Australian Government
Department of Health
Australian Industrial Chemicals Introduction Scheme

2,5-Furandione, polymer with 1-alkene, α-methyl-ω-(2-propen-1-yloxy)poly(oxy-1,2-ethanediyl) and 1-alkene, alkyl amide

Assessment statement

4 July 2022

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AICIS assessment statement

Chemical in this assessment

Name	CAS registry number
2,5-Furandione, polymer with 1-alkene, α-methyl-ω-(2-propen-1-yloxy)poly(oxy-1,2-ethanediyl) and 1-alkene, alkyl amide	AICIS Approved Chemical Name (AACN)

Reason for the assessment

An application for an assessment certificate under section 31 of the *Industrial Chemicals Act 2019* (the Act)

Certificate Application Type

Very low to low risk

The assessed polymer meets the criteria as a polymer of low concern (PLC) [Schedule 2 of the *Industrial Chemicals (General) Rules 2019* (the Rules)] and is not a high molecular weight polymer that has lung overloading potential. Therefore, the introduction of the assessed polymer meets the circumstances in which introductions are exempted introductions (Section 26(6) of the Rules). An exempted introduction is an industrial chemical introduction that poses a very low risk to human health and the environment.

Defined scope of assessment

The chemical has been assessed:

- as meeting the PLC criteria (Schedule 2 of the Rules) and
- as not meeting the definition of lung overloading potential [within the meaning given in the Industrial Chemicals Categorisation Guidelines (the Guidelines)]

Summary of assessment

Summary of introduction, use and end use

The assessed polymer will be imported into Australia either as a component of an additive package at a concentration of up to 40% concentration for further reformulation by liquid blending with diesel fuel to a final concentration of 0.1% or as a component of diesel fuels at a concentration of 0.1%. The assessed polymer will be used as an additive to improve the flow of diesel fuels in cold weather.

The assessed polymer as additive package will be imported in 200 L drums, 1000 L intermediate bulk containers (IBC), or 24000 L ISO certified tanks. The containers containing the additive package will be transported to the reformulation/blending sites by both rail and road. Following reformulation/blending, the finished fuel containing the assessed polymer at 0.1% will be transported by rail, road or pipeline to various fuel depots and filling service

stations for end use. Finished fuels will be transferred to vehicles from storage tanks by pump at fuel stations.

When imported as a component of fuels, it will be imported in oil tanker ships designed for the bulk transport of fuels. On arrival, the fuel will be transferred to on-site storage tanks at the oil terminals and will be transported by rail cars, road tankers or pipeline to various fuel depots and filling service stations.

Human health

Summary of health hazards

No toxicology data were provided for the assessed polymer. The assessed polymer meets the PLC criteria and is thus assumed to be of low hazard.

The assessed polymer does not contain any structural alerts typically associated with hazardous properties.

Health hazard classification

The applicant did not provide toxicology data for the assessed polymer. The assessed polymer meets the PLC criteria and is thus assumed to be of low hazard for human health not requiring classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals* (UNECE 2017), as adopted for industrial chemicals in Australia.

Summary of health risk

The assessed polymer meets the PLC criteria and human health risks are not expected from exposure to the assessed polymer.

Public

When introduced and used in the proposed manner, exposure of the public to the assessed polymer during refilling of diesel fuel is possible but expected to be low due to the low concentration of the assessed polymer in diesel fuels (0.1%).

This assessment does not identify any risks to public health that would require specific risk management measure when the assessed polymer is introduced in accordance with the terms of the assessment certificate.

Workers

When introduced and used in the proposed manner, there is potential for worker exposure to the assessed polymer during reformulation at 40% concentration and during end-use at 0.1% concentration when fuels containing the assessed polymer are pumped into vehicles due to spillage or accidental release.

This assessment does not identify any risks to the health of workers that would require specific risk management measures when the assessed polymer is introduced in accordance with the terms of the assessment certificate.

Environment

Summary of environmental hazard characteristics

According to domestic environmental hazard thresholds and based on the available data, the assessed polymer is:

- Persistent (P)
- Not bioaccumulative (not B)
- Not toxic (not T)

Environmental hazard classification

The applicant did not provide aquatic toxicology data for the assessed polymer. The assessed polymer meets the PLC criteria and is thus assumed to be of low hazard for environmental health not requiring classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals* for acute and chronic toxicities (UNECE 2017), as adopted for industrial chemicals in Australia.

Summary of environmental risk

No significant release of the assessed polymer is expected to occur as a result of its use as a fuel additive. The assessed polymer is expected to be thermally combusted during end use.

The assessed polymer is not expected to bioaccumulate or cause toxic effects in aquatic organisms.

Based on its low hazard and the assessed use pattern, the assessed polymer is unlikely to cause environmental risk.

Means for managing risk

No specific means for managing risk are required when the assessed polymer is introduced in accordance with the terms of the assessment certificate.

Conclusions

The conclusions of this assessment are based on the information described in this statement.

The Executive Director is satisfied that when the assessed polymer is introduced and used in accordance with the terms of the assessment certificate, the human health and environment risks can be managed. This is provided that all requirements are met under environmental, workplace health and safety and poisons legislation as adopted by the relevant state or territory.

Note: Obligations to report additional information about hazards under section 100 of the Industrial Chemicals Act 2019 apply.

Supporting information

Chemical identity

The assessed polymer has a typical degree of purity of > 75%.

Chemical name	2,5-Furandione, polymer with 1-alkene, α-methyl-ω-(2-propen-1-yloxy)poly(oxy-1,2-ethanediyl) and 1-alkene, alkyl amide (AACN)
Synonyms	Dodiflow® 5521 (product containing up to 40% assessed polymer)
Molecular formula	Unspecified
Number Average Molecular Weight (Mn)	1368 g/mol
Percentage of low molecular weight species (<1,000 g/mol)	17.1%
Percentage of low molecular weight species (<500 g/mol)	7.8%
Chemical description	Polymer

Relevant physical and chemical properties

Physical form	Yellow/brownish viscous liquid
Water solubility	5.1 – 8.8 mg/L
n-Octanol solubility	1153.5 – 1184.2 mg/L
log K_{ow}	2.23

Human exposure

Workers

Transport, storage and warehouse workers are not expected to be exposed to the assessed polymer or products containing the assessed polymer, except in the unlikely event of an accidental rupture of containers.

Reformulation/Blending

At reformulation/blending sites, the additive package will be transferred from ISO tanks on rail cars or tank trucks into storage tanks via 10 cm hosing and pumping equipment.

From the storage tanks, the additive package will be transferred to blending tanks through a computer-controlled automated valve process and fixed lines. The product will be blended using typical liquid blending process with other components into a finished fuel product containing the assessed polymer at up to 1000 ppm (0.1%). Finished fuels will be transported

by rail, road or pipeline to various fuel depots and filling service stations for end use. Finished fuels will be transferred from storage tanks to vehicles by bowser.

Blending operations are also expected to be automated and will be carried out in closed systems, limiting the potential exposure of workers. There is potential for worker exposure to the assessed polymer during the changing of filling lines and drums.

Environmental exposure

The assessed polymer will be imported into Australia and reformulated into fuels using enclosed automated systems. The automated transfer systems limit the potential for accidental spills. The finished fuel products will then be transported to storage depots and eventually to underground storage tanks where they will be pumped into both industrial and consumer vehicles. The assessed polymer will be combusted as a function of its overall use and therefore will not be released into the environment.

Any release of the assessed polymer will be from accidental spills of the blended fuel. Spills which occur during transfer and filling processes are expected to be captured and collected for appropriate disposal.

Environmental fate

Partitioning

The assessed polymer has limited solubility in water and if released into the environment, it is expected to partition soils and sediments based on its partition coefficient (Log Kow = 2.23) and high molecular weight (NAMW >1000 g/mol).

Degradation

No information about the degradation of the assessed polymer is available. The assessed polymer is expected to be stable but will eventually degrade to simpler organic molecules.

Bioaccumulation

The assessed polymer has a high molecular weight (NAMW > 1000 g/mol) and is not expected to be bioavailable. Additionally, the assessed polymer has a log Kow value < 4.2, which is below the domestic threshold for bioaccumulation. Therefore, the assessed polymer is not expected to bioaccumulate.

Predicted environmental concentration (PEC)

The predicted environmental concentration (PEC) has not been calculated as release of the assessed polymer to the aquatic environment will be negligible based on its assessed use pattern.

Environmental effects

No information about the toxicity of the assessed polymer is available. The assessed polymer is not expected to be bioavailable and does not contain functional groups of concern. Thus, it is not expected to cause toxic effects in the environment.

Predicted no-effect concentration (PNEC)

A predicted no-effect concentration (PNEC) for the aquatic compartment could not be calculated.

Categorisation of environmental hazard

The categorisation of the environmental hazards of the assessed polymer according to domestic environmental hazard thresholds is presented below:

Persistence

Persistent (P). No information about the degradation of the assessed polymer was available. Based on its assumed stability, and lack of demonstrated degradation, the assessed polymer is persistent.

Bioaccumulation

Not Bioaccumulative (Not B). No information about adverse effects of the assessed polymer to the aquatic environment was available. Based on its expected low bioavailability and low log Kow, the assessed polymer is not bioaccumulative.

Toxicity

Not Toxic (Not T). Based on its expected low bioavailability and lack of concerning functional groups, the assessed polymer is not toxic.

Environmental risk characterisation

A Risk Quotient (PEC/PNEC) for the aquatic compartment could not be calculated. However, the assessed polymer is not expected to be harmful to aquatic life, and release of the assessed polymer to the aquatic environment will be negligible based on its assessed use pattern.

Thus, based on its low hazard and the assessed use pattern, the assessed polymer is unlikely to pose a significant risk to the environment.

References

UNECE (United Nations Economic Commission for Europe) (2017) *Globally Harmonized System of Classification and Labelling of Chemicals (GHS) 7th Revised Edition*, UNECE, accessed May 2022.