

Dialkyl quaternary ammonium salt

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	Dialkyl quaternary ammonium salt
Substance Name	1-Decanaminium, <i>N</i> -decyl- <i>N</i> -ethyl- <i>N</i> -methylammonium sulfate Di-C12-15-alkyldimonium chloride
CAS Number	181875-97-8、 68910-56-5

2. Product Uses and Benefits

Dialkyl quaternary ammonium salt (QAC: Quaternary Ammonium Compound) is a cationic surfactant. QAC has conditioning properties and it is widely used as consumer products contained in shampoo, conditioner and fabric detergent and fabric softener.

QAC is used for industrial as anti-static agents and others.

3. Physical/Chemical Properties

As the representative structure of QAC, the physicochemical properties of 1-Decanaminium, *N*-decyl-*N*-ethyl-*N*-methylammonium sulfate (C10-DAMEA-ES) and Di-C12-15-alkyldimonium chloride were calculated using computer software EPI suite 4.11 of the U.S. Environmental Protection Agency or measured values are shown below.

Physicochemical properties of Dialkyl quaternary ammonium salt

Property	Representative structure	
	C10-DAMEA-ES	C12-15-DAQAC-C
Molecular weight	465.78	418.2~502.36
Boiling point (°C)	658.42	581.12~650.74
Melting point (°C)	286.6	250.49~283.01
Vapor pressure (Pa) 25°C	3.59×10^{-13}	$1.08 \times 10^{-10} \sim 6.36 \times 10^{-13}$
Water solubility (mg/L)	0.000164	0.005215~0.000004654
Octanol/water partition coefficient (Log Kow)	8.03	6.62~9.57
Soil adsorption coefficient (Log Koc)	1377000	5348000~195900000

4. Human Health Safety Assessment

Consumer: The exposure to QAC is at safe levels.

Worker: The acute and repeated exposure of QAC does not cause any toxic effects

Effect Assessment	Result
Acute Toxicity oral/ dermal	No acute toxicity after oral/ dermal exposure in practical use The substance does not cause damage to any organs following single exposure
Irritation skin/ eye	Undiluted substance causes severe skin burn Undiluted substance causes serious eye damage
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

The test results with fish, aquatic invertebrates and algae suggest that QAC could cause a strong toxicity for aquatic organism and a long-term harmful effect to aquatic organisms.

However, QAC is unlikely to persist in the environment because of the readily biodegradation. QAC does not bioaccumulate in the food chain.

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

*PBT=Persistent, Bioaccumulative and Toxic
vPvB=Very Persistent and Very Bioaccumulative

6. Exposure

- **Consumer**

The consumer can come into contact with the substance in use of the detergents, but the concentration of QAC 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 QAC manufacturing facilities or in the various industrial facilities when QAC is used. Those workers in industrial operations during maintenance, sampling, testing, or other procedures could be exposed with QAC. 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, the substance is readily biodegradable, so that it is removed efficiently in waste water treatment plants. The substance is biologically degraded in the surface water and is rapidly removed even if it is remained slightly in the waste water. Hence, the chronic exposure to aquatic organisms of the substance is unlikely to occur. 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. If eye irritation persists, get medical help.

Wastewater containing the substance must be passed the wastewater treatment plants in order to remove the substance. 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.

QAC is assigned to following GHS classifications.



Classification and labelling information

Acute tox. (oral) 4

Skin Corr. 1

Eye Dam. 2A

Aquatic Acute 1

Aquatic Chronic 2

Hazard Statements:

H302: Harmful if swallowed

H314 Causes severe skin burns and eye damages

H319: Causes serious eye damage

H400: Toxic to aquatic life

H412: Harmful to aquatic life with long lasting effects

Signal Word

Danger

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

Though QAC are suggested to cause strong toxicity to aquatic organisms, the risk to environment organisms is negligible due to the rapid degradation of QAC. In the PBT/vPvB assessments for QAC, the substance is not applicable to PBT/vPvB. Contact with the undiluted QAC may cause serious damage to the eyes. 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 QAC 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	https://ssl.kao.com/en/chemical/

11. Glossary

Hazard	Hazardous property for human health or environments
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
Acute Toxicity	Adverse effects that result from a single exposure
Sensitization	Inducibility of allergy
Mutagenicity	Effects to induce gene mutations
Toxicity after repeated exposure	Adverse effects that result from repeated exposure
Toxicity for reproduction	Adverse effects for teratogenicity, embryotoxicity, and reproductivity
Carcinogenicity	Action influence to cause a cancer
Biodegradation	Biological degradation of a substance in environments
Bioaccumulation	Accumulation of substances in environments

12. Date of Issue

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