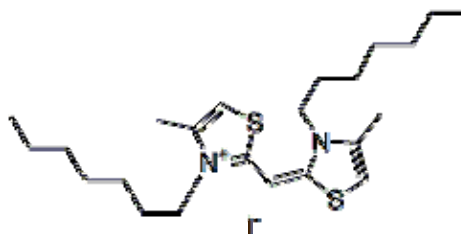


Quaternium-73

•Acne care •Anti-bacterial •Anti-dandruff •Deodorant •Anti-melanin

INCI Name	: Quaternium-73
Synonyms	: 3-Heptyl-2-[(3-heptyl-4-methyl-3H-thiazol-2-ylidene)methyl]-4-methylthiazolium iodide; Pionin; Bioxyne
中文品名	: 季铵盐-73
别名	: 皮傲宁; 感光素 201; 感光素 201 号; Kankohso 201; Pionin™; Photosensitizing Dye No.201
日文名称	: クオタニウム-73; ピオニン
韩文名称	: 퀴터늄-73, 감광소 201 호
CAS No.	: 15763-48-1
EINESC No.	: 239-852-5
Molecular Formula	: C ₂₃ H ₃₉ IN ₂ S ₂

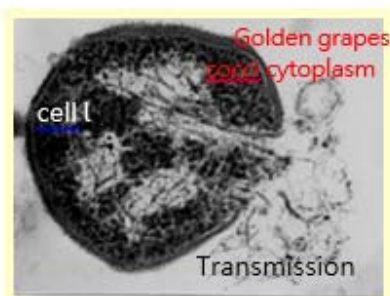
Structure:



Quaternium-73 structure

1. Antibacterial activity

Quaternium-73 shows extremely strong antibacterial activity at very low concentration. It damage the microorganisms by causing collapse of cell membrane and cell wall and intracellular degradation.



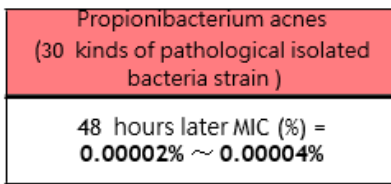
Transmission
electron
microscope

Quaternium-73 is similar to cyanine dyes. Even a single Quaternium-73 molecule also has anti-bacterial activity, which is the reason why Quaternium-73 is still efficient even with an extremely low dose.

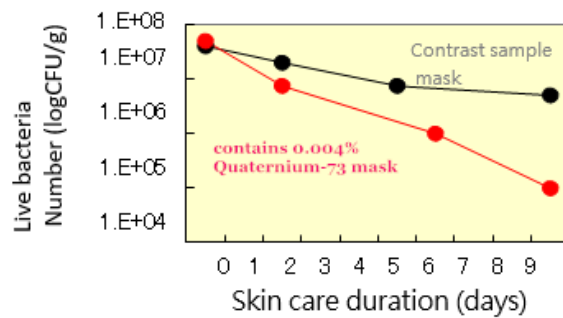
1.1 Fast and deep effect on anti-acne

Quaternium-73 has an excellent effect on Propionibacterium acnes. It is commonly used in Japanese over-the-counter (OTC) as an anti-acne ingredient. Clinical research shows that it has a MIC = 0.00002% for acne bacilli, and the rash can be reduced by 50% after two weeks of use.

- **In Vitro Test : Strongly inhibit propionibacterium acnes**



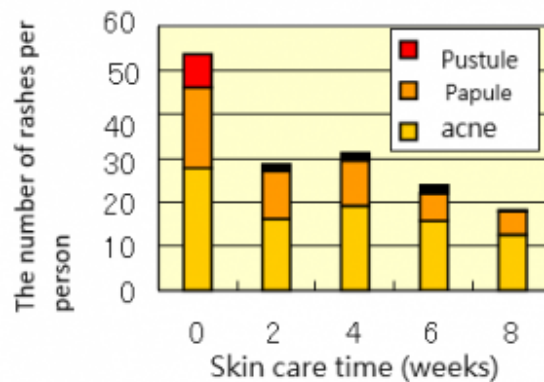
- **In Vivo Tests: Effectively reduce propionibacterium acnes**
Number of propionibacterium acnes on the skin during skin care process



Clinical Test: Within two weeks, it reduced 50% spots

Testing program: Carry out test in 38 testees with acne problems

Method: Wash face 3 times every day with emulsion containing 0.001% of Quaternium-73 and smears twice a week with cream containing 0.005% of Quaternium-73.





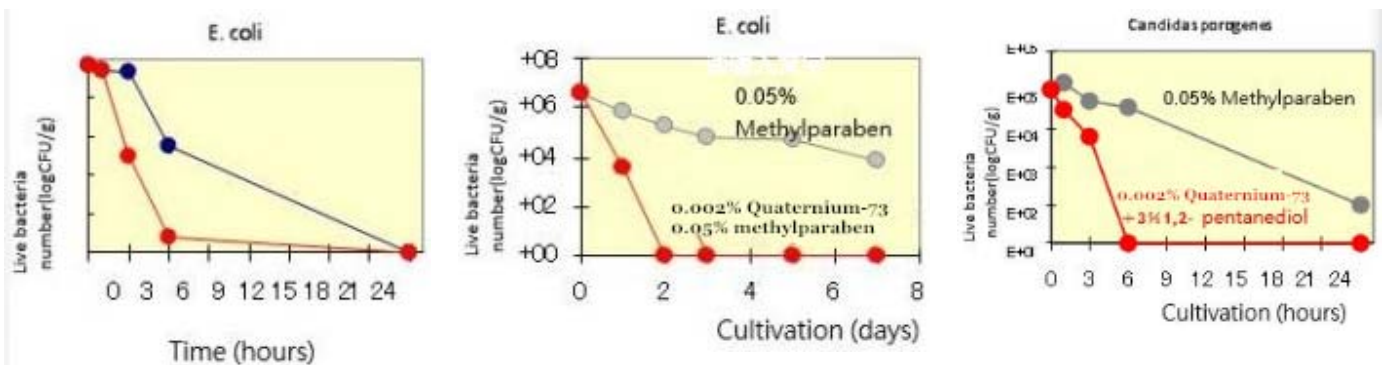
Anti-acne, whitening, anti-freckle

1.2 Bactericidal activity

The Quaternium-73's bactericidal ability allows it to be used as a preservative. In vitro test data shows that in term of anti-bacteria and anti-fungi of various kinds, Quaternium-73 is more effective than paraben methyl ester. Therefore, just adding a small amount of paraben in the formulation containing Quaternium-73 is enough to achieve an antibacterial effect.

Bacteria Category	MIC (%) Methylparaben	MIC (%) Quaternium-73
Escherichia coli	0.125-0.4	0.005
Pseudomonas	0.1-0.4	>0.01
Staphylococcus	0.16-0.4	0.005
Candida	0.1	0.001
Aspergillus	0.08-0.27	0.005

- Quaternium-73 can be used alone (see the picture below, the number of E.coli contained in 0.002% quaternium-73)
- Quaternium-73 can compensate for the methylparaben (Adding 0.002% quaternium-73 can lead to an increase of anti-E.Coli activity of 0.005% methylparaben)
- When mixed with polyols, Quaternium-73 can completely replaced parabens as a preservative



1.3 Inhibits bacteria and fungi with an extremely low dose of use (In vitro test)

In vitro test (see table below, agar plate dilution) proves that the extremely low dose of use of Quaternium-73 can also inhibit a wide range of bacteria and fungi. The lowest concentration of Quaternium-73 used to inhibit bacterial growth is called the Minimum Inhibitory Concentration (MIC).

<u>Bacterial names</u>	<u>MIC %</u>	<u>Fungi names</u>	<u>MIC %</u>
Liquid achromobacter sp	0.001	Absidia orchidis	0.0001
Enterobacteriaceae	0.01	Tinea capitis fungus	0.001
Botulinum toxin	0.005	Black aspergillus	0.005
Escherichia coli	0.01	Aspergillus flavus	0.0005
Brown flavobacterium	0.001	Candida albicans	0.001
Proteus bacillus vulgaris	0.001	Epidermophyton floccosum	0.0001
Pseudomonas aeruginosa	0.1	Gypsum-like microsporum	0.0001
Salmonella enteritidis	0.005	Soft rot rhizopus nigricans	0.001
Staphylococcus aureus	0.0005	Saccharomyces sake	0.001
Staphylococcus citrate	0.001	Zygosaccharomyces	0.0005

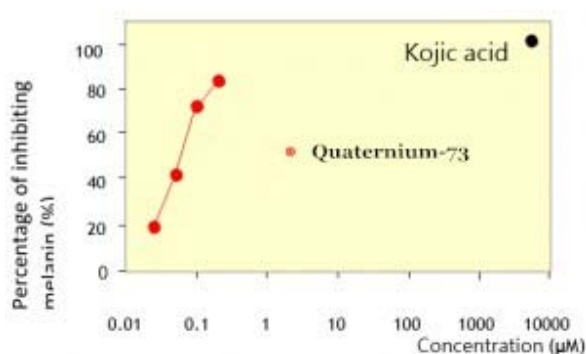
2. Strong inhibition of melanin

In vitro test indicates that:

0.000003% Quaternium-73 can suppress 50% melanin formation

0.00001% Quaternium-73 can suppress 83% melanin formation.

In contrast, 0.07% kojic acid can inhibit 100% melanin formation.



3. Highly safe and non-irritant

- ◇ Human body patch test (human body, 0.2%, 48 hours): negative
- ◇ Initial skin irritation (rabbit, 0.2%, 24 hours): negative
- ◇ Sustained skin irritation (rabbit, 0.01%, 90 day):negative
- ◇ Eye irritation (rabbit, 0.0007%, 24 hour): negative
- ◇ Skin sensitization (Guinea pig, 0.2%, maximum test): negative
- ◇ Phototoxicity (rabbit, 0.2%): negative
- ◇ Photosensitization (Guinea Pig, 0.2%, Adjuvant-Strip Method): negative
- ◇ Induced gene mutation (10µg, Ames test, ±S9 mix): negative
- ◇ Acute Toxicity LD 50 (mouse): 325 mg/kg; LD50 oral rat: 460mg/kg

4. Formulation Guidelines

Recommended dosage	0.001-0.005%
Stable pH	5.5-8.0
Good thermal stability	Up to 90°C
Solubility	Soluble in butylene glycol, propylene glycol, ethanol, 1,2– pentanediol. Slightly soluble in water (0.6068mg/L @ 25°C (est)).
Operation guide	It is recommended to pre-dissolve quaternium-73 in butylene glycol, propylene glycol, or 1,2– pentanediol before adding. The dissolution can be accelerated by the aid of boiling water bath.
Photostability	Unstable; cosmetic products containing quaternium-73 need to be canned in opaque containers.

5. Applications

Quaternium-73 can be used in Cleaning products (facial cleanser, shampoo); Acne products, Oily skin care products; Whitening products; Synergist as preservative

6. Regulatory status

Compliant with Japanese Quasi Drugs to be used in anti-acne products; China Compliant

7. Specifications

Appearance	:	Light to yellow crystalline powder
Purity (HPLC)	:	≥99.0%
Melting range	:	224-228°C
Loss on drying	:	≤0.5%
Heavy metals(Pb)	:	≤10ppm
Bacteria	:	<500cfu/g
Mold and yeast	:	<100cfu/g
Escherichia coli	:	Negative

8. Handling and Storage

Stored in a cool, dry, dark place.

Special care is taken to prevent the powder from diffusing into the air. Wear a mask to avoid inhaling powder. After use please wash your body, hands, mouth and face thoroughly.