xi	11-36-67	B
butan-1-ol; n-butanol	71-36-3	200-751-6	<0.1	Xn	10-22-37/38-41-67	B
tetrafluoroethane	811-97-2	212-377-0	10-30	-	-	B
Explanation notes						
A : substance with Community workplace exposure limit						
B : substance with national established workplace exposure limit						
G : exempted from the obligation to register in accordance with art.2(7)(a)of REACH Regulation No 1907/2006						
P : not classified as carcinogen, less than 0.1% w/w benzene (Einecs-nr. 200-753-7)						

Belt adhesive

Composition :

Identification	Nom	Classification	%
INDEX: 601-004-00-0 CAS: 106-97-8 EC: 203-448-7	BUTANE (CONTENANT MOINS DE 0.1% DE BUTADIÈNE)	GHS02, GHS04, Dgr F+ H:220 R: 12 NOTA: C	25 <= x % < 50
CAS: 109-87-5 EC: 203-714-2	DIMETHOXYMETHANE	GHS02, Dgr F H:225 R: 11	10 <= x % < 25
INDEX: 601-003-00-5 CAS: 74-98-6 EC: 200-827-9	PROPANE	GHS02, GHS04, Dgr F+ H:220 R: 12	10 <= x % < 25
INDEX: 650-015-00-7 CAS: 8050-09-7 EC: 232-475-7	COLOPHAN	GHS07, Wng Xi H:317 R: 43	2.5 <= x % < 10
INDEX: 601-004-00-0 CAS: 75-28-5 EC: 200-857-2	ISOBUTANE	GHS02, GHS04, Dgr F+ H:220 R: 12 NOTA: C	0 <= x % < 2.5



CONCLUSION

Methylal's benefits for aerosols :

- Eases dissolution of ingredients
- Allows to formulate with all kinds of propellants
- Helps formulating low VOC products
- Enhances spray quality
- Speeds up drying