



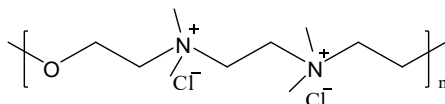
Purified Aqueous Solutions of Polyquaternium-42 (PAPQ-42)

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Polymers containing quaternary ammonium moieties either in the polymer main chain or at a pendent site are referred to as polyquaterniums. So far, polyquaterniums are used as polycationic polymers principally for cosmetic ingredients such as conditioners, shampoo, hair mousse, hair spray, hair dye, etc. Therefore, tens of commercialized polyquaterniums have been approved by INCI (the International Nomenclature for Cosmetic Ingredients) under polyquaternium designation, for example, polyquaternium-1, polyquaternium-11 and so on. The numbers are assigned in the order in which they are registered. It is also important that some types of polyquaterniums, such as polyquaternium-1 (PQ-1) and polyquaternium-42 (PQ-42), present highly antimicrobial activity while having low toxicity.

PQ-42, having the following formula and the number average molecular weight (M_n) of 2 to 10 K, was made first by Buckman Laboratories of Memphis, TN, more than two decades ago.



The main application of this polymer is in water treatment as an algacide, especially for swimming pools due to the characteristic of non-irritating to eyes and skin. It has been reported that PQ-42 can work synergistically with alcohol solutions to inactivate non-enveloped viruses. It can also be used for cooling tower biocide, antistatic agent, polymeric flocculant for silicon wafer processing as well as biotechnical engineering.

PQ-42 is also known as polixetonium chloride which has been successfully used as a contact lens disinfectant in multi-use contact lens solutions for almost two decades. The clinical studies have demonstrated that PQ-42 exhibits potent antimicrobial activity combined with extremely low ocular irritancy because it does not damage the ocular surface or tear film even with long term use. PQ-42 meets the FDA Preservative Challenge Test and Draize Test (ocular safety testing). Therefore, many solutions of ophthalmic medications (eye drops) are also preserved with PQ-42.

The chemical structure of PQ-42 does not contain any unsaturated bonds like double bonds or benzene rings. This intrinsically imparts better thermal/oxidation stability and more biocompatibility to this polymer which is advantaged with combination of hydrogen peroxide so as to amplify its antimicrobial efficacy and minimize toxicity for long term use.



Probably for this reason, some lacrimologists even believe that PQ-42 is superior to other preservatives or antimicrobial agents when used in collyria including contact lens disinfecting and cushioning solutions. In addition, some research results suggest that highly hydrophilic PQ-42 actually facilitates wetting of surfaces of contact lenses and improves the ocular comfort and safety of patients wearing contact lenses if defining and purifying PQ-42 for ophthalmic use.

PQ-42 is one of the polyquaterniums which have been commercialized and are being manufactured on a large scale. This polymer is most consumed in a crude form, as specified industrial grade, for swimming pools and other water treatment applications as an algaecide. However, analytical results revealed that the crude PQ-42 contains residual unreacted monomers (raw materials) and byproducts usually at a level of several hundreds of ppm. Toxicity of these residuals may raise hazard concerns especially for long term use. It is understandable that some manufacturers have made the decision to end supply of the crude PQ-42 to the personal care industry, including ophthalmic use.

In order to mitigate hazardous risk of the toxic residuals and meet emerging technological needs, Moly Laboratories supplies onto the market with the purified aqueous solutions of PQ-42 (PAPQ-42) with well-defined structure that are manufactured by a proprietary technology. PAPQ-42 contains no residual unreacted monomers and byproducts (at least undetectable by GC, HPLC or NMR). A warning, "this product may contain substance (s) which are known to the State of California to cause cancer or reproductive harm", is eliminated from MSDS when upgrading the crude PQ-42 to PAPQ-42. We believe that the upgrade of this product will facilitate you to upgrade your innovation and your business.

Moly Laboratories is a start-up R&D company located in San Francisco Bay Area. We are dedicated to develop novel polymeric materials and new applications.

We offer services all about polymeric materials on:

- Customer synthesis from lab scale to commercial quantities.
- Contract or subcontract R&D projects.
- Technical Consulting.

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