

Liquid K7 Totarol

A natural low hazard rated 25% Totarol™ water dispersible multi-functional concentrate for use as a cosmetic ingredient

Key Features

- All ingredients are organic or natural in certification
- Water dispersible
- Low hazard rated ingredients
- Broad spectrum preservation system -multi-functional
- Stable activity levels
- Effective over a pH range of 5 to 7
- Broad compatibility with cosmetic ingredients
- No animal testing
- Non-sensitizing and non-irritating
- Improves skin moisture content

Certification

- Provisional patent application and INCI name pending for 'Liquid K7 Totarol'
- Totarol™ is certified organic by BioGro
- Other ingredients are certified organic or natural by AsureQuality or Ecocert

Properties of Active Ingredients

- Anti-microbial activity (including MRSA)
- Strong anti-oxidant and ROS anti-oxidant activity

Specifications

- Colour: Dark brown (colour does not affect formulation)
- Form: Liquid emulsion
- Odour: Slight woody smell, which disperses in formulation

Antimicrobial Efficacy Testing

An independent and accredited laboratory has conducted repeated efficacy testing on the K7 concentrate, adopting the guidelines set out in Appendix XVI C of the British Pharmacopoeia 2012 regarding Efficacy of Antimicrobial Preservation. The concentrate has been compliant in each instance. The test organisms were *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Candida albicans* and *Aspergillus brasiliensis*

Stability Testing

No formal stability testing has been undertaken but informal trials suggest that Liquid K7 Totarol should provide a long shelf life to all cosmetic products in which it is applied.

Stability and efficacy testing is required on final formulations to determine shelf life.

K7 DISPERSION USAGE

- For use as a cosmetic ingredient only
- K7 is a dispersible Totarol concentrate (25% Totarol)
- It has been specifically developed for ease of use while providing optimum utilization and bioavailability. For use in emulsion, gels and surfactant systems
- The dispersible concentrate is versatile and can be added into hot or cold phases – preferably into the aqueous phase. Recommended concentration of K7 in final formulation is between 0.8%-1%
- Add at the final stage into emulsion or gel systems by rapid mixing below 30°C
- Can be added during the heating phase (75°C) into the water or oil phase
- Ideally, an aqueous dispersion should be used within 1 hour of preparation
- Add required amount to water under rapid mixing or ideally under shear with a homogenizer and use.

Recommended Concentration

- The most effective concentration range for broad spectrum preserving activity has been found to be 0.8% - 1% of final formulation for (equating to Totarol concentration in final formulation of 0.2%-0.25% respectively).

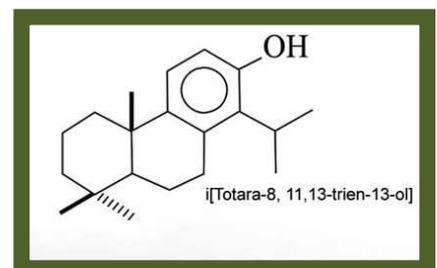
Key Ingredient

Totarol™ the world's new Bioactive – BioGro Certified Organic

Background to Totarol™

Totarol™ is an aromatic diterpenoid with chemical formula C₂₀H₃₀O. Totarol™ is a natural extract from heartwood of the Totara tree (Podocarpus totara). Totara is a podocarpus tree, unique to New Zealand. It has an ancient lineage up to 100 million years ago. Totara develops a massive trunk and can live to a great age. Totara can be found throughout New Zealand; historically it was particularly abundant in the forests of the central North Island. Maori revered Totara as a symbol of strength and used the wood for canoe-making due to its length, lightness and

Totara-8,11,13-trien-13-ol; C₂₀H₃₀O



durability. The timber of *Podocarpus totara* is renowned for its resilience against rotting, which made it valuable to early European settlers of New Zealand for uses such as wharf piles, fence posts and foundation blocks. The durability stems from the anti-bacterial activity of Totarol™. Totarol™ can be extracted from the dead wood, negating the need to cut down live trees.

The Patented extraction process is based on 'supercritical extraction'. This is a process that uses high pressure carbon dioxide under defined conditions of temperature, pressure and gas flow to extract Totarol™ from powdered Totara deadwood (in the form of old fence posts, telegraph poles, house piles, and so on). The process ensures that the extract and residual wood has no harmful solvent residues, and that the highest possible quality of extract is obtained.

Table 1: Minimum Inhibitory Concentration (MIC) of Totarol-containing extract against Gram-positive bacteria

Bacterial strain	Antibiotic resistance	MIC (µg/mL)
<i>Staphylococcus aureus</i> Acc2243	Not resistant	8
<i>Enterococcus faecalis</i> Acc2244	Not resistant	8
<i>Staphylococcus aureus</i> MRS02/2215	Epidemic MRSA	4
<i>Staphylococcus aureus</i> MRS02/2214	Multiresistant MRSA	4
<i>Staphylococcus aureus</i> MRS/02/2249	Community MRSA	8
<i>Enterococcus faecalis</i> Acc2244	High-level gentamicin	8
<i>Enterococcus faecalis</i> Acc2244	Vancomycin	4
<i>Streptococcus pyogenes</i> ARL02/752	Erythromycin	4

The results shown in Table 1 demonstrate that the Totarol™ extract has very high antibacterial activity against a wide range of antibiotic-resistant Gram-positive bacterial strains.

Testing of extract against selected gram negative bacteria was carried out by Agricultural Research New Zealand (AgResearch)

Totarol™'s mechanism of antibacterial activity is not known, however some authors have suggested that it compromises the functional integrity of cell membranes. Haraguchi *et al.* studied Totarol™'s actions on *Pseudomonas* and discovered that it inhibited oxygen consumption and respiratory-driven proton translocation in whole cells, and oxidation of NADH in membrane preparation (by inhibiting a number of NADH-related enzymes). Evans *et al.* alternatively suggested that it disrupts bacterial energy metabolism, although they admitted that this action occurs at much higher concentrations than are significant for antibacterial activity. Although the exact mechanism of action is not known, all proposed mechanisms are dissimilar to those of macrolides and tetracyclines.

Totarol™ is a potent anti-oxidant and strongly inhibits lipid peroxidation and scavenges ROS (reactive oxygen species). Totarol™ has a good antioxidant preservative activity in lipid or emulsion based systems.