



Product Stewardship Summary

AlphaPlus® 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 on the chemical is available through the applicable Material Safety Data Sheet which should be consulted before use of the 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. This category contains 11 alpha olefins and their blends with individual CAS numbers and names of the 11 alpha olefins and their blends listed below.

CAS Number	Product Name
106-98-9	1-Butene (C4)
592-41-6	1-Hexene (C6)
111-66-0	1-Octene (C8)
872-05-9	1-Decene (C10)
112-41-4	1-Dodecene (C12)
1120-36-1	1-Tetradecene (C14)
629-73-2	1-Hexadecene (C16)
112-88-9	1-Octadecene(C18)
93924-10-8	Alpha Olefin C20-24
93924-11-9	Alpha Olefin C24-28
131459-42-2	Alpha Olefin C30+
112-41-4 and 1120-36-1	C12 and C14 Blend
1120-36-1 and 629-73-2	C14 and C16 Blend
1120-36-1 and 629-73-2 and 112-88-9	C14 and C16 and C18 Blend

Category Justification:

These products are all 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. These products are predominantly linear, but may contain small amounts of branched materials.

Product Overview:

Normal alpha olefins, featuring highly accessible terminal double bonds, are ideal materials for manufacturing numerous products. They can also 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 is virtually unlimited.

Product Uses:

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 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 alpha olefins are readily biodegradable; however, they will ultimately biodegrade. While the octanol/water partition coefficients of 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), would indicate that bioaccumulation will not occur. Under most environmental scenarios, extensive evaporation and subsequent degradation in the atmosphere would preclude bioaccumulation. Therefore, alpha olefins are not expected to be toxic to aquatic organisms, will biodegrade, and will not bioaccumulate.

Exposure Potential:

Exposure potential is considered to be low, however, based on the uses/applications of the normal alpha olefins category, the public could possibly experience exposure to the product as stated below:

- Workplace use: This refers to potential exposure to normal alpha olefins to persons in a manufacturing facility or through evaporation in various industrial applications. Although the normal alpha olefins are produced in closed systems, it is common practice to use personal protective equipment.

This category of materials does not normally 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 and therefore, respiratory protection may be required. Or, if engineering controls are not expected to maintain airborne concentrations at a level which is adequate to protect worker health, personal protective equipment will be

necessary. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, including but not limited to OSHA.

If respiratory protection is necessary, there are several types of respiratory personal protection equipment available such as approved supplied-air respirators, operated in positive pressure mode; or supplied air respirators with an escape bottle in situations when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating are exceeded.

In the case of dermal exposures, the use of protective gloves helps protect against the mildly irritating properties of this category of chemicals. Common materials used in gloves to reduce risk of incidental contact/splash protection are PVC, neoprene rubber, or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage (e.g., frequency and duration of contact, chemical resistance of glove material, glove thickness, and dexterity). If prolonged or repeated contact is likely, chemical resistant gloves are recommended by OSHA. If contact with forearms is likely, gauntlet style gloves may offer additional protection. Replacing contaminated gloves helps to reduce risks of accidental contamination and exposure.

- *Consumer use:* Except for a small percentage of alpha olefin C26-28 used in candle application, the normal alpha olefins are primarily used as industrial intermediates, i.e., they are transformed into other chemicals; hence consumer exposure is expected to be limited to exposure following inadvertent release of the products.
- *Potential environmental release:* There may be some potential for exposure to the environment from an accidental release of the normal alpha olefins due to transportation of large quantities over long distances by pipeline, tank car and ship, however, exposure due to release is believed to be very low. Qatar Chemical Company II (Q-Chem II) is committed to operating in an environmentally responsible manner and has adopted the Gulf Petrochemical & Chemical Association's (GPCA) Responsible Care ® initiative.

Risk Management:

Qatar Chemical Company II (Q-Chem II) 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.

With regard to normal alpha olefins, good industrial hygiene practices should always be followed. Avoid contact of normal alpha olefins 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. Therefore 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 products from the normal alpha olefins category or products which contain a mixture of normal alpha olefins, make sure to consult the relevant product Material Safety Data Sheet 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 the normal alpha olefins category. These regulations may vary by city, state, country or geographic region. Additional helpful information may be found by consulting the relevant product Material Safety Data Sheet.

Sources of Additional Information:

- Organization for Economic Cooperation and Development (OECD) - ChemPortal web-based search tool (use applicable CAS No): <http://webnet3.oecd.org/echemportal/>
- U.S. Environmental Protection Agency (USEPA) - High Production Volume Chemical Challenge (Higher Olefins Category):
<http://www.epa.gov/chemrtk/pubs/summaries/olefins/c13116tc.htm>
- European Chemical Substances Information System (ESIS) <http://ecb.jrc.it/esis/>
- 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.
http://www.americanchemistry.com/s_acc/sec_CPT.asp?CID=1075&DID=4217
- George Lappin (ed.) (1989). *Alpha Olefins Applications Handbook*. CRC Press. ISBN 0824778952.
- CPChem normal alpha olefins website <http://www.cpchem.com/enu/nao.asp>
- Safe Handling and Storage Brochure http://www.cpchem.com/enu/nao_tl_technical_library.asp
- Material Safety Data Sheet <http://www.qchem.com.qa/internet/Products/Pages/NAO.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, make sure to consult the relevant product Material Safety Data Sheet and review applicable OSHA and other appropriate regulatory guidelines prior to use of these materials.

Contact Information:

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