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Product Stewardship Summary
PAO 4-10 cSt

The product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of all health and safety information. Additional information is available through the applicable Safety Data Sheet (SDS) which should be consulted before use of any chemical. This product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.

Chemical Identity:

Polyalphaolefins (PAOs) are a category of products. PAOs are hydrogenated olefin oligomers manufactured by catalytic polymerization of normal alpha olefins. They are colorless liquids with well-defined, wax-free isoparaffinic structures. The even-numbered PAOs are manufactured from 1-decene, the odd-numbered PAOs, 6 cSt HVI, 8 cSt HVI, tetramer 7, and C12 PAO are manufactured from 1-dodecene. This category contains various viscosity grades of PAO products, with CAS numbers and names listed below.

CAS Number	Product Name
68037-01-4	Synfluid® PAO 4 cSt
151006-62-1, 151006-63-2	Synfluid® PAO 5 cSt
68037-01-4	Synfluid® PAO 6 cSt
151006-63-2	Synfluid® PAO 7 cSt
151006-63-2	Tetramer 7
68037-01-4	Tetramer 6
68037-01-4	Tetramer 8
151006-63-2	C12 PAO
68037-01-4	Synfluid® PAO 8 cSt
151006-62-1, 151006-63-2	Synfluid® PAO 9 cSt
68037-01-4	Synfluid® PAO 10 cSt
151006-62-1, 151006-63-2	Synfluid® PAO 6 cSt HVI
151006-63-2	Synfluid® PAO 8 cSt HVI
68037-01-4	Hydrogenated poly-1-decene PAO 4 FG
68037-01-4	Hydrogenated poly-1-decene PAO 6 FG
68037-01-4	Hydrogenated poly-1-decene PAO 8 FG

Category Justification:

The 4-10 cSt PAOs are highly branched, isoparaffinic polyalphaolefins produced by oligomerizing either 1-decene or 1-dodecene. They are composed of various ranges of 1-decene or 1-dodecene trimer, tetramer, pentamer and higher. Within this category, the viscosity of the fluid increases as the percentage of the heavy oligomers increases. In addition to the similarity of chemical structures, the physical and health hazard profile of the 4-10 cSt PAOs are also similar.

Product Uses:

The 4-10 cSt PAOs are used as synthetic base fluids for high-performance industrial and automotive lubricants (gear oils, compressor oils, hydraulic fluids, greases, engine oils), functional fluids (dielectric, heat transfer, drilling), additives for drilling fluid, and also serve as carrier/moisturizer in cosmetic formulations. Almost all products go into lubricant applications with the exception of PAOs FG 4-6-8, which generally go into cosmetic applications. The 4-10 cSt PAOs meet

the FDA technical white oil specifications as described in 21 CFR 178.3620(b)(1) and may be used as a component of non-food articles intended for use in contact with food. They are registered by the National Sanitation Foundation (NSF) as H1 and HX-1 substances which allows for incidental food contact for use in food production and processing plants.

Physical/Chemical Properties:
The 4-10 cSt PAOs are clear, colorless, and odorless liquids at ambient conditions. They are not flammable, combustible, or highly reactive. Bonding and grounding are needed to prevent static hazards which could cause a fire.

Health Information:
The 4-10 cSt PAOs are not expected to be hazardous to human health except for PAO 4 cSt which is classified as aspiration hazard based on its viscosity. If PAO 4 cSt is swallowed, it may be aspirated into the lungs, resulting in inflammation and possible fluid accumulation. The 4-10 cSt PAOs are not acutely toxic by the oral, dermal, or inhalation routes of exposure; and there is no evidence that these products cause adverse chronic, genetic, developmental, reproductive or carcinogenic effects.

Environmental Information:
The 4-10 cSt PAOs are not expected to be hazardous to the environment. These products are not harmful to aquatic organisms and are not expected to be harmful to terrestrial mammals or to bioaccumulate. The 4-10 cSt PAOs are not considered to be readily biodegradable, but are expected to completely biodegrade over extended periods of time. The most likely sources of environmental exposures are accidental spills.

Exposure Potential:
The most likely routes of exposure to the 4-10 cSt PAOs are eye and skin contact.

- *Workplace use:* This refers to potential exposure to 4-10 cSt PAOs to persons in a manufacturing facility or through various industrial applications. The potentially exposed populations include (1) workers who manufacture this material and blend it into finished oils; (2) quality assurance workers who sample and analyze the product to ensure that it meets specifications; (3) workers involved in the transfer and transport of this material or finished oils that contain it; and (4) mechanics who may come into contact with both fresh and used oils while working on equipment. The most likely routes of exposure to the 4-10 cSt PAOs are eye and skin contact. Manufacturing, quality assurance, and transportation workers will likely have access to engineering controls and should wear personal protective equipment to eliminate exposure, as should mechanics.

- *Consumer use:* Depending on the specific products being used and the conditions they are used under, this category of exposure is highly variable. Consumers who periodically add oil to crankcases or change their own oil may be exposed to the 4-10 cSt PAOs. The most likely routes of exposure are eye and skin contact. Consumers are likely to work without gloves or other protective equipment. PAO FG products are sold into cosmetics primary & secondary oils serving as carrier & moisturizers for which skin contact is expected.

- *Potential environmental release:* There may be some potential for exposure to the environment from an accidental release of the 4-10 cSt PAOs due to transportation by rail, tank car, and ship; however, risk of exposure due to release is believed to be very low. Chevron Phillips Chemical Company LP is committed to operating in an environmentally responsible manner and has adopted the American Chemistry Council's Responsible Care® initiative. Chevron Phillips Chemicals International N.V. is a member of CEFIC, the European Chemical Industry Council, and has adopted the Responsible Care initiative as well.

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Risk Management:

Chevron Phillips Chemical Company LP is committed to Product Stewardship and doing business responsibly. We endeavor to provide information for the safe use and handling of all our products. We make product information available to all of our customers, distributors and carriers of 4-10 cSt PAOs which contain details about the properties of the product. To that end, a Safety Data Sheet and a certificate of analysis accompany each shipment from our manufacturing plant. We can also provide an in-depth guide to the Safe Handling & Storage of Polyalphaolefins and a Product Integrity Protection Guidelines brochure.

Before using these products, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the product for the specific use in question. It is the ultimate responsibility of the user to ensure suitability for use and determine if this information is applicable to the user's specific application. Chevron Phillips Chemical does not make, and expressly disclaims, all warranties, including warranties of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, or allegedly arising from any usage of any trade or from any course of dealing in connection with the use of the information contained herein or any product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with the use of the information contained herein or any product itself.

Regulatory Information:

Regulations exist that govern the manufacture, sale, transportation, use and/or disposal of products of the 4-10 cSt PAOs category. These regulations may vary by city, state, country or geographic region. Additional helpful information may be found by consulting the relevant product Safety Data Sheet.

Sources of Additional Information:

- U.S. Environmental Protection Agency (USEPA) - High Production Volume Chemical Challenge - Robust Summaries & Test Plans: 1-Decene, Tetramer, mixed with 1-Decene Trimer, Hydrogenated: https://iaspub.epa.gov/oppthpv/public_search.html_page
- European Chemicals Agency (ECHA) – Information on Registered Substances (use applicable CAS No.): https://echa.europa.eu/information-on-chemicals/registered-substances
- Organization for Economic Cooperation and Development (OECD) – eChemPortal web-based search tool (use applicable CAS No.): http://www.echemportal.org/
- Our polyalphaolefins website: http://www.cpchem.com/bl/pao/en-us/Pages/default.aspx
- Our Safe Handling and Storage Brochure: https://www.cpchem.com/what-we-do/solutions/polyalphaolefins/resources
- Our Product Integrity Protection Guidelines brochure: https://www.cpchem.com/what-we-do/solutions/polyalphaolefins/resources
- Safety Data Sheet: https://www.cpchem.com/what-we-do/solutions/polyalphaolefins/products

Conclusion:

In general, 4-10 cSt PAOs are not expected to be hazardous to human health and the environment. They have not been shown to cause adverse health or environmental effects at levels typically found in the workplace or environment; however, prior to use or handling products from the 4-10 cSt PAOs category or products which contain a mixture of 4-10 cSt PAOs, make sure to consult the relevant product Safety Data Sheet and review applicable regulatory guidelines and requirements, including but not limited to OSHA guidelines.

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Contact Information:
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