



Product Stewardship Summary Normal Alpha Olefins

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. The product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.

Chemical identity:

Normal Alpha Olefins are a category of products comprised of alpha olefins, alpha olefins blends, and reactor wash products. Products are listed below with their accompanying CAS numbers.

| CAS Number* | Product Name |
|---------------------------------------|--------------------------------|
| 106-98-9 | 1-Butene |
| 592-41-6 | 1-Hexene |
| 111-66-0 | 1-Octene |
| 872-05-9 | 1-Decene |
| 112-41-4 | 1-Dodecene |
| 1120-36-1 | 1-Tetradecene |
| 629-73-2 | 1-Hexadecene |
| 112-88-9 | 1-Octadecene |
| 26952-14-7 | Isomerized Alpha Olefin C16 |
| Mixture | Isomerized Alpha Olefin C18 |
| Mixture | AlphaPlus C16-18 IS |
| Mixture | Isomerized Alpha Olefin C20-24 |
| 93924-10-8 | Alpha Olefin C20-24 |
| Mixture | Alpha Olefin C20-24P |
| 93924-11-9 | Alpha Olefin C24-28 |
| 18835-33-1 (C26) and 18835-34-2 (C28) | Alpha Olefin C26-28 |
| 131459-42-2 | Alpha Olefin C30+ |
| 260255-62-7 | Alpha Olefin C30+ HA |
| 260255-62-7 | Alpha Olefin C30+ High Solids |
| Mixture | C12/14 Reactor Wash |
| Mixture | C16 Reactor Wash |
| Mixture | C18 Reactor Wash |
| 112-41-4 | C12 Reactor Wash |
| Mixture | AlphaPlus C12-14 Blend |

| | |
|-------------|--------------------------------|
| 148617-59-8 | AlphaPlus C18 ISA |
| Mixture | ALPHA OLEFIN 10-18 |
| Mixture | AlphaPlus C14-16-18 |
| Mixture | AlphaPlus C16 ISA |
| 111-66-0 | 1-Octene Alternate Disposition |
| Mixture | AlphaPlus C16/18/20-24 IS |
| Mixture | AlphaPlus C14-16 Blend |
| Mixture | AlphaPlus C8 - C12 Blend A |
| Mixture | AlphaPlus C14-16-18 Blend A |
| Mixture | AlphaPlus® C16-18 Blend |
| Mixture | Intermediate Olefins |

*** For mixture, CAS number of components can be found on product SDS.**

Category Justification:

These products are linear alpha olefins with a chemical formula C_nH_{2n} (carbon number n is even number ranging from 4 to 30 plus), distinguished from other mono-olefins with a similar molecular formula by linearity of the hydrocarbon chain and the position of the double bond at the primary or alpha position. Isomerized alpha olefins product have double bond occurring at other positions of the hydrocarbon chain. These products are predominantly linear, but may contain small amounts of branched materials. The physical-chemical, mammalian toxicity, and environmental fate properties of the category members are similar.

Product Uses:

Normal Alpha Olefins, featuring highly accessible terminal double bonds, are ideal materials for manufacturing numerous products. They can be used to synthesize any derivative requiring an even-numbered straight carbon chain, making them a major petrochemical building block. Their use in the development of new chemical products has virtually unlimited potential. Normal Alpha Olefins or their derivatives are used extensively as polyethylene comonomers, plasticizers, synthetic motor oils, lubricants, automotive additives, surfactants, paper sizing agents, and in a wide range of specialty applications.

Physical/chemical properties:

Normal Alpha Olefins, from C4 to C30+ carbon lengths, are high-quality intermediates. They are straight-chain hydrocarbons with a double bond in the terminal position. At ambient conditions, C4 is a gaseous product and C6 through C18 are clear water-white liquids with a distinctive olefinic odor. The C20+ products are solid at room temperature and have a white waxy appearance.

Health Information:

Studies have shown that Normal Alpha Olefins are expected to have little or no toxic effect on animals, except in very severe inhalation conditions and that they may produce minimal skin and eye irritation, but are not skin sensitizers. Laboratory exposures to very high airborne concentrations of C6-C16 normal alpha olefin vapors or mists produced central nervous system effects including anesthesia. If C20+ products are heated, fumes

may produce nausea and irritation of the upper respiratory tract. Although not all products have been tested in genetic toxicity assays, the available data indicate normal alpha olefins are not mutagenic.

Environmental Information:

Ecotoxicity studies conducted with a wide range of products have shown little potential for toxicity to aquatic organisms under expected conditions of use or in the event of an accidental release. Not all Normal Alpha Olefins are readily biodegradable; however, they will ultimately biodegrade. While the octanol/water partition coefficients of Normal Alpha Olefins suggest a potential for bioaccumulation of these materials in aquatic organisms, the volatility of these materials (especially for the liquid alpha olefins) and the low-water solubility (indicative of limited bioavailability) suggest that bioaccumulation of these products is not expected to occur. Under most environmental scenarios, extensive evaporation and subsequent degradation in the atmosphere is expected to preclude bioaccumulation.

Exposure Potential:

Exposure potential is considered to be low, however, based on the typical uses/applications of Normal Alpha Olefins within the industry. Potential avenues for exposure might be as follows:

- *Workplace use:* This refers to potential exposure to Normal Alpha Olefins to persons in an industrial manufacturing facility or through evaporation in various industrial applications. Although Normal Alpha Olefins are produced in closed systems, it should be common practice to use personal protective equipment (PPE). Using appropriate PPE during handling and having risk mitigation measures in place should reduce the potential for physical hazards or accidental releases.

This category of materials is not normally expected to present an inhalation hazard, however, under certain conditions, the use of respiratory protection equipment suitable for the specific conditions may be necessary. For example, when the material is heated, sprayed, misted, or there is a risk of oxygen deficiency, such that may be found in confined spaces, there is greater potential for airborne concentrations to be generated. Or, if engineering controls are not expected to maintain airborne concentrations at a level which is adequate to protect worker health, personal protective equipment should reduce potential exposure. Respirator selection, use, and maintenance should follow applicable regulatory requirements, including but not limited to those administered by the U.S. Occupational Safety and Health Administration (OSHA).

The use of protective gloves helps protect against dermal exposures to the mildly irritating properties of this category of chemicals. The suitability and durability of a glove, which is dependent on usage (e.g., frequency and duration of contact, chemical resistance of glove material, glove thickness, and dexterity), should be considered when selecting the appropriate PPE. For example, if prolonged or repeated contact is likely, chemical resistant gloves are recommended by OSHA, or if contact with forearms is likely, gauntlet style gloves may offer additional protection. Replacing contaminated gloves should also help to reduce the risk of potential exposure.

- *Consumer use:* Except for a small percentage of Alpha Olefin C26-28 used in candle application, Normal Alpha Olefins are primarily used as industrial intermediates, i.e., sold to sophisticated industrial customers where they are transformed into other chemicals. Potential exposure or impact to the general public from consumer use is not anticipated for these products.
- *Potential environmental release:* Normal Alpha Olefins are routinely transported by pipeline, rail, tank car and ship, however, potential exposure to the environment due to release is expected 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.

Risk Management:

Chevron Phillips Chemical Company LP is committed to Product Stewardship and doing business responsibly. We endeavor to provide sufficient information for the safe use and handling of all our products. We make product information available to all of our customers, distributors, carriers, and users of these products which contain detail about the properties of each product. To that end, a SDS and a certificate of analysis accompany each shipment from our manufacturing plant.

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 Company LP 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.

Good industrial hygiene practices should always be followed when handling Normal Alpha Olefins, including avoiding contact with eyes and skin. Splashes in the eye should be treated by thoroughly flushing with water. Contaminated skin areas should be carefully washed with soap and water, and contaminated clothing should be laundered before reuse.

It is particularly important to safeguard against excessive and prolonged exposures to Normal Alpha Olefin vapors and mists. Unsafe vapor concentrations may not only be harmful to workers' health, they may also constitute fire or explosion hazards. Adequate local or general exhaust ventilation should be used to prevent the accumulation of high vapor concentrations and National Institute for Occupational Safety and Health (NIOSH)-certified organic vapor respirators or supplied air breathing apparatus should be used in the absence of reliable detection and warning devices.

Finally, when handling Normal Alpha Olefins product, any user should consult the relevant product SDS and review applicable regulatory guidelines and requirements, including but not limited to OSHA guidelines.

Regulatory Information:

Regulations exist that govern the manufacture, sale, transportation, use and/or disposal of products of Normal Alpha Olefins product. 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:

- Organization for Economic Cooperation and Development (OECD) - ChemPortal web-based search tool (use applicable CAS No):
<http://www.echemportal.org/>
- U.S. Environmental Protection Agency (USEPA) - High Production Volume Chemical Challenge (Higher Olefins Category):
https://iaspub.epa.gov/opptpv/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>
- Product stewardship summary document for the Higher Olefins Category developed by American Chemistry Council Higher Olefins Panel of which Chevron Phillips Chemical Company is a member.
<https://www.americanchemistry.com/ProductsTechnology/Higher-Olefins/Product-Stewardship-Summary-for-Higher-Olefins-Category.pdf>
- George Lappin (ed.) (1989). *Alpha Olefins Applications Handbook*. CRC Press. ISBN 0824778952.
- Our normal alpha olefins website: <http://www.cpchem.com/bl/nao/en-us/pages/default.aspx>
- Our Safe Handling and Storage Brochure: <http://www.cpchem.com/bl/nao/en-us/pages/technicallibrary.aspx>
- Safety Data Sheet: <http://www.cpchem.com/en-us/pages/msdssearch.aspx>

Conclusion:

Normal Alpha Olefins are widely used chemical intermediates in the production of other chemicals (including, but not limited to, polymers, fatty acids, mercaptans, plasticizer alcohols, surfactants, wax applications, and additives.). They are low in acute toxicity and they have not been shown to cause adverse health or environmental effects at levels typically found in the workplace or environment. However, efforts should be taken to minimize eye, dermal and inhalation exposures to this product by adhering to safe handling procedures for designated applications and uses. Also, appropriate personal protective equipment practices and labeling, storage, and transportation procedures should be followed. Further, the relevant product Safety Data Sheets and applicable regulatory guidelines, including, but not limited to OSHA guidelines, must be consulted prior to use of these materials.

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