



FRIKE GROUP
THE SMART SOLUTION

Swiss Quality

Aerosols as SPF boosters – how does that work?

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Agenda

- **Background**
- **Aerosols as Solubility Booster**
- **Aerosols as Dry Touch Booster**
- **Summary - All info on one slide**

A woman in a white lab coat and safety glasses is working in a laboratory, smiling as she handles a piece of equipment. In the background, two other scientists, a man and a woman, are also working. The man is holding a small vial, and the woman is holding a blue pen. The laboratory is well-lit with overhead lights.

Largest Swiss independent contract manufacturer
1500 active recipes
Pharma, Personal Care, Home Care
Full Service – Development, Production, Regulatory

Background

SPF - what has to be considered

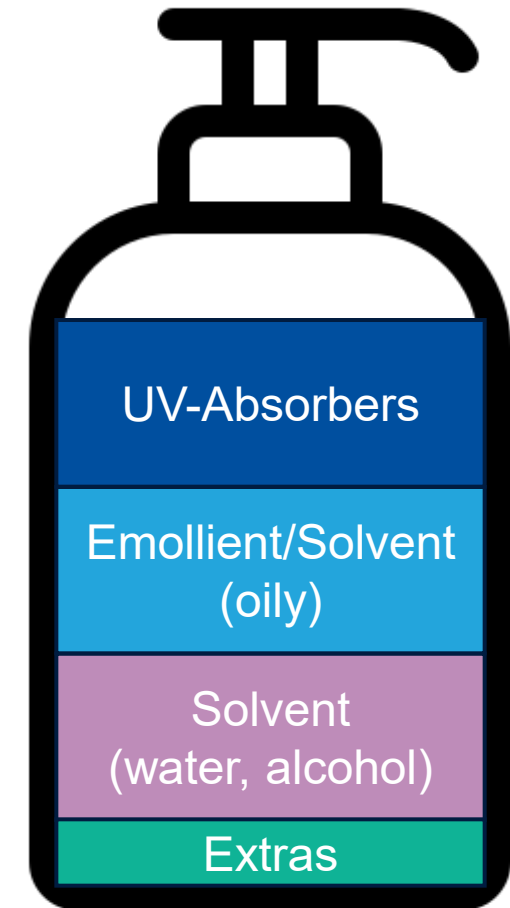


Background

SPF formulation and development

- **Application of UV-absorbers** can occur in numerous formulation types
 - W/O, O/W, oil, gel, spray, etc.
- **UV-Absorbers work** chemically (organic) or physically (mineral)
- **Organic UV-absorbers** come in liquid or solid state

	INCI	State at RT	UV-Absorbtion
BEMT	BIS-ETHYLHEXYLOXYPHENOL METHOXYPHENYL TRIAZINE	Solid	UVA/UVB
DBT	DIETHYLHEXYL BUTAMIDO TRIAZONE	Solid	UVB
EHT	ETHYLHEXYL TRIAZONE	Solid	UVB
DHNB	DIETHYLAMINO HYDROXYBENZOYL HEXYL BENZOATE	Solid	UVA
BMDBM	BUTYL METHOXYDIBENZOYLMETHANE	Solid	UVA
OCR	OCTOCRYLENE	Liquid	UVB
	HOMOSALATE	Liquid	UVB
EHMC	ETHYLHEXYL METHOXYCINNAMATE	Liquid	UVB
EHS	ETHYLHEXYLSALICYLATE	Liquid	UVB



Background

Stability is key

- **Supersaturated solutions**

- More critical for monophasic systems
- oil, gel and alcoholic solution

- **Recrystallisation**

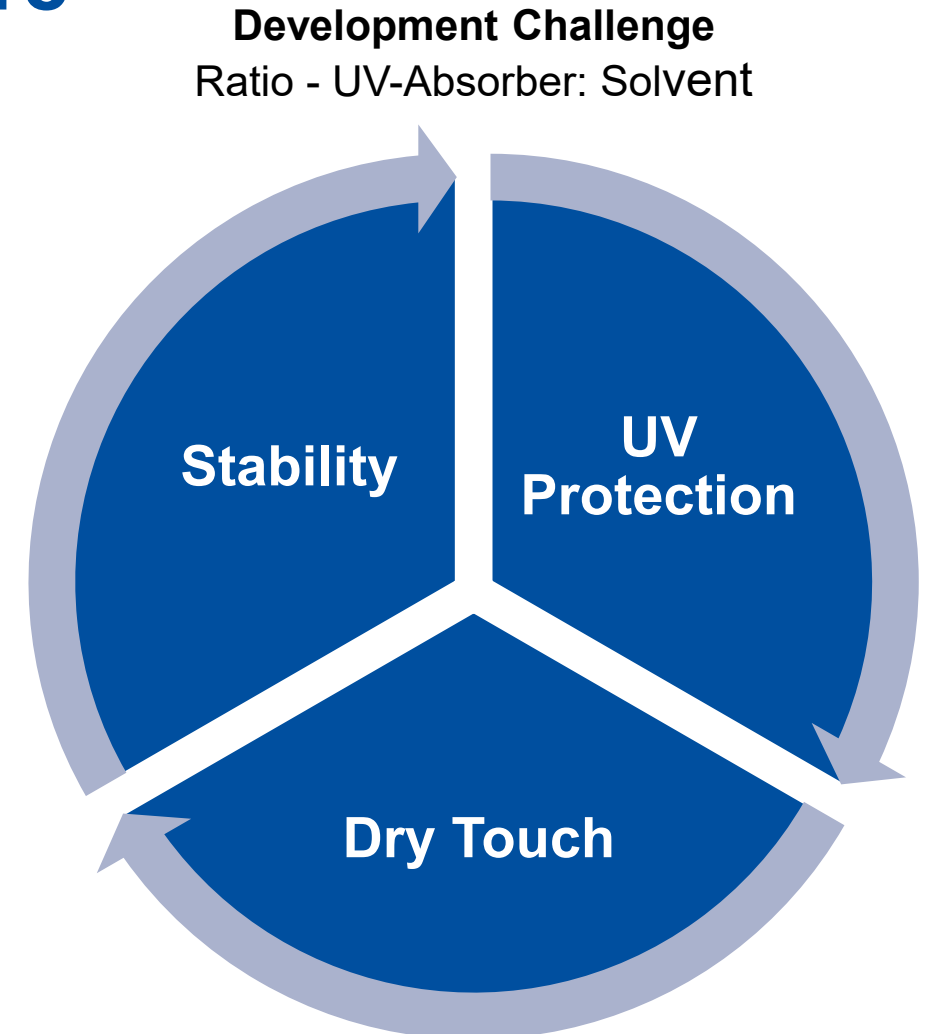
- solid chemical UV-absorbers = no protection
- can take long time (>70 days)
- bigger issue for monophasic solution (oils, sprays)



Background

Challenges of formulating sun care

- **Market demands**
 - Reef Friendly
 - Higher SPF popular
 - No liquid organic UV-absorbers (viewed critically)
- **Majority of product launches today (no OCR, no EHMC)**
- **Customer need for “Dry Touch”**
 - Light texture, velvety, quick skin absorption



Background

Aerosols can solve crystallisation issues

Customer Briefing

- Monophasic Sun Spray
- Dry-Touch (less oily, light touch)
- High SPF (50 and 50+)
- No UV-absorbers with bad image

Development approach

- Emollient reduction
- UV-Absorber maximisation

Unstable formulation (with crystals) turns
to stable aerosol formulation within hours at RT.

Formulation
non-Aerosol
(2 weeks)



Formulation in
Aerosol
(2 years)



Aerosols as Solubility Booster

Propellants act as solvents

Aerosols – the most
sustainable packaging
(Sepawa 2023)



Packaging
(Can, Valve, Actuator, Cap)

Solvent / Propellant
(Butan, Dimethylether)

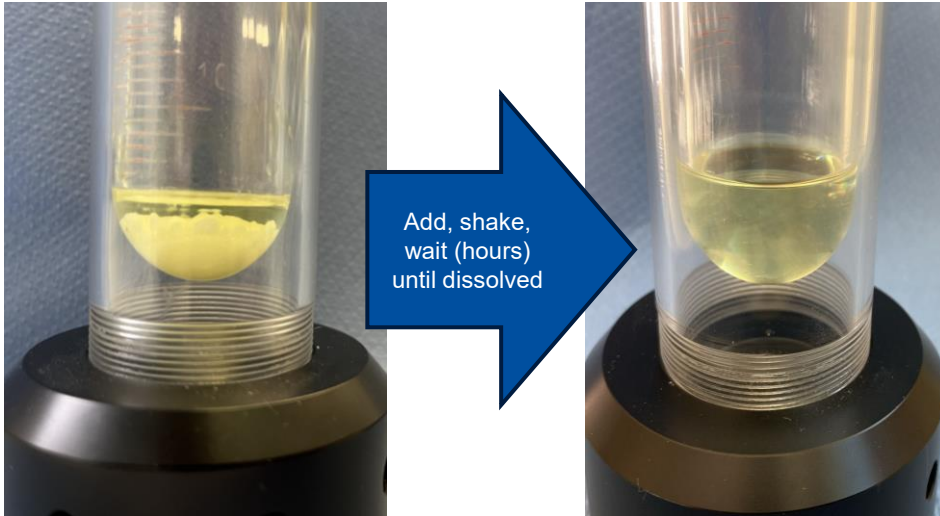
Active Phase
(e.g. UV-Absorbers, Emollient,
Polymers, Perfume, etc.)

Aerosols as Solubility Booster

Methods

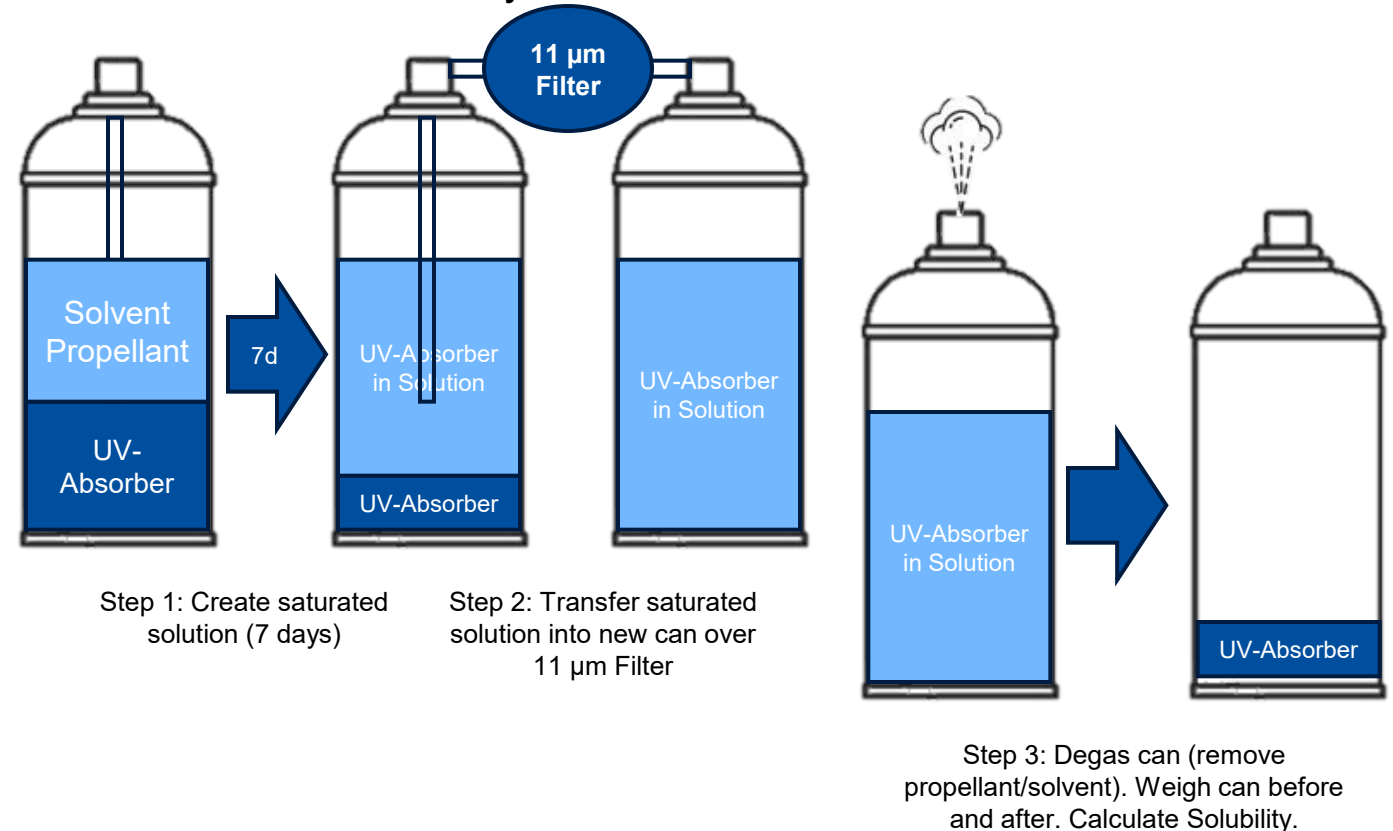
Qualitative

Solubility test series – Optical evaluation



Quantitative

Saturated Solution – Dry Residue Measurement



Aerosols as Solubility Booster

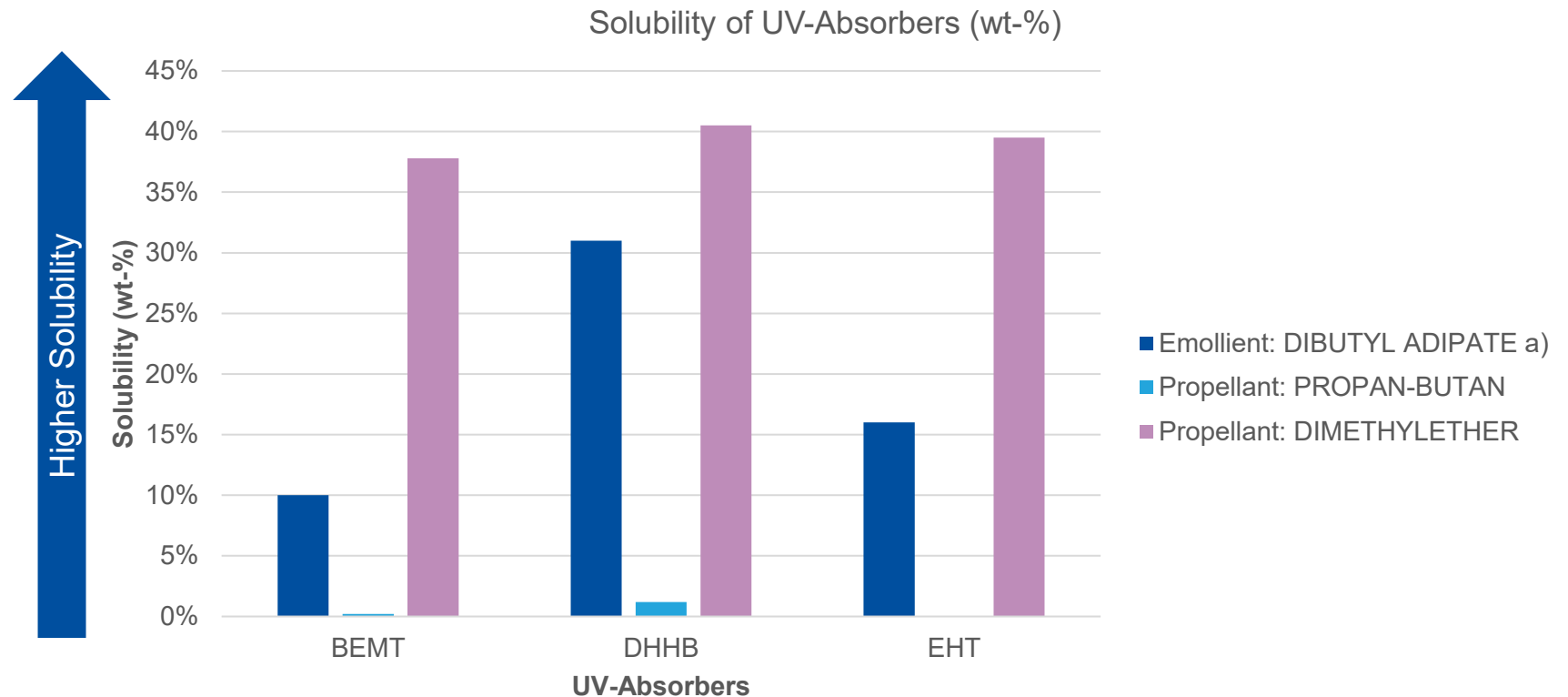
Propellant with exceptional solubility characteristics

Solubility of UV-Filter in different propellants (quantitative results)

Both methods show the same trend.

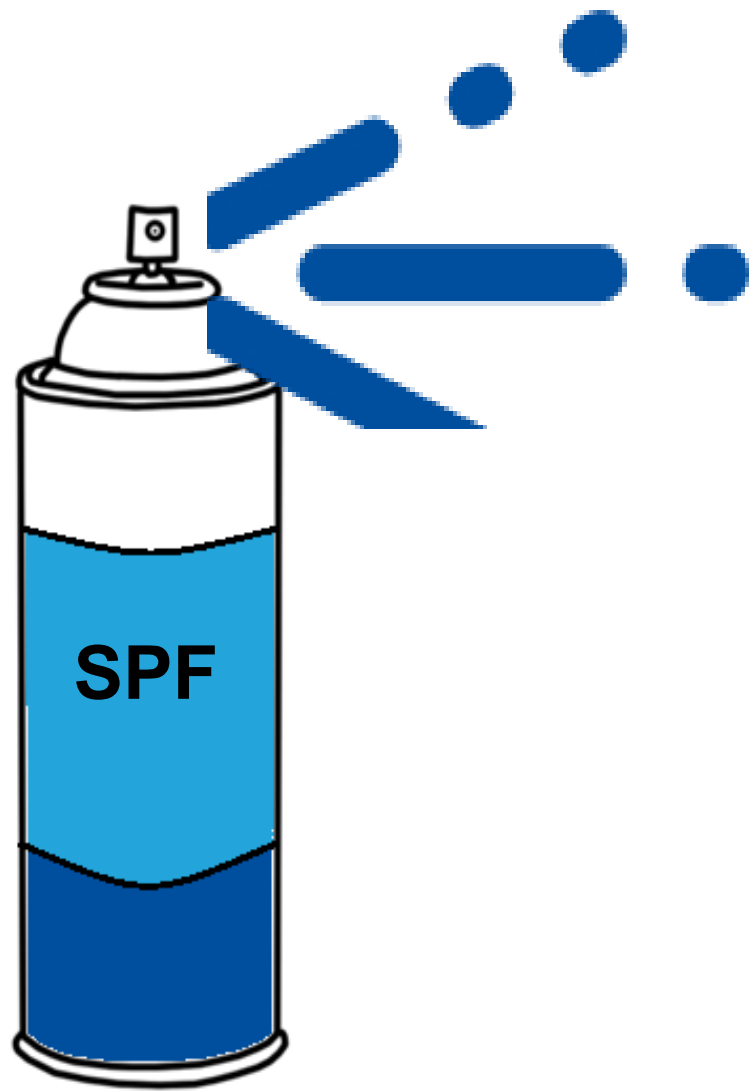
Dimethylether is an **exceptional solvent** of UV-Absorbers.

Dimethylether outperforms emollients as solvent of UV-Absorbers.



a) Literature values from:

B. Herzog, J. Giesinger, M. Schnyder, Solubility of UV absorbers for sunscreens is essential for the creation of light feel formulations, SOFW J. (2013) 7–14.



Aerosols as Dry-Touch Booster

Recipe comparison

Basis

- Applying the same amount of UV-absorber on skin
- Exchange oily solvent (Dibutyl Adipate) with dry solvents (Dimethylether, Propan-Butan)

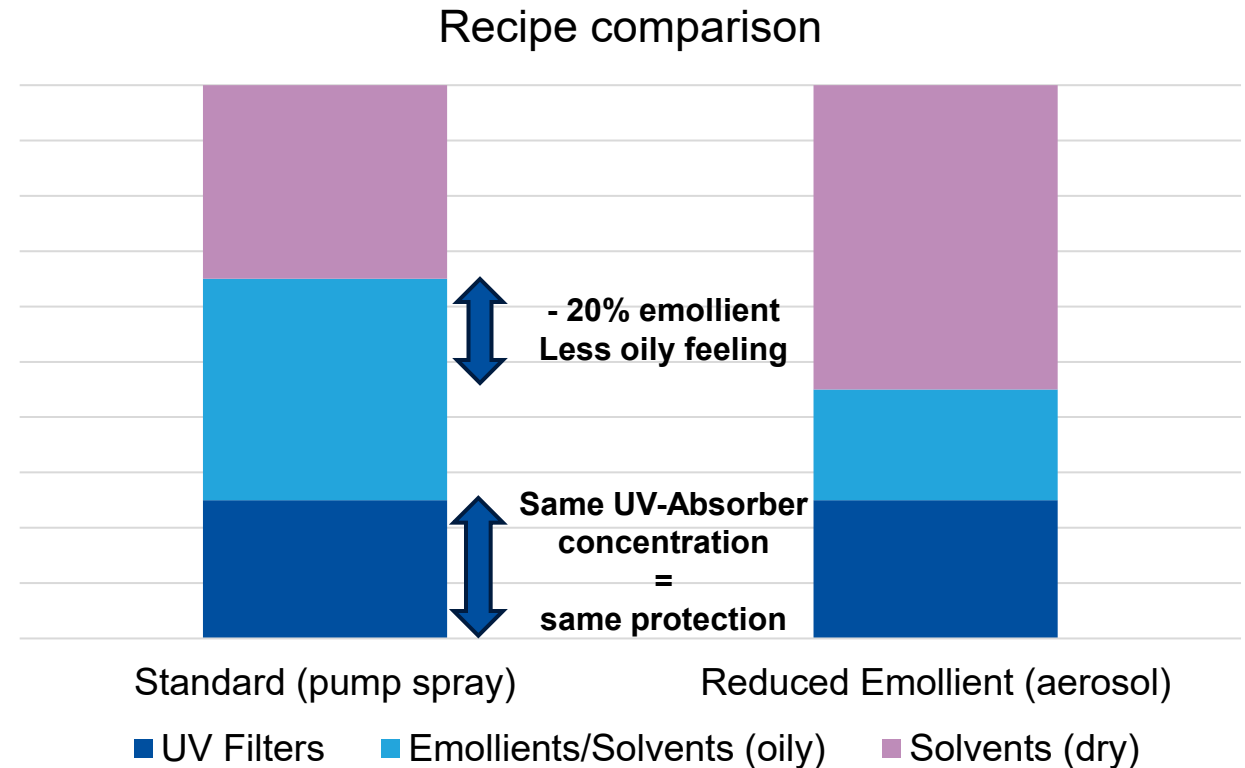
Effects

- Less oily solvent applied on skin -> boost dry-touch
- Higher concentration of UV-filters in film on skin
- We can use an **instable formulation**

Qualitative survey (n=10)

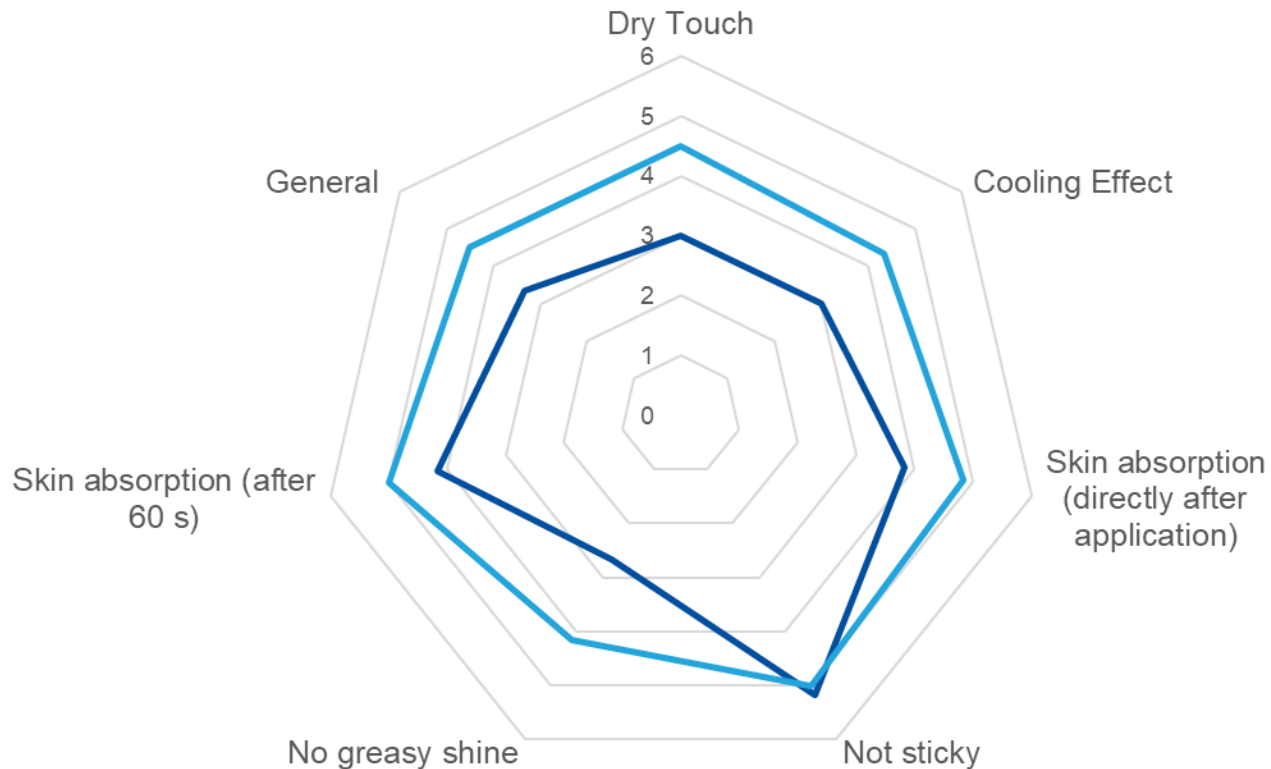
to showcase improvements on:

- Dry-Touch / Cooling / Fast absorbtion
- Less Oily / Less fatty shine / Less Stickiness



Aerosols as Dry-Touch Booster

Sensory evaluation



n=10, Scale: 1-6, with 1=not accurate, low and 6=very accurate, high

**Aerosol
boosts Dry
Touch**

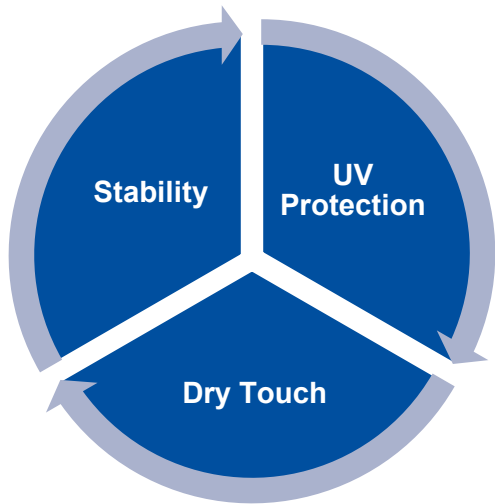
**Aerosol
provides
faster
absorption**

**Aerosol
reduces
greasy shine**

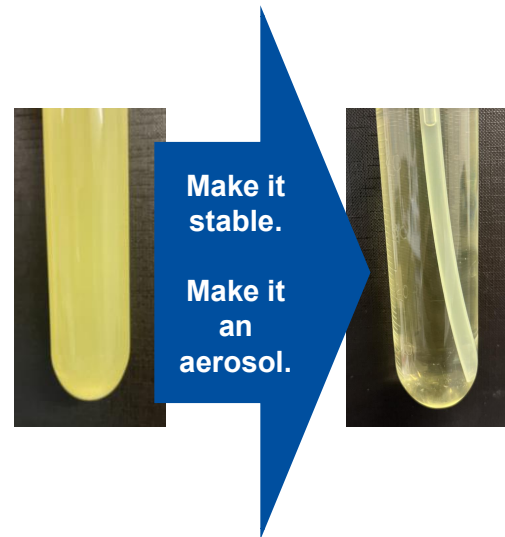
Summary

Aerosols as Solubility and Dry-Touch Booster

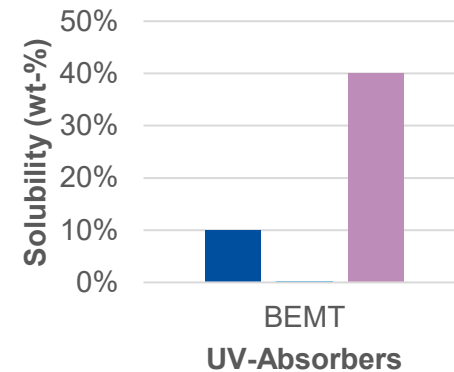
Market trends create challenges for formulating sun care



Stability is key



Aerosol propellant (DME) is an exceptional solvent



- Emollient: DIBUTYL ADIPATE a)
- Propellant: PROPAN-BUTAN
- Propellant: DIMETHYLETHER

Aerosol propellants opens new doors for formulating dry-touch products



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**Aerosol propellants opens
new doors for formulating
dry-touch, sun care products**



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Questions?
Visit us at our Booth C484-485.

