

## Polyquaternium

The document of the safety summary provides the safety information of the chemical substance to the general public. The safety summary is NOT intended to be an alternative document of Safety Data Sheet which is described from the recommendable detailed safety measures for each use. The safety summary is NOT intended to be an alternate document of the instructions for use nor the warning of consumer products including this substance. The contents of this summary are based on the laws, documents, information, and data available at present, without any warranty.

### 1. Chemical Identity

Category Name	Polyquaternium
Substance Name	Copolymer of acrylamide and diallyldimethylammonium chloride (PQ-7)
CAS Number	26590-05-6

### 2. Product Uses and Benefits

Polyquaterniums (PQ) is the International Nomenclature of Cosmetic Ingredients (INCI) name for cationic polymers used in daily products. PQ-7 is a copolymer of acrylamide and diallyldimethylammonium chloride, and is mainly used in shampoos to improve texture, antistatic properties, and foam stability.

### 3. Physical/Chemical Properties

Examples of physicochemical properties of PQ-7 as a typical structure of polyquaterniums are shown below.

The physicochemical properties of PQ-7 may vary depending on the monomer ratio and molecular weight.

Physicochemical properties of PQ-7 (Reference value)

Property	PQ-7
Molecular weight	120000-1600000
Boiling point (°C)	No data available
Melting point (°C)	Not applicable
Vapor pressure (Pa) 25°C	It is considered to be extremely low
Water solubility (g/L) 25°C	> 98
Octanol/water partition coefficient (Log Kow)	It is considered to be low due to the presence of many hydrophilic groups in the structure.
Soil adsorption coefficient (Log Koc)	It is expected to show relatively high because it is a cationic polymer.

#### 4. Human Health Safety Assessment

Consumer: The exposure to PQ-7 is at safe levels.

Worker: The short-term and repeated exposure of PQ-7 does not cause any toxic effects

Effect Assessment	Result
Acute Toxicity oral/ dermal	Unlikely no toxicity after oral/dermal exposure in practical use The substance does not cause damage to any organs following single exposure
Irritation skin/ eye	Based on the available data, unlikely to cause irritation/corrosivity to skin or eyes
Sensitization	Based on the available data, unlikely to cause allergic skin reaction
Toxicity after repeated exposure	Unlikely to cause any toxic effects through prolonged or repeated oral exposure in practical use
Mutagenicity	Based on the available data, unlikely to cause genetic defects
Carcinogenicity	Based on the available data, unlikely to cause cancer
Toxicity for reproduction	Based on the available data, unlikely to be damaging to fertility or the unborn child

#### 5. Environmental Safety Assessment

Test results on fish, aquatic invertebrates, and algae indicate that PQ-7 is very strong toxic to aquatic organisms when exposed to high concentrations in the environment. Long-term persistent toxicity to aquatic organisms is also suggested. Based on general information of polymer, PQ-7 is considered to be persistent, but it is expected to be removed by sewage

treatment. Even if a small amount of PQ-7 remains in the effluent, it is expected to be adsorbed by dissolved organic matter in the river<sup>1)</sup>, mitigating its toxicity. In addition, the potential for concentration in the food chain is considered low.

- 1) Enoki et al., 2024. Environmental Risk Assessment of Water-Soluble Cationic Polymers for Aquatic Organisms (Poster presentation), The 58th Japan Society for Water Environment.

Effect Assessment	Result
Aquatic Toxicity	Suggests to cause very strong toxicity for aquatic organism and toxic to aquatic life with long lasting effects
Biodegradation	It seems to be not readily biodegradable
PBT/ vPvB conclusion*	Persistent in the environment, not bioaccumulating in organisms and not toxic nor very persistent and very bioaccumulating

## 6. Exposure

- **Consumer**

The consumer can come into contact with the substance in use of the shampoo etc., but the concentration of PQ in use is below the level which would give rise harmful effects of concern. When it's used as the recommended use, consumer should always read product information before use and follow the label / use instructions.

- **Worker**

The exposure can occur either in PQ manufacturing facilities or in the various industrial facilities when PQ is used. Those workers in industrial operations during maintenance, sampling, testing, or other procedures could be exposed with PQ. Only qualified and trained workers handle the undiluted substance. The manufacturing facilities offer thorough training program for employees and appropriate work processes, as well as safety equipment (goggles and gloves) in place to prevent an unnecessary exposure. Safety showers and eye-wash stations are accessible nearby. Workers are required to be trained in accordance with the safety measures in the Safety Data Sheet.

- **Environment**

Since this substance is used extensively, it is discharged to wastewater treatment plants from industrial sites such as manufacturing, preparation, handling, storage and use of the substance as well as from consumer households. However, this substance is efficiently removed by adsorption on sludge in wastewater treatment plants. Even if a small amount of PQ-7 remains in the effluent, it is expected to be adsorbed by dissolved organic matter in the river, mitigating its toxicity. Furthermore, the substance does not accumulate in the food chain, so that there is no concern of human exposure through environmental pathway.

## 7. Risk management recommendations

When you use the substance, make sure to be measured the adequate ventilation. Always use appropriate chemical-resistant gloves to protect your hands and skin and always wear eye protection equipment. Do not eat, drink or smoke where the substance is handled, processed or stored. Wash hands and skin after contact with the substance. When the substance attaches to skin (or hair), take off the contaminated clothes. Wash with a large amount of water and soap. When it causes your skin irritation, consult doctor (medical diagnosis/therapy). If the substance gets into your eyes, rinse your eyes thoroughly for several minutes. If you wear contact lens, and you can take it off easily, take it off and continue to rinse your eyes. Contact to a doctor immediately.

Wastewater containing the substance must be passed the wastewater treatment plants in order to remove the substance. For air emission, no specific measures are needed, because it is not expected to be released into the air.

## 8. Regulatory Information/Classification and Labeling

Under GHS classification chemical substances are classified in hazards for physical properties, human health and environment. The hazard information for industrial products are transmitted via specific labels and Safety Data Sheet. GHS offers the standardization for hazard communication. The subjects who could be assumed to be exposed to the substance, workers, consumers, transport workers, and emergency responders, can better understand the hazards of the chemicals in use through the transmission.

### Labeling according to UN GHS

UN GHS is the basis for country specific GHS labeling.

PQ-7 is assigned to following GHS classifications.



### Classification and labelling information

Aquatic Acute 1

Aquatic Chronic 1

### Hazard Statements:

H400: Very toxic to aquatic life

H410: Very toxic to aquatic life with long lasting effects

### Signal Word

Warning

The laws of manufacturing, sale, transport, use and disposal are different among countries or areas. Details are referred to Safety Data Sheet provided by the supplier.

## 9. Conclusion

PQ is suggested to cause very strong toxicity to aquatic life if exposure to high concentrations in the environment. In addition, long-term persistent toxicity to aquatic organisms is also suggested. Based on general information of polymer, PQ is considered to be persistent, but it is expected to be removed by adsorption to sludge in sewage treatment plants. In the PBT/vPvB assessments for PQ, the substance is not applicable to PBT/vPvB. When handling the substance, workers should follow the standard safety measures and refer to the Safety Data Sheet. Consumers will usually not come into contact with the substance bulk and the substance is used diluted in consumer products, therefore, it is considered that PQ give rise no hazardous effects to human health.

## 10. Contact

For further information on this substance or Safety Summaries in general, please contact us.

Name	Kao Corporation
URL	<a href="https://ssl.kao.com/en/chemical/">https://ssl.kao.com/en/chemical/</a>

## 11. Glossary

Acute Toxicity	Adverse effects that result from a single exposure
Sensitization	Inducibility of allergy
Genotoxicity	Effects to induce gene mutations
Carcinogenicity	Action influence to cause a cancer
Toxicity for Reproduction	Adverse effects that result from repeated exposure
Biodegradation	Biological degradation of a substance in environments
PBT (Persistent, Bioaccumulative and Toxic)	Substances that are environmentally persistent, bioaccumulative, and toxic
vPvB (Very Persistent and Very Bioaccumulative)	Substances with high persistence in the environment and high accumulation in ecology
GHS	Globally Harmonized System of Classification and Labelling of Chemicals

## 12. Date of Issue

October 17, 2024