

Lubricating oil

3,431 tonnes per year

Synonyms: Fischer-Tropsch Oil; Liquid Paraffin; Light Fischer-Tropsch Liquid; LFTL, middles distillate, Fischer Tropsch Light Oil.

Molecular Formula (carbon number) : The lubricating oil has the formula $(CH_2)_nH_2$, where n ranges between about 5 and 22

Chemical Properties

Appearance: colourless to faintly yellow liquid at 20 deg C

Freezing point: <5°C

Boiling point range: 21-360°C

Vapour Density: >1

Viscosity at 40 Deg C - <1

Odour – acrid to sweet paraffin

Standard test: BS 4695

storage temp: Store at RT.

Stability: Stable. Substances to be avoided include strong oxidizing agents, peroxides, acids, organic solvents

Water Solubility: sparingly miscible with water;

CAS No -

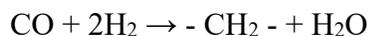
Detection Methods: GC / FID & DSC

Flash Point: <23 Deg C

Lubricating oils Background

Paraffins are synthesized by the 'low temperature' Fischer-Tropsch (FT) process. This process produces synthetic linear paraffins spanning carbon numbers approximately C2 to C12. The liquid paraffins spanning carbon number C5-C22 are separated by distillation and hydrotreated to produce the highly pure liquid n-paraffins.

The paraffins (C_xH_y) are synthesized in the FT process from CO and H₂ (syngas). In the FT process one mole of CO reacts with two moles of H₂ to afford a hydrocarbon chain extension (-CH₂-). The oxygen from the CO is released as product water:



The subsequent FT chain-growth process is comparable with a polymerisation process resulting in a normal distribution of chain-lengths of the products. The reaction affords mainly aliphatic straight-chain hydrocarbons (C_xH_y). The liquid paraffins spanning carbon number C5-C20 are separated by distillation and hydrotreated to produce the highly pure n-paraffins.

Because the production process is totally synthetic, unique normal alkanes having low aromatic contents, negligible sulphur levels and which are practically odourless and colourless, are produced. These unique properties enable us to offer a range of superior environmentally friendly products which sets them apart from the liquid paraffins derived from crude origin. Not only are the products clean and environmentally friendly, the production process is one which results in far less hazardous emissions and negative impact on the environment.

Uses

The odourless nature, very low aromatic content, negligible residue on evaporation and general low impurity levels of our products makes them suitable for use as solvents in a wide range of applications where traditional solvents would not be considered, or have to be improved upon. Application range from the use as components in the preparation of tyres, rubber solutions, wood treatment products, adhesives, solvents for the extraction of seed oils, rolling oil applications, household cleaners, detergents and in various aerosols formulations.

These pure aliphatic paraffins also have relatively low evaporation. They are ideal for formulating quick-drying lacquers, paints, varnishes and inks where they are used as diluents and solvents. The high linearity of our aliphatic range also enables them to be used as raw materials in synthesis reactions such as in the production of chlorinated paraffins and linear alkylated benzenes (LAB).

In general, the unique properties of our synthetic n-paraffins namely, lack of colour and odour, the low toxicity, being readily biodegradable are sought after for environmentally conscious formulators covering a wide spectrum of applications.

Typical specifications of n-paraffins

<i>Properties</i>	<i>Units</i>	<i>Product</i>				
		C5-C6	C7-C8	C9-C11	C12-C13	C14-C20
Flash point	°C	<-20	0	45	90	110
<i>Distillation:</i>						
Initial boiling point	°C	55	96	156	213	250
Dry point	°C	98	128	195	225	315
Appearance		Bright & clear				
Colour	Saybolt	+25	+30	+30	+30	+30
Sulphur	mg/kg	2 max	2 max	2 max	5 max	1 max
Evaporation rate*	90%	6.75	1.97	0.199	0.015	<0.015
	100%	5.1	1.78	0.139	n/a	n/a
Aromatics	mass %	0.1 max	0.1 max	0.1 max	0.5 max	0.5 max
KB value		27	27	25	22	19
Aniline point	°C	72	74	80	89	102
Pour point	°C	<-40	<-40	-30	-10	6

*relative to butyl acetate = 1

Polymerisation solvents

Hydrocarbons derived from crude naturally contain significant amounts of unwanted impurities which are detrimental to the polymerisation processes. With our Fischer-Tropsch process we produce synthetic hydrocarbons containing only a few of these unwanted impurities. Through further hydro treating and other purification steps, we reduce these impurities even further to acceptable levels and beyond.

The high level of purity, being free of catalysts poisons such as oxygenates, sulphur, carbonyls, cyclic compounds or dienes and the relative inertness of our range make them suitable solvents or diluents for the polymerisation industry. They find use as reaction solvent in *solution phase polymerisation* to produce linear low density polyethylene (LLDPE) and high density polyethylene (HDPE), in *slurry phase processes* to produce polypropylene (PP) or various grades of polyethylene (PE) and in *gas phase processes* as catalyst or external donor carriers, and as diluents for peroxide to control rheology during the extrusion process.

Low aromatic (especially poly aromatic) levels and low benzene content makes our hydro treated range of synthetic hydrocarbons suitable for food contact applications.

Typical specifications for liquid paraffins

<i>Properties</i>	<i>Units</i>	<i>Product</i>			
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
Benzene	ppm	50	<10	<1	<1
Aromatics	ppm	50	50	50	50
Chlorides	ppm	<1	<1	<1	<1
Initial boiling point	°C	50	100	150	200
Dry point	°C	100	125	200	240
Odour		Neutral	Neutral	Neutral	Neutral
Bromine index	mg Br/100 g	<10	<10	<10	<10
Sulphur	ppm	<1	<1	<1	<1

Solvents for the extraction of metals

Because the production process of Liquid Paraffins is totally synthetic, unique normal alkanes having low aromatic contents, negligible sulphur levels and which are practically odourless and colourless, are produced. These unique properties enable us to offer a range of superior environmentally friendly products which sets them apart from the liquid paraffins derived from crude origin.

Our aliphatic range is used as metal extraction diluents for cobalt, nickel, copper, gold and zinc solvent extraction (SX) circuits. Importantly, our aliphatic diluents have proved to be the preferred diluent for the extraction of cobalt (Co) or for circuits which contain significant amounts of cobalt and nickel (Ni) making them susceptible to diluent oxidation.

Diluent oxidation causes the introduction of carboxylic acids and the formation of sodium carboxylates into the organic phase. The presence of carboxylic acids causes a significant fall-off in the Co/Ni separation factor. Sodium carboxylates interferes with the phase break causing drastic deterioration over time which eventually results in the failure of the circuit. Diluent oxidation in the absence of an anti-oxidant is very much faster for an aromatic diluent than for an aliphatic diluent. Therefore, aliphatic SX diluents are the preferred diluents in SX circuits in which the metals present promote the oxidation of the diluents.

Our diluents are also used on plants where low aromatic levels in diluents are preferred for health reasons and due to the environmental limits placed on total aromatic emissions. The inert nature of our range of diluents and the low aromatic content makes them suitable for use in such circuits. The aliphatic range is free of poly aromatic compounds which are known carcinogens.

Overall, our aliphatic diluents are preferred in SX circuits containing metals which promote the oxidation of the diluent; in SX plants that are health and safety conscious and those that prescribe to a low level of aromatic emissions for environmental reasons.

Typical specifications

<i>Properties</i>	<i>Units</i>	<i>Method</i>	<i>Product</i>			
			W	X	Y	Z
Viscosity at 40°C	cSt	ASTM D 445	1.19	1.9	2.4	2.78
Flash point	°C	ASTM D 93	40 min.	80 min.	110	110 min
Aromatics	mass %	ASTM D 1840	0.3 max.	0.3 max.	0.5 max.	0.3 max.
Copper corrosion		ASTM D 130	1a	1a	1a	1a
Density at 20°C	kg/l	Sasol 1.173	0.73	0.75	0.76	0.77
Odour			Neutral	Odourless		Odourless