

## BIOTHICKENER Type BP

### Thickener for Cosmetics

“BIOTHICKENER Type BP” adds strong thickening effect to a sulfate anionic surfactant with small amount. It is effective especially to betaine, and polyoxyethylene-lauryl ether sulfate triethanol amine, sulfosuccinate and amino acid which were difficult with previous thickening agent.

Type BP is approved as a food additive, which makes very safe chemical material to use.

### 1. General physical characteristics of BIOTHICKENER Type BP

Appearance	Liquid (room temperature)
Freezing Point(°C)	5~10
Specific Gravity	0.916 (30°C) 0.900 (50°C) 0.884 (70°C)
Viscosity (mPa·s)	19 (30°C) 11 (50°C)
HLB	4.5 (by calculation)
Solubility (25°C)	<p>&lt; Soluble &gt;</p> <ul style="list-style-type: none"> <li>• Ethanol, Acetone, n-Heptane</li> <li>• Fats, Liquid Paraffin, Alcohols, Esters of Fatty Acids, etc.</li> <li>• Propyleneglycol</li> </ul> <p>&lt; Not Soluble &gt;</p> <ul style="list-style-type: none"> <li>• Water</li> <li>• Glycerin</li> </ul>

### 2. Test sample

#### 【Thickener】

- BIOTHICKENER Type BP (**Propylene Glycol Laurate**)
- CME : Coconut Oil Fatty Acid Monoethanolamide (**Cocamide MEA**)
- Nonionic surfactant

#### 【Anionic surfactant, Ampholytic surfactant】

- Betaine : Lauryl Dimethylaminoacetic Acid Betaine (Sulfate free formula)
- AES-TEA : Triethanolamine Polyoxyethylene Laurylether Sulfate
- AES-Na : Sodium Polyoxyethylene Laurylether Sulfate
- AS-Na : Sodium Lauryl Sulfate
- AMT: coconut oil fatty acid sodium lauroylmethyltaurate ·
- LS-2Na: Disodium Laureth Sulfosuccinate

**3. Criteria**

- Thickening effect against aqueous cleaner
- Effect of pH change to viscosity
- Foaming ability
- Stability at low temperature
- Solubility

**4. Results**

**4-1. Thickening effect**

**4-1-1. Thickening effect to sulfate surfactant and betaine formulation**

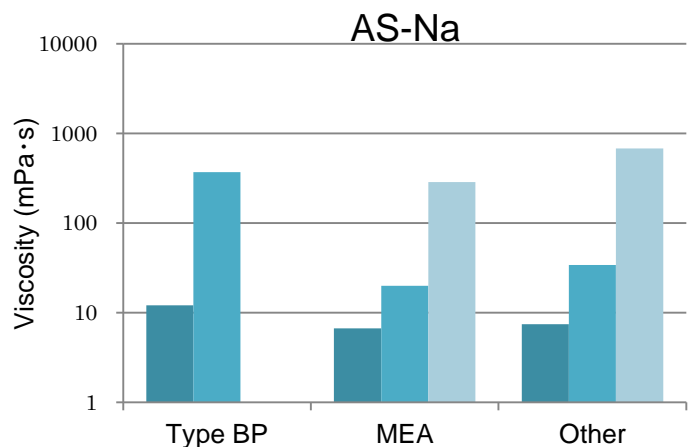
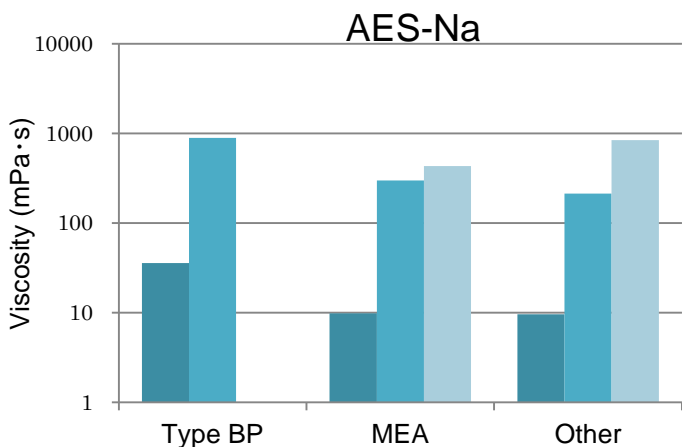
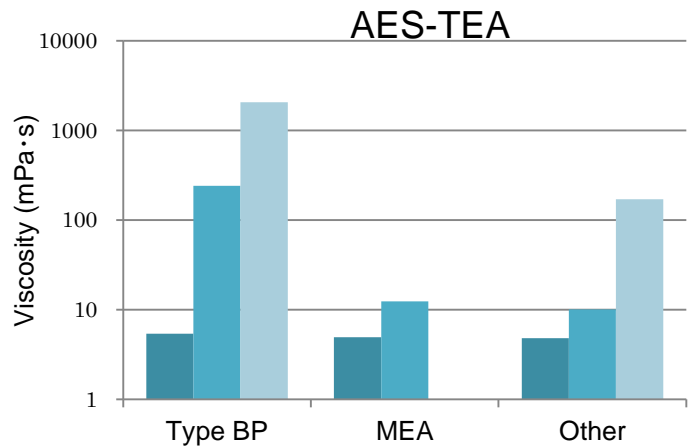
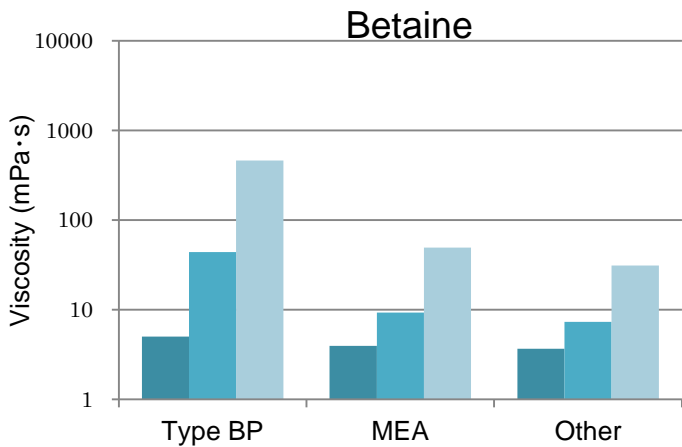
Small dosage of Type BP adds strong thickening effect to sulfate surfactant and betaine formulation.

**【Formula】**

Ingredients	%
Surfactant	20
Thickener	2-6
Water	Balance

**【Evaluation condition】**

- Measured within a day
- SV viscometer
- Temp: 25°C



**4-1-2. Thickening effect with taurine sodium mixture and sulfosuccinate formulation**

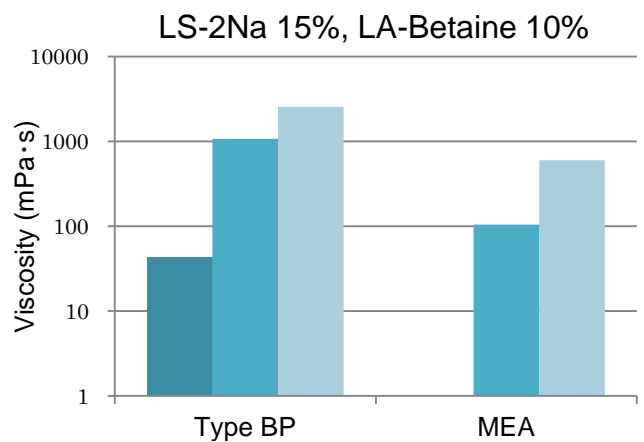
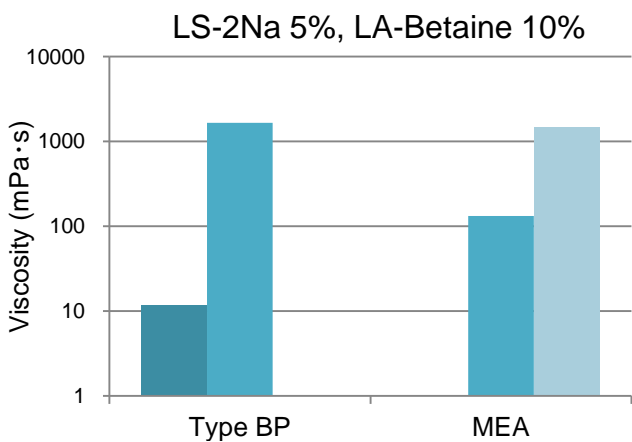
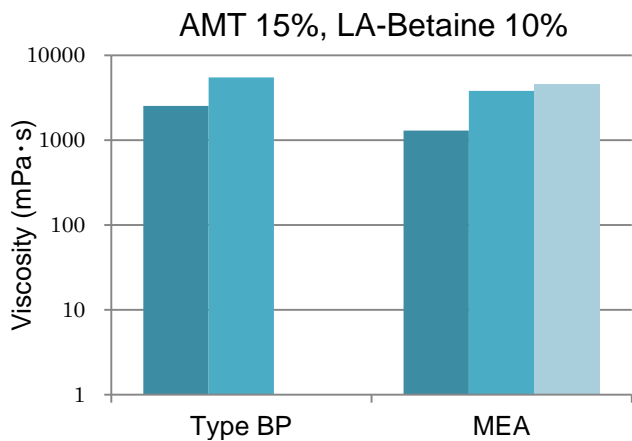
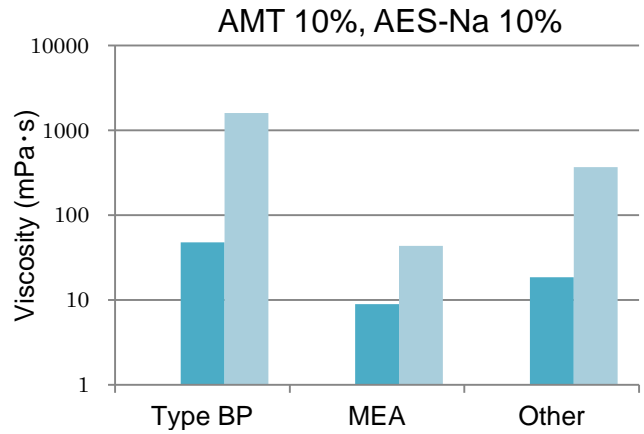
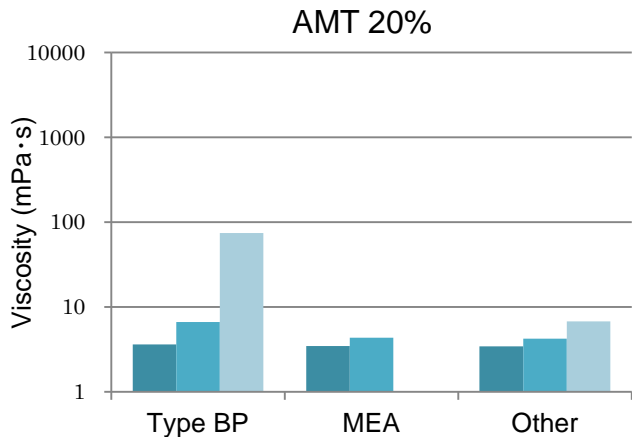
Type BP increase viscosity of taurine salt with polyoxyethylene lauryl ether or lauric acid amide propyl betaine mixture, and sulfosuccinate salt with lauric acid amide propyl betaine mixture.

**【Formula】**

Ingredients	%
Surfactant	15-25
Thickener	2-6
Water	Balance

**【Evaluation condition】**

- Measured within a day
- SV viscometer
- Temperature: 25°C



**4-2. Change of viscosity with pH**

Type BP shows stable thickening effect with polyoxyethylene laurylsulfate and betaine with several pHs.

**【Formula】**

Ingredients	%
Surfactant	20
Thickener	4
Water (pH4,9) or Buffer (pH4,9)	76

**【Evaluation condition】**

- Measured within a day
- SV viscometer
- Temperature 25°C

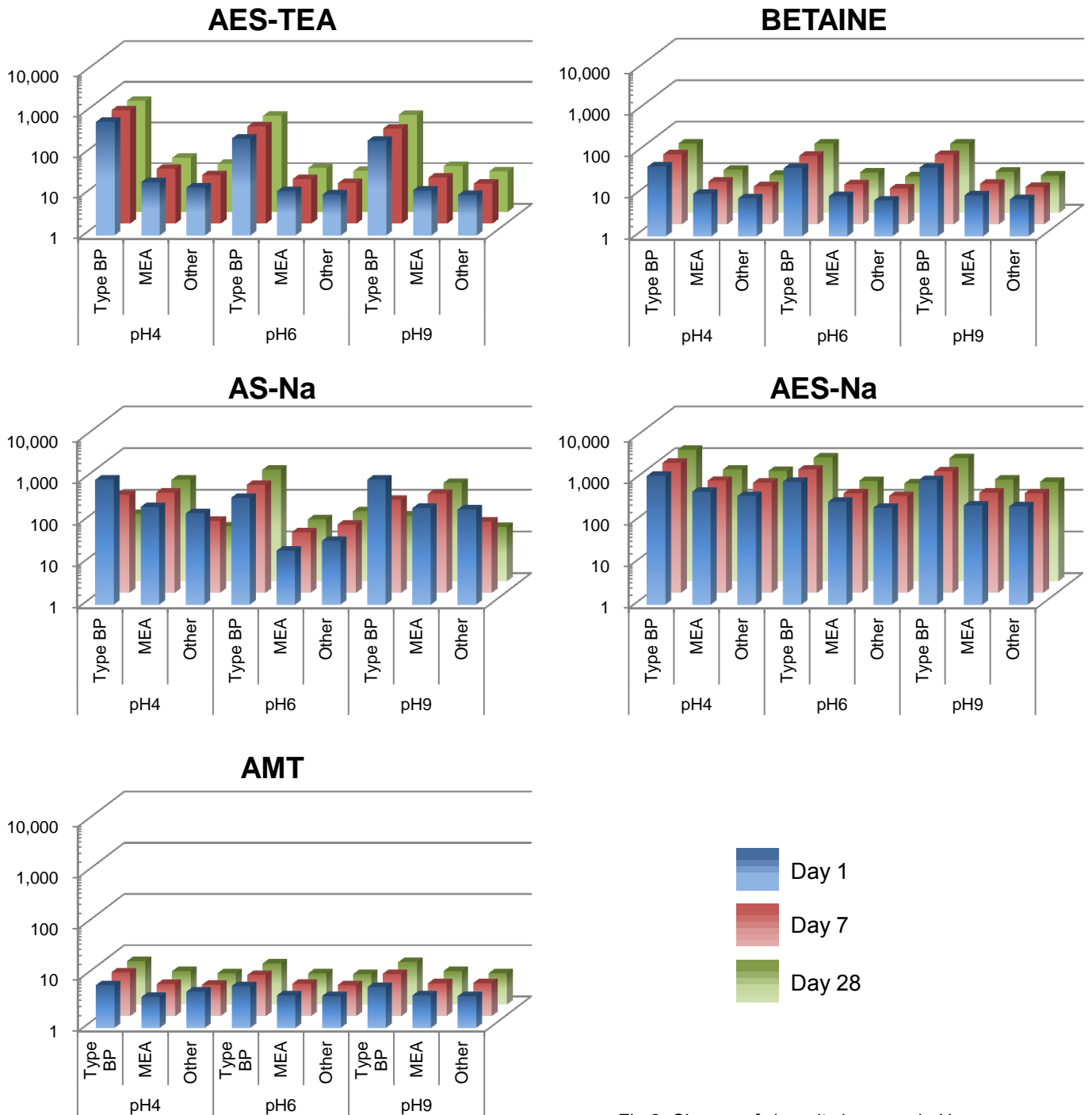


Fig.2. Change of viscosity in several pHs

4-3. Foaming effect

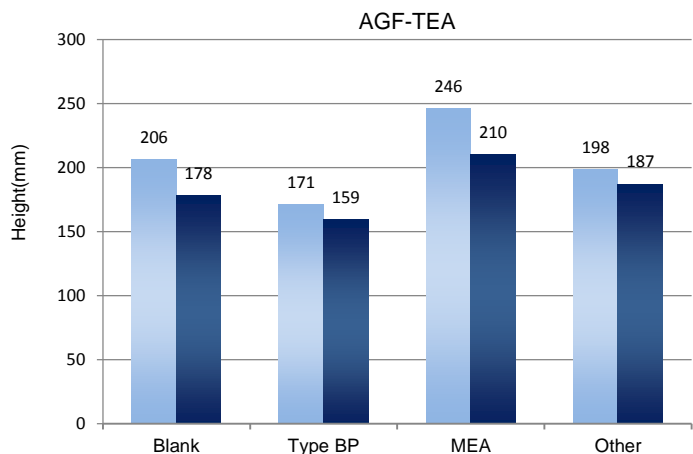
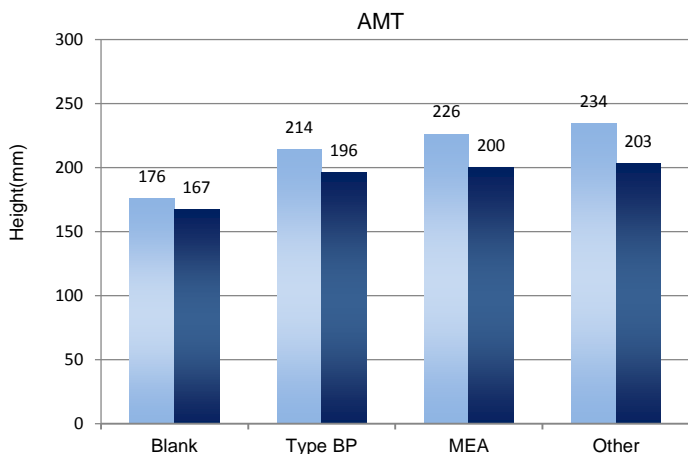
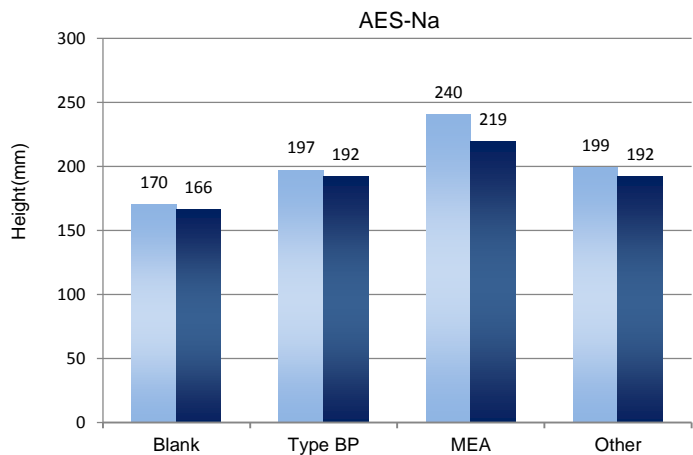
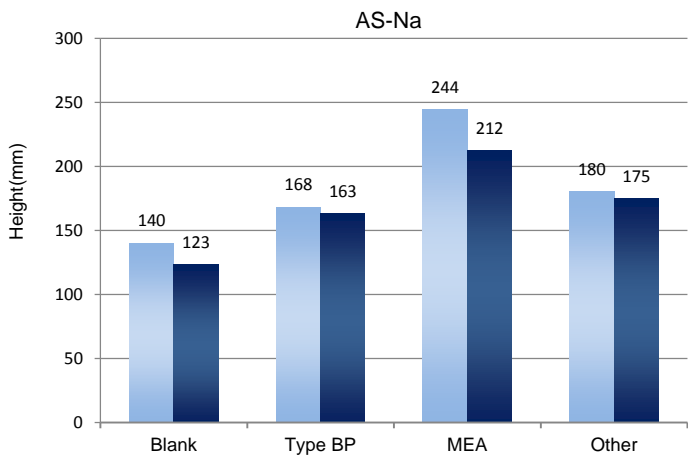
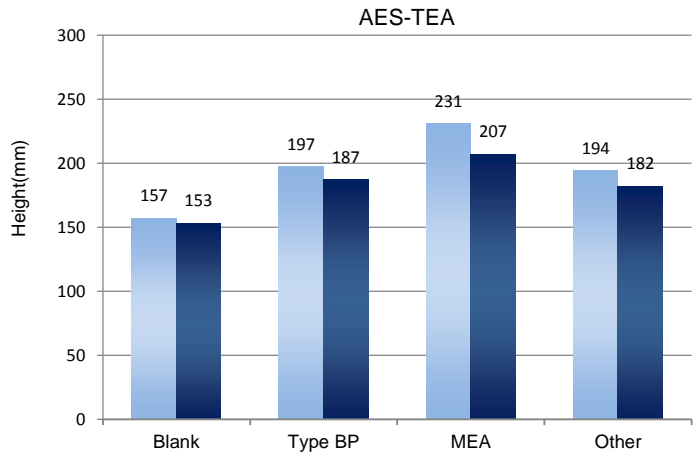
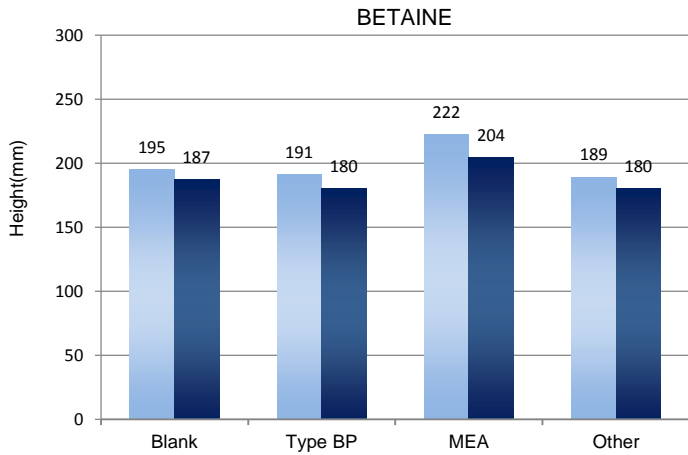
Type BP has excellent foaming ability with sulfate surfactant and taurine.

**【Formula】**

Ingredients	%
Surfactant	0.1
Thickener	0.02
Water (ph4,9) or Buffer (pH4,9)	99.88

**【Evaluation condition】**

- Ross-Miles method
- Temperature 40°C



**4-4. Stability at low temperature**

The stability of Type BP is not affected by low temperature.

**【Formula】**

	%
Anionic surfactant or Ampholytic surfactant	20
Thickener	4
Water	76

**【Evaluation condition】**

- Stored at 5°C
- Visual observation

**【Evaluation criteria】**



	Betaine			AES-TEA			AES-Na		
	1 day	7 days	4 weeks	1 day	7 days	4 weeks	1 day	7 days	4 weeks
Blank	○	○	○	○	○	○	○	○	○
Type BP	○	○	○	○	○	○	○	○	○
MEA	✕	✕	✕	✕	✕	✕	✕	✕	✕
Other	✕	✕	✕	○	○	○	○	○	○

	AS-Na			AMT		
	1 day	7 days	4 weeks	1 day	7 days	4 weeks
Blank	✕	✕	✕	✕	✕	✕
Type BP	✕	✕	✕	○	✕	✕
MEA	✕	✕	✕	✕	✕	✕
Other	✕	✕	✕	○	✕	✕

4-5. Solubility of the BIOTHICKENER Type BP

**Type BP adds oil solution to have solubility to ethanol.**

Type BP adds solubility to oils, fats, and liquid paraffin to an ethanol which could open possibility to a cosmetic industry (cosmetic toner and hair product)

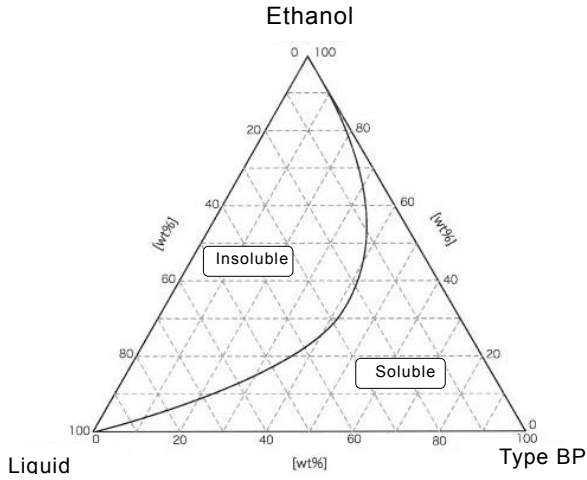


Fig.4: Mutual solubility of Liquid Paraffin / Type BP / Ethanol

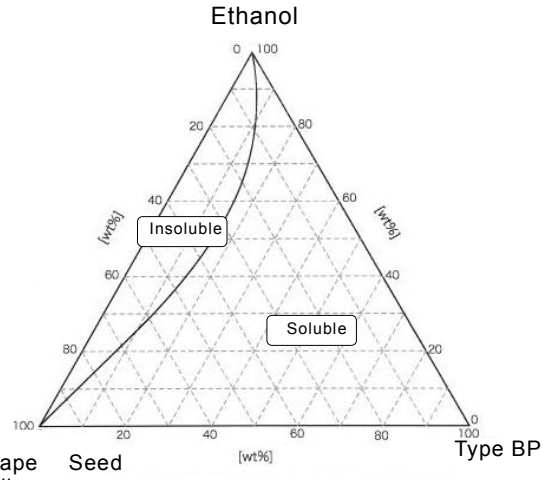


Fig.5: Mutual solubility of Rape Seed Oil / Type BP / Ethanol

**Water solubility of Type BP with ethanol**

Type BP used with ethanol adds moderate solubility to water, which opens a possibility to water based cosmetics.

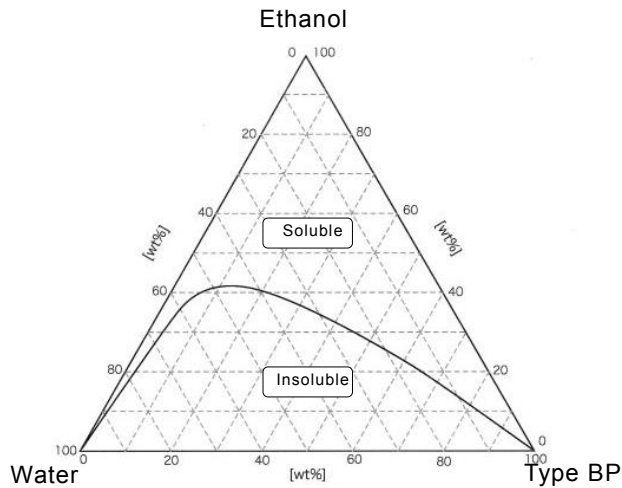
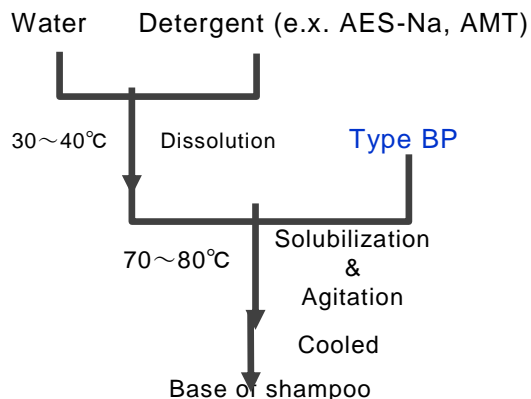


Fig.6. System of Water / Type BP / Ethanol

### 5. Method of making shampoo base



1. Add 10 -30% of detergent to water and dissolve in 30-40°C
2. Add 1-8 % of Type BP and increase its temperature to 70-80°C while agitated until solubilize and thicken.
3. Cooled at room temperature.

### 6. Mechanism of thickening effect between anion detergent and Type BP

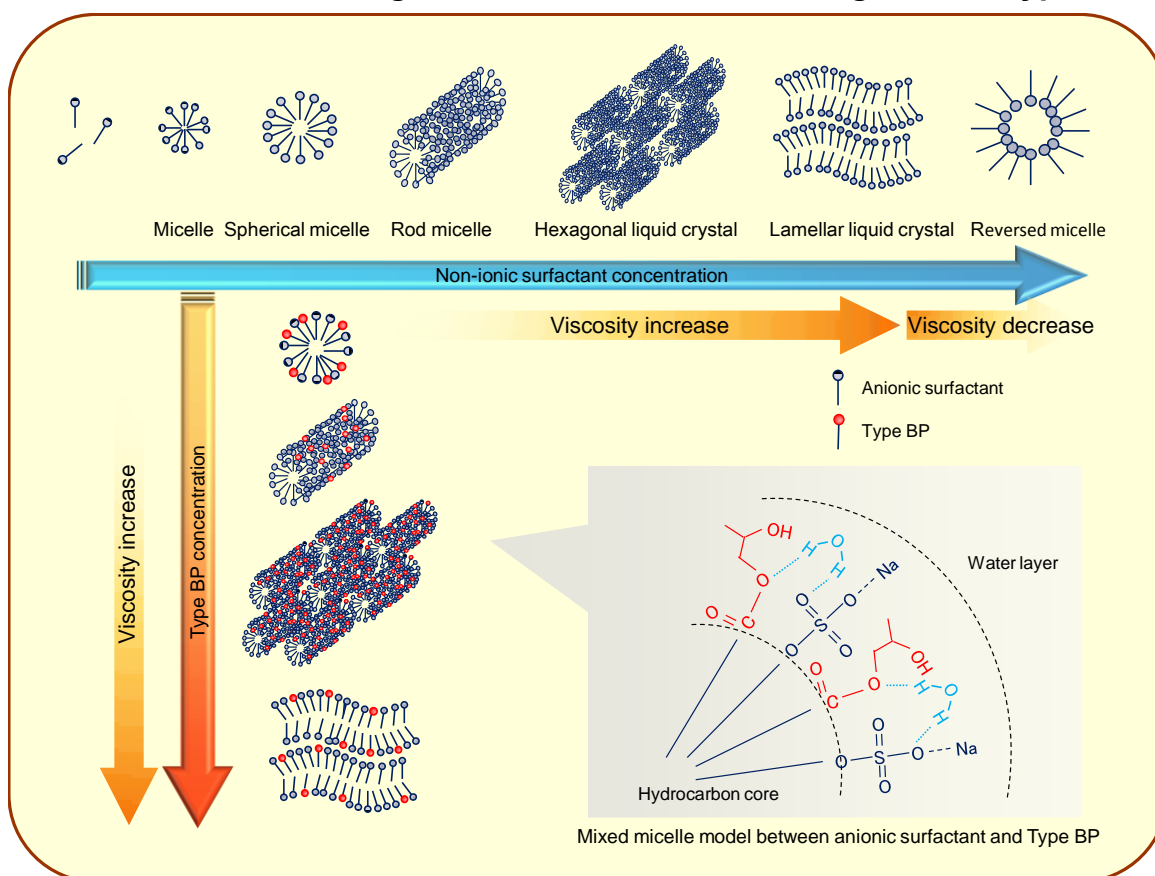


Fig6. Thickening model of Type BP and anionic surfactant

Mixing Type BP with anion surfactant will create mixed micelle by forming hydrogen bonds between anion group and carbonyl group or hydroxide, and which lower critical micelle concentration by initializing hydrophobization. Even with slight amount of Type BP will create a larger micelle than simple anion surfactant, which increase viscosity by forming a rod micelle or crystal structure.

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