

MMB in Air Fresheners

October 2017





- Clear, Colorless liquid
- With low toxicity and good biodegradability
- Good solvency properties
- Mild odor
- Fully water soluble
- Amphiphilic



Registered and used worldwide !

• CAS Number :
56539-66-3

• INCI Name :
Methoxymethylbutanol

- ✓ EINECS (EU) : Listed (260-252-4)
- ✓ Swiss : Listed (G-117002)
- ✓ TSCA (US) : Listed
- ✓ DSL (Canada) : Listed
- ✓ AICS (Australia) : Listed
- ✓ NZIoC (New Zealand) : Listed
- ✓ ENCS (Japan) : Listed (2-3079)
- ✓ ECL (Korea) : Listed (KE-24367)
- ✓ CRC-SEPA (China) : Listed
- ✓ ASIA-PAC : Listed
- ✓ PICCS (Philippine) : Listed
- ✓ REACH Europe : Registered by Kuraray

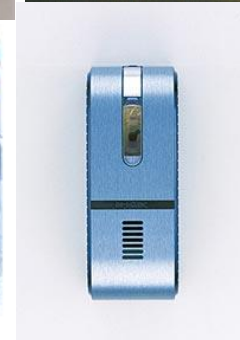
Main Chemical & Physical characteristics

- Flash point 71°C
- Boiling point 174°C
- Freezing point < -50°C
- Viscosity 7.35 cps
- Azeotrope MMB : Water = 15 : 85
- Solubility in water ∞
- HLB Value 7.8
- Surface tension 29.9 dynes/cm @20 °C
- Excellent oxidation stability

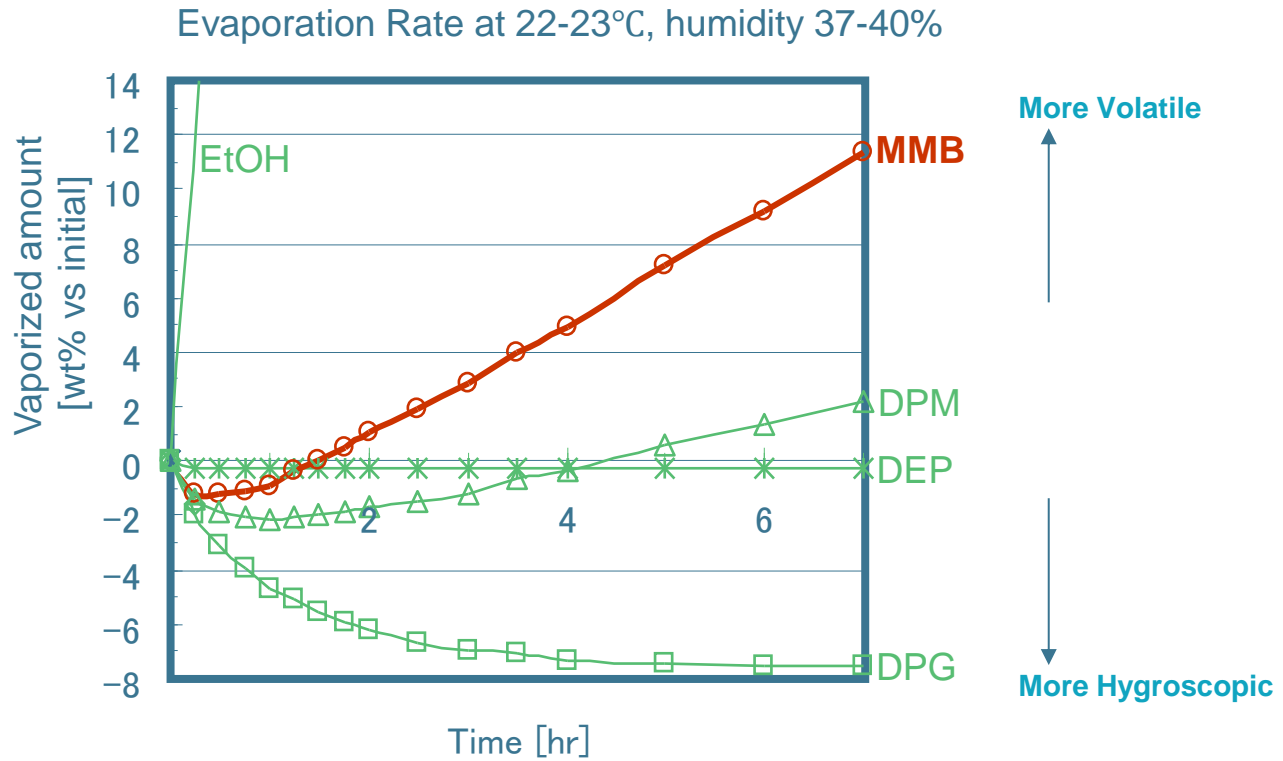
MMB in Air Fresheners

MMB & Air Fresheners

- Historically the first use of MMB
- First use in volume among other applications
- Used worldwide for this application



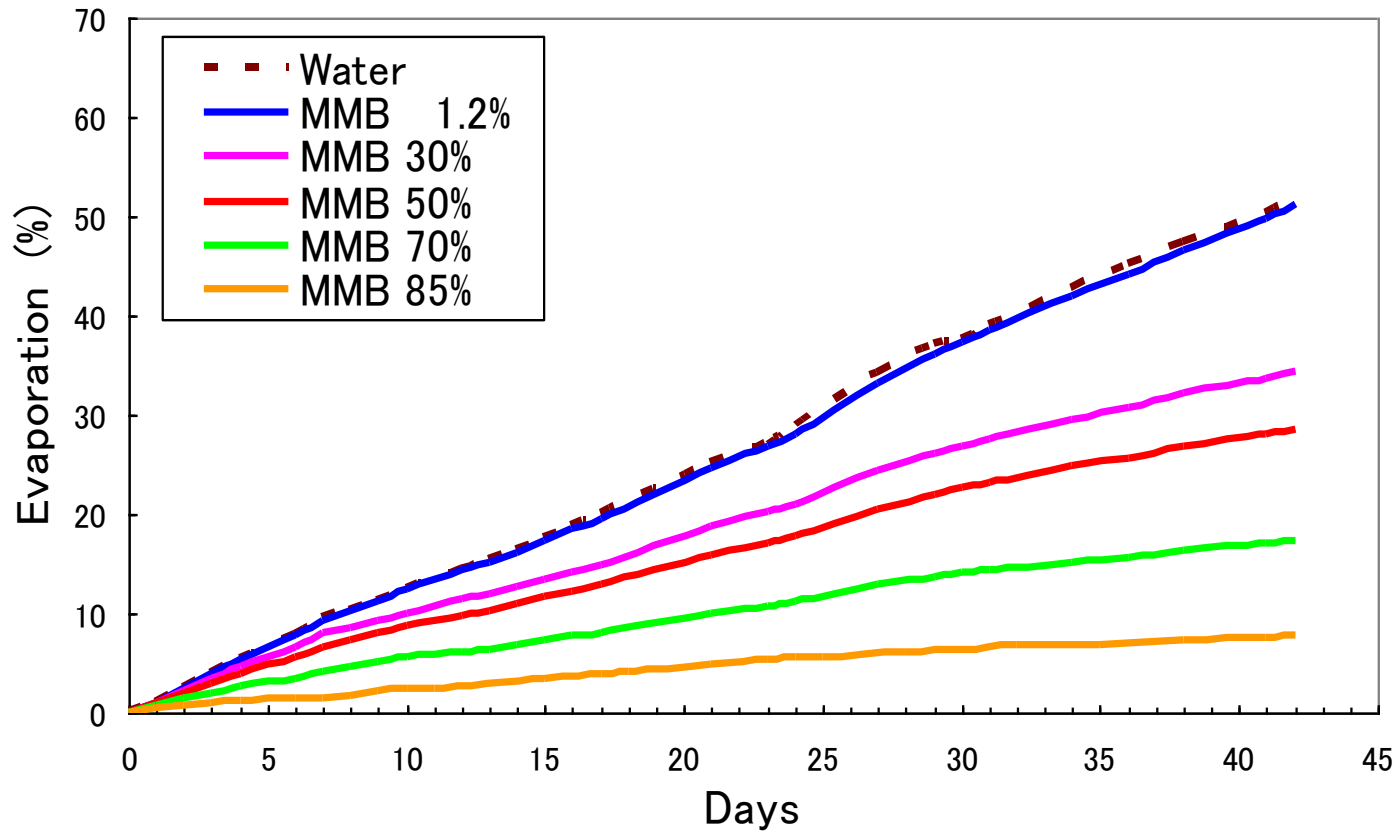
Unique Evaporation profile



→ Convenient evaporation profile

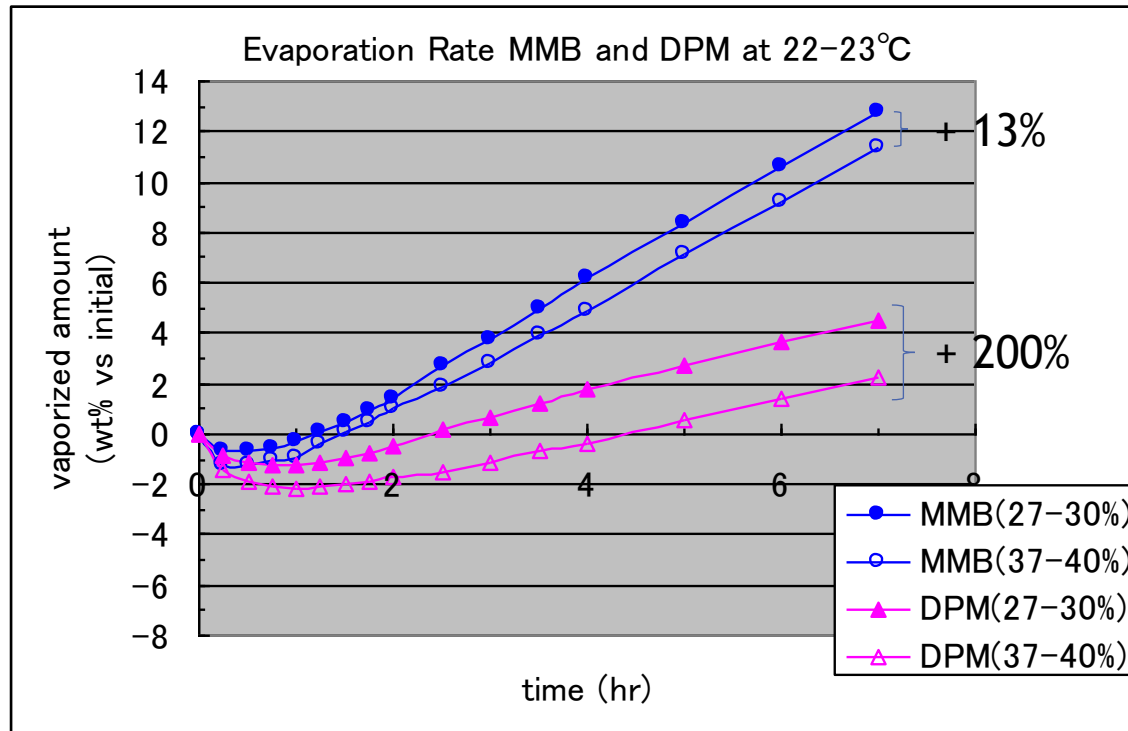
Evaporation rate of MMB water solution

MMB water solution at 25°C



→ Easy control of evaporation rate

Less sensitive to humidity

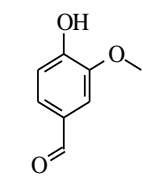


➔ Humidity has less impact on the evaporation profile of MMB

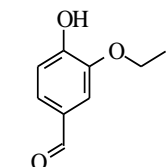
Solubility of aroma chemicals

	Vanillin	Ethyl vanillin	YARA YARA	Coumarin	Rosacetol	Musk ketone	Tonalid	Menthol	Linalool	d-Limonene
MMB	36	39	12	19	11	9	45	46	∞	∞
DPG	29	27	8	14	4	2	5	42	∞	32
PG	36	15	2	8	1	1	1	42	∞	2
IPD	41	20	2	8	2	1	5	43	∞	10
DPM	35	35	17	23	16	9	40	45	∞	∞
Isopar-M	<1	<1	2	<1	1	<1	50	∞	∞	∞
Isopar-M/MMB 50/50	4	4	9	3	7	5	50	∞	∞	∞

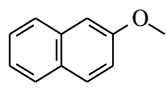
(wt%)



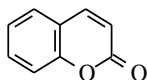
Vanillin



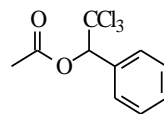
Ethyl Vanillin



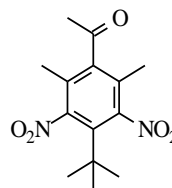
YARA YARA



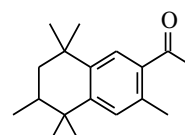
Coumarin



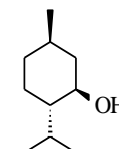
Rosacetol



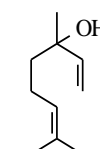
Musk ketone



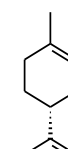
Tonalid



l-menthol



Linalool



d-Limonene

→ compatibility with wide range of aroma chemicals

A tool to increase the flash point

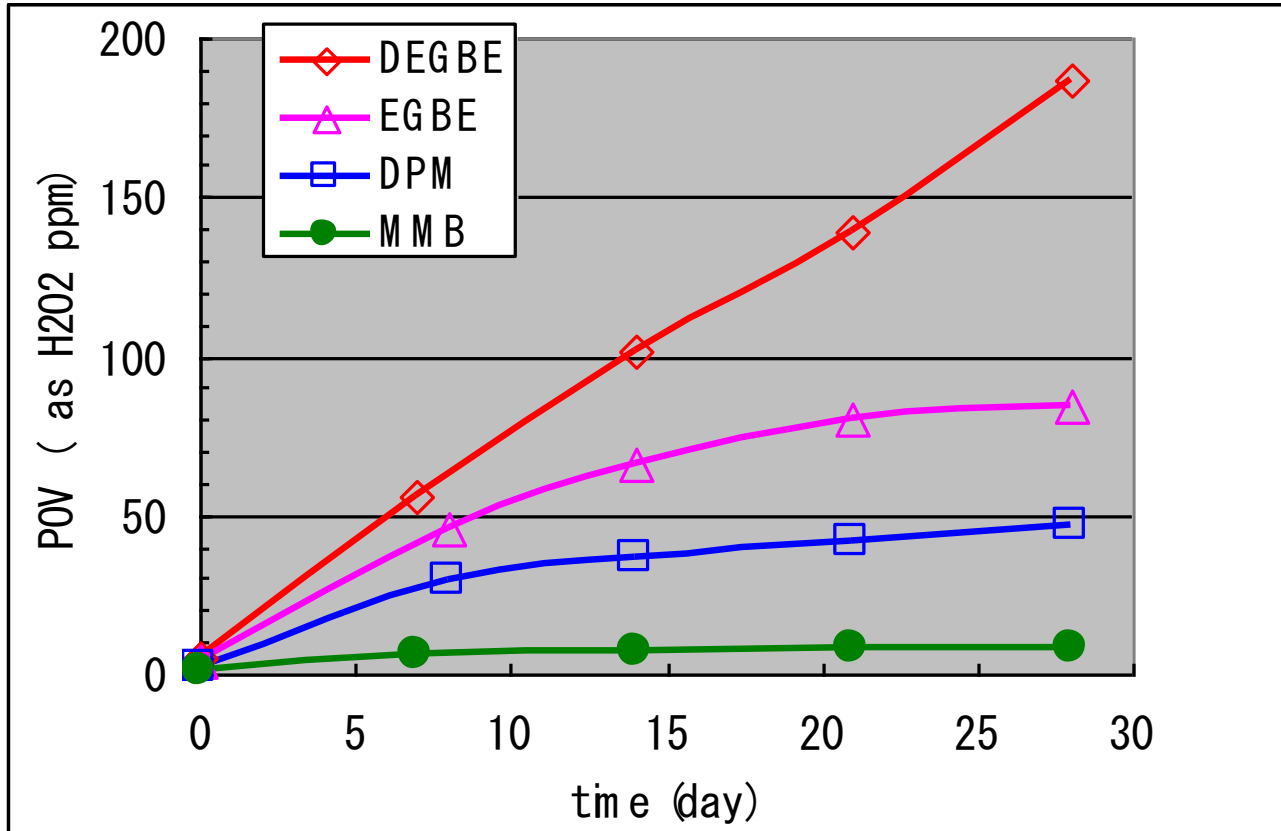
% MMB / %Water	Flash point (Tag Closed Cup)
100 / 0	71 ° C
99 / 1	72 ° C
97 / 3	75 ° C
95 / 5	80 ° C
90 / 10	Not Measurable

→ Mixed with 10% of water, Flash point is not measurable

Nice toxicological profile

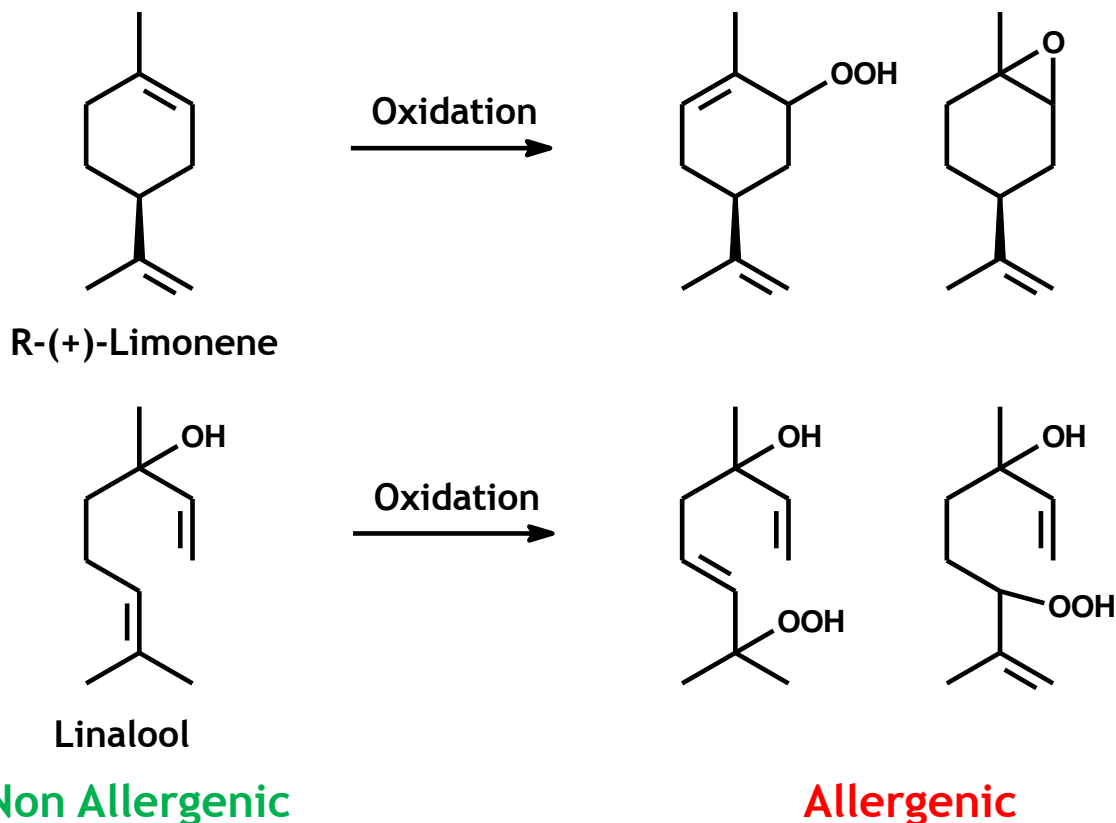
- Acute Oral Toxicity: LD₅₀ 4.30g/kg (rats)
LD₅₀ 5.83g/kg (mice)
- Dermal Irritation: 0.6 Slightly irritant (MMB
100%, Rabbits, 28days repeat)
0.0 (MMB 50% (v/v with DW),
Rabbits, 28days repeat)
- Skin sensitization: Negative
- Inhalation Toxicity: No significant change (rats /
500ppm / 28days)
- Mutagenicity: Negative (Ames test)
- Teratogenicity: Negative (Developmental NOEL 500mg/kg,
rat/day)

Excellent stability to auto-oxidation

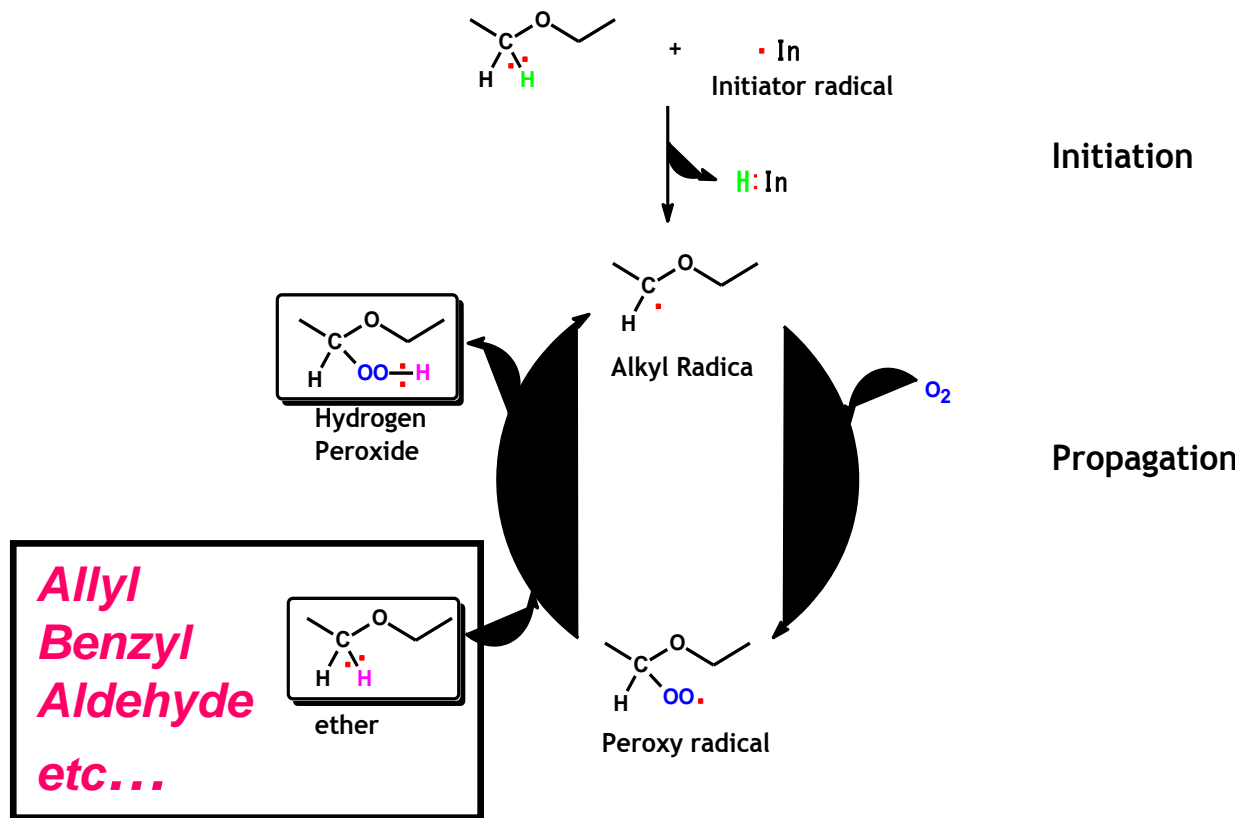


➔ Low peroxide value even after 30 days of exposure to air

Why oxidation stability is important ?



Oxidation : exponential phenomenon!



If the type of solvent used is easily oxidized then oxidation of the other ingredients will dramatically increase.

Other good reasons for using MMB ...



2% d-Limonene + 2% MMB 4% d-Limonene

- Stable Air Freshener at any temperature and prevents from freezing (freezing point < - 50°C)
- Great help for solubilizing fragrance components (HLB of 7.8) and help solving transparency (eg D-Limonene) or recrystallization (eg Vanillin) problems.
- To decrease the amount of surfactant in the formulations :
 - Avoid the clogging of the wick
- To obtain a non-flammable liquid Air Freshener.

Air Fresheners using MMB



- **Content of MMB : around 4%**
- **Main purposes :**
 - To control the evaporation speed
 - To solubilize the fragrance
 - To prevent from freezing

Liquid Type (wick)



- **Content of MMB : 5% to 25%.**
MMB & Water are used as the major solvents.
- **Main purposes for using MMB :**
 - To avoid having a product with flash point
 - To control evaporation speed
 - To obtain a good solubilization of the fragrance
 - To avoid the clogging of the wick
 - To reduce the amount of surfactant

Plug in & fan types



- **Content of MMB : 45% to 80%.**
MMB is used as the major solvent.

- **Main purposes :**

- To adjust evaporation profile
- To get a stable product at any temperature
- To keep the transparency of the product



- **Content of MMB : 10 to 30%**

- **Main purpose :**

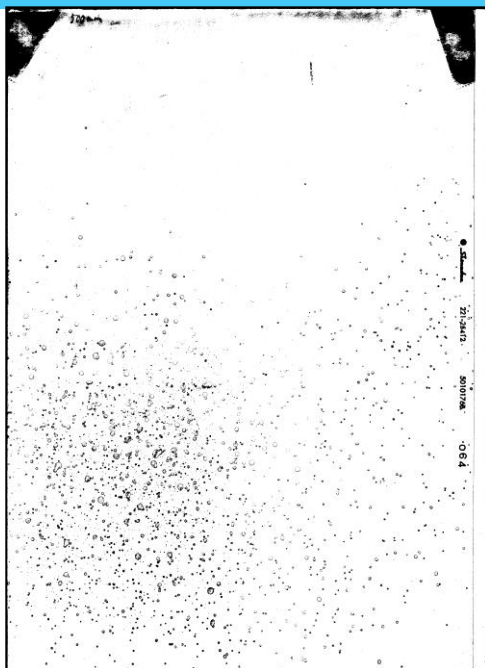
- **To decrease particle size**
- **To decrease the surfactant content**



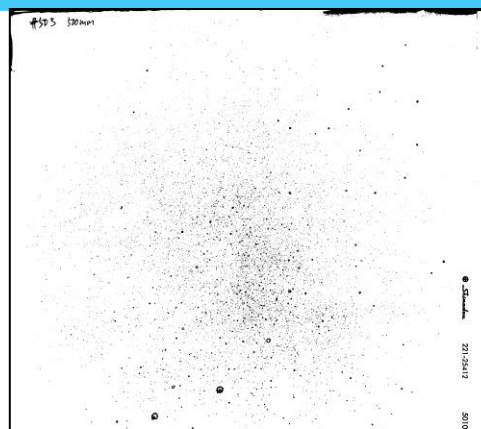
MMB : 10 %

Particle size in a pump spray

Sample A (no MMB)



Sample B (MMB)



- Finer particles
- No white spots (surfactants) on hard surface after spraying

	A	B
water (wt%)	40	4
MMB (wt%)	0	30
EtOH (wt%)	38	50
Surfactant(wt%)	5~8	0%
others (wt%)	3~5	16

Tested on thermal paper



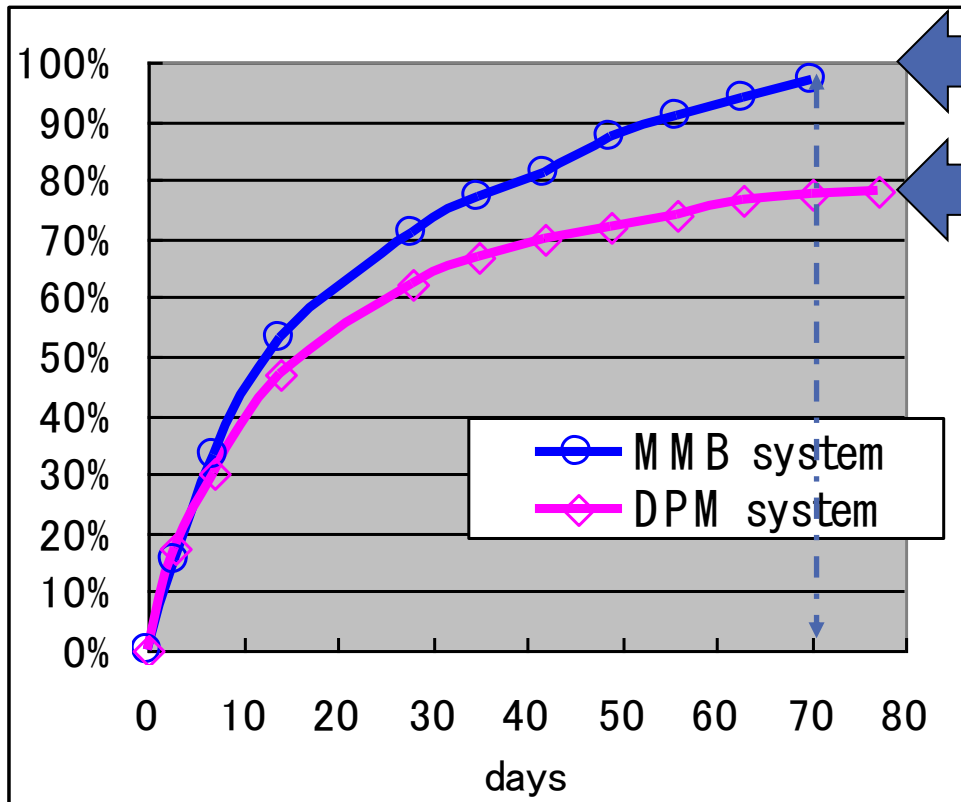
MMB : 70 %

- **Content of MMB : 70%**
- **Main purpose :**
 - **Better diffusion vs DPM (see next slide)**
 - **Not flammable**
 - **Adapted evaporation profile :**
Full diffusion in the correct timing

Evaporation profile of MMB & DPM

- MMB system : MMB(80%)、Fragrance(20%)
- DPM system : DPM(80%)、Fragrance(20%)

Conditions of the test : Liquid (25g) in a bottle(110ml) with 5 reeds (25cm in length)
At room temperature(17-25°C)



100% of evaporation

Evaporation stopped at 80% of the total !



A world map is visible in the background, rendered in a light blue color. The map is centered on the Atlantic Ocean, showing the continents of North America, South America, Europe, Africa, and Asia. The map is overlaid on a solid blue horizontal band that spans the width of the slide.

Thank you
for your attention.