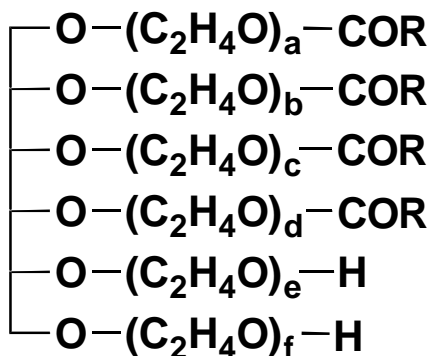


1 What is UNIOX[®] ST-60E ?

Chemical Structure



COR=Oleic acid residue

Addition number of moles of Ethylene oxide

$$=a+b+c+d+e+f \doteq 60$$

HLB=14.2

INCI Name Chinese INCI

Sorbeth-60 tetraoleate
 山梨醇聚醚-60 四油酸酯

Appearance

Slightly yellowish clear liquid. (Freezing point 12°C)

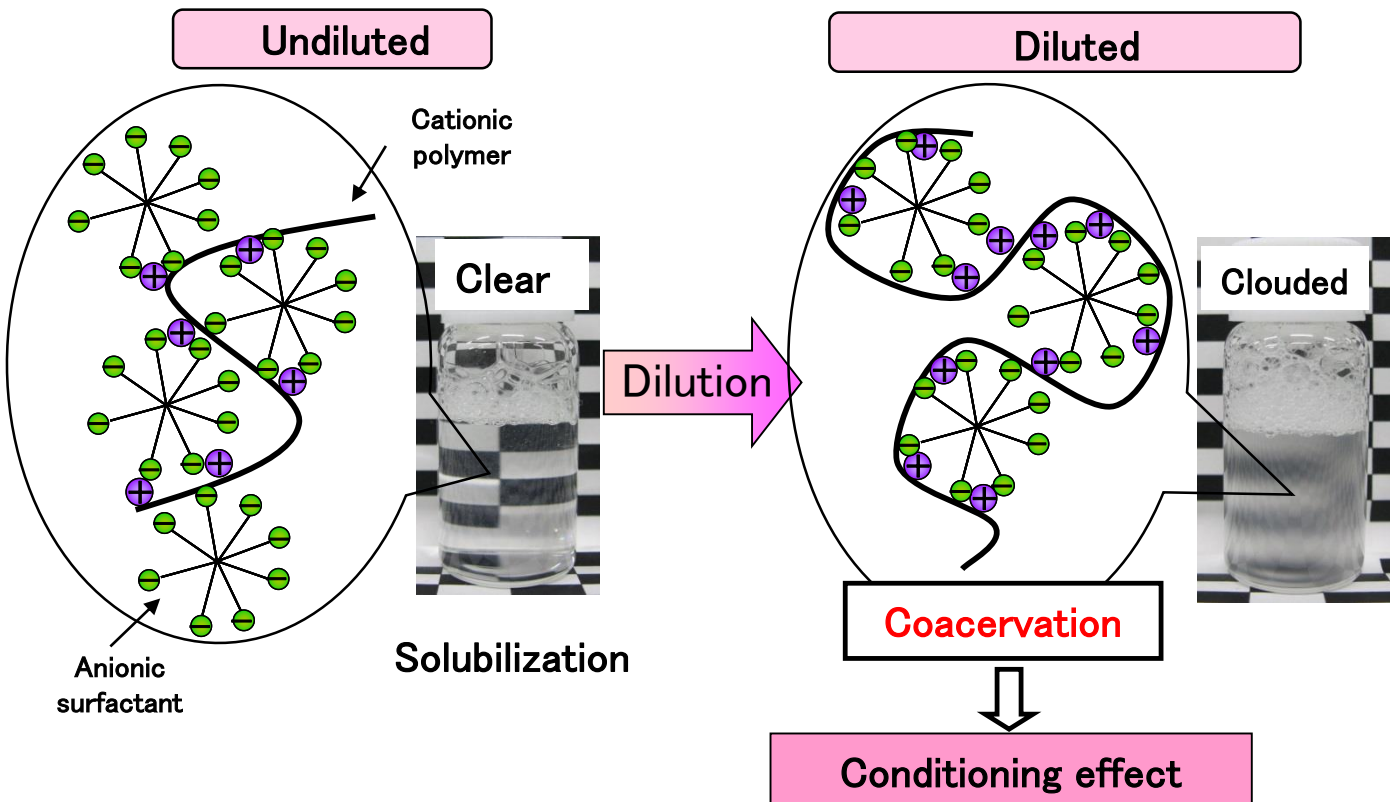
Concept

Coacervation Booster in Shampoo

2 Characteristics

- ① Improves smoothness of hair during washing off.
- ② Provides conditioning efficacy without silicone oils.
- ③ Provides amino acid surfactant shampoo with high viscosity, as well as AES shampoo.
- ④ Provides elastic foam, because of long PEG chain.
- ⑤ Low irritation and high safety.
- ⑥ Provides high stability in low temperature, because of solubilization efficacy.
- ⑦ Easy to handle, because of high water solubility.

3 Coacervation in shampoo

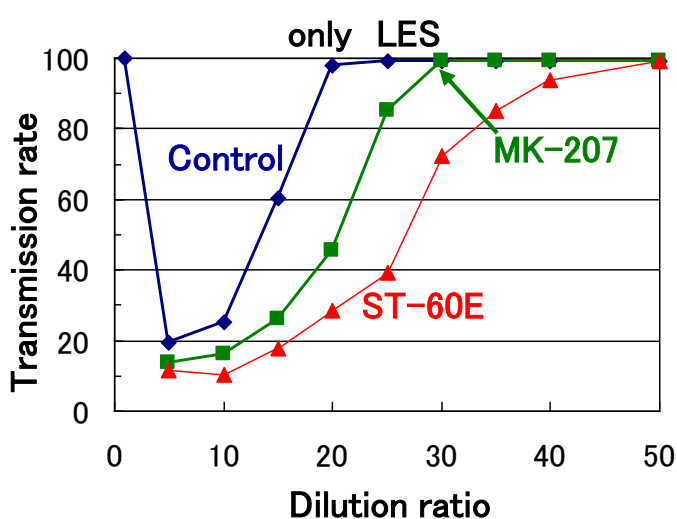


4 Coacervation foaming ability

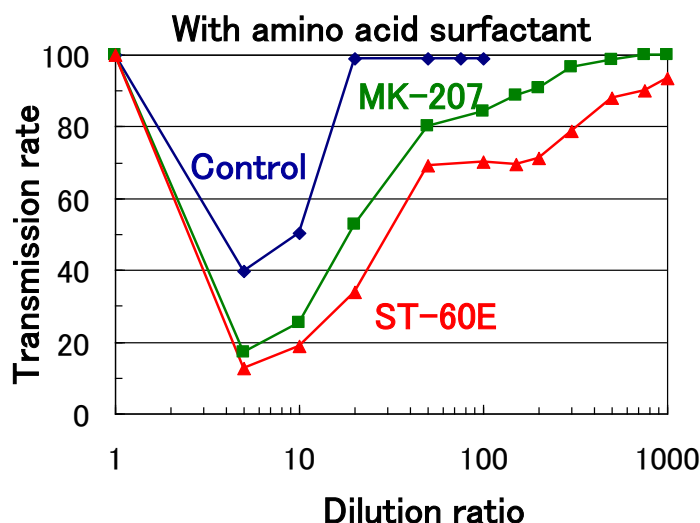
<Method>

① Mixed anionic surfactant, amphoteric surfactant, **nonionic surfactants 3wt%** and cationized cellulose 0.5wt%, pH6.0 adjusted by citric acid.

② Diluted ① by tap water (40°C), then measured transmission rate.



LES/CAPB=7/5wt%



LES/LMA /CAPB=5/5/5wt%

LES: Sodium laureth sulfate

CAPB: Cocamidopropylbetaine

LMA: Sodium lauroyl methylaminopropionate

MK-207: PEG-7 glyceryl cocoate

5 Smoothness during washing off

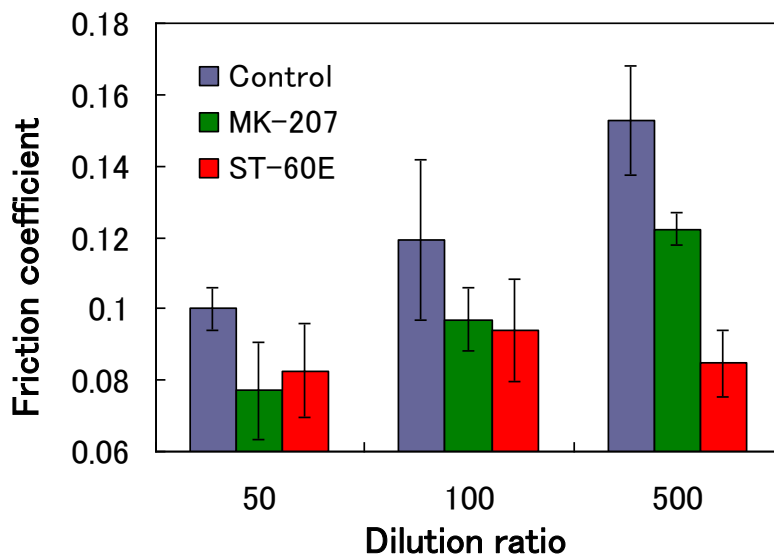
<Formulation>

LES/LMA/CAPB=5/5/5 wt% (active)

Nonionic surfactants 3wt%, cationized cellulose 0.5wt%, pH6.0 adjusted by citric acid.

<Result>

Measured friction coefficient of the hair soaked by diluted formulation.



Measured by Friction tester (KATO TECH CO.,LTD KES-SE)
25°C, 50%RH, Weight of SENSOR:50g ,SENSOR: Silicone Speed: 5mm/s

6 Viscosity

<Formulation>

Anionic surfactant/CAPB=10/5 wt% (active)

Nonionic surfactants, cocamide MEA, pH6.0 adjusted by citric acid.

only LES

Nonionic surfactant	dosage (wt%)	viscosity (mPa·s, 25°C)
Control	—	194
ST-60E	1.0	1104
	3.0	9594
MK-207	3.0	318
DL-4HN	1.0	679
	3.0	5192

※with cocamide MEA 1.0wt%

only LMA

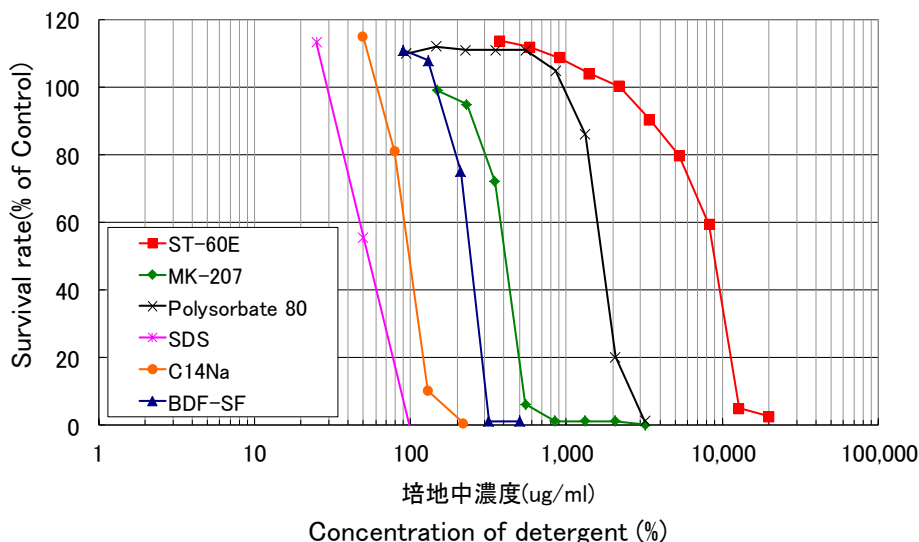
Nonionic surfactant	dosage (wt%)	viscosity (mPa·s, 25°C)
Control	—	81
ST-60E	1.0	1031
	3.0	4905
MK-207	3.0	74
DL-4HN	1.0	183
	3.0	638

※with cocamide MEA 1.5wt%

DL-4HN: PEG-8dilaurate

7 Safety

- ① Human patch testing **Negative**
(34 adults, 1%aq., Occlusive patch 24hours)
- ② Cytotoxicity test



Medium: DMEM + 10%FBS, Seeding density: 20,000cells/well, Exposure time:72hrs

8 Application

Clear shampoo

INCI	NOF products	Composition *1 (%)
Sodium lauroyl methylaminopropionate	SOFTILT® AS-L	5.0
Sodium laureth sulfate	PERSOFT™ EF	5.0
Cocamidopropyl betaine	NISSAN ANON® BDF-R	5.0
Polyquaternium-10	—	0.5
BG	—	2.0
Sorbeth-60 tetraoleate	UNIOX® ST-60E	3.0
Cocamide MEA	STAFOAM™ MF	1.2
Sodium benzoic acid	—	0.4
Citric acid	—	q.s.
Water	—	Balance

* 1 Active

<Procedure>

Dissolved Polyquaternium-10 in water, and added the other ingredients at 80°C.

Cool down to 40°C, then adjusted pH to 6.0 by citric acid.

<Viscosity> 2826 mPa·s (25°C)

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