Technical Information

Kolliphor® EL

Macrogolglycerol Ricinoleate (Ph. Eur.),
Polyoxyl 35 Castor Oil (USP-NF)

BASF
We create chemistry

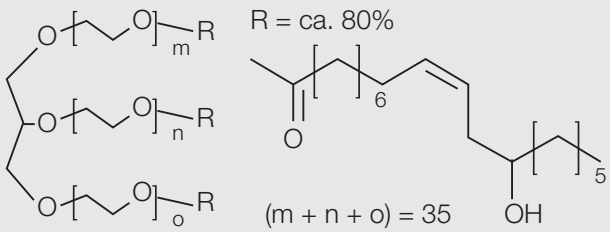
1. Technical properties

Description

Kolliphor® EL is a nonionic solubiliser and emulsifier made by reacting castor oil with ethylene oxide in a molar ratio of 1 : 35.

The main component of Kolliphor® EL is glycerol polyethylene glycol ricinoleate. Together with fatty acid esters of polyethylene glycol, this forms the hydrophobic part of the product. The smaller hydrophylic part consists of free polyethylene glycols and ethoxylated glycerol.

A diagram of the molecular formula is listed below:



Kolliphor® EL is a pale yellow oily liquid that is clear at temperatures above 26 °C. It has a faint but characteristic odor.

The hydrophilic-lipophilic balance (HLB) lies between 12 and 14.

CAS-number

61791-12-6

Solubility

Kolliphor® EL forms clear solutions in water. It is also soluble in many organic solvents, e.g.ethyl alcohol, n-propyl alcohol, isopropyl alcohol, ethyl acetate, chloroform, carbon tetrachloride, trichloroethylene, toluene and xylene.

In contrast to anionic emulsifying agents, Kolliphor® EL becomes less soluble in water at higher temperatures. Thus, aqueous solutions become turbid at a certain temperature.

Kolliphor® EL is miscible with all the other Kolliphor grades and, on heating, also with fatty acids, fatty alcohols and certain animal and vegetable oils. It is thus miscible with oleic and stearic acids, dodecyl and octa-decyl alcohols, castor oil, and a number of lipid-soluble substances.

Critical micelle concentration

The critical micelle concentration (CMC) is 0.02% w/w @ 37°C

Dispensing

It is recommended that Kolliphor® EL be heated to between 50 and 60 °C and lightly agitated prior to use. Kolliphor® EL exhibits complex melting behavior, and phase separation is known to occur depending on the shipping and storage conditions. This is easily overcome via melting and light mixing.

2. Handling

Please refer to the individual Material Safety Data Sheet (MSDS) for instructions on safe and proper handling and disposal.

3. Example application

Kolliphor® EL is recommended as a solubilizer and emulsifier in many different branches of industry. It is particularly suitable for the production of liquid preparations.

Kolliphor® EL is the industry standard pharmaceutical surfactant used primarily as a solubilizer and emulsifier.
Most notably the product is used in the following types of formulations (common concentration show):

- Softgel Capsules – 600 mg per dose
- Ophthalmics up to 5 % w/w
- Oral Solutions and Suspensions 0.5 – 45%
- Topicals – 4% w/w

In softgel applications, Kolliphor® EL is soluble in PEG 400 (Kollisolv® PEG 400) up to 50% w/w.
Kolliphor® EL is fully miscible in aqueous formulations.
For Parenteral Applications, please see Kolliphor® ELP.

Solubilization and Bioavailability Enhancement

Kolliphor® EL may be use very effectively in Lipid-Based Drug Delivery Systems, for example, Self-Emulsifying Drug Delivery Systems (SEDDS). In order to effectively make such formulations, high concentrations of primary surfactant, secondary surfactant, oil and aqueous phase are mixed. The resultant formulations are clear, low-viscosity, isotropic and suitable for encapsulation into softgels, hard shell capsules and other liquid formulations. Once the formulations are released inside the GIT, they emulsify into nanoscale (15 – 80 nm) droplets, which are further digested and absorbed, significantly increasing bioavailability.

In Vivo, it has been shown that Kolliphor® EL digests slightly faster than Kolliphor® RH 40 and can retain drug in solution (micelles) for a long period of time allowing for absorption to take place.

Note: Water or Ethanol is used as an aqueous phase – this is to account for atmospheric water that is absorbed from the environment or during encapsulation, thus maintaining stability and integrity of the system.

Example SEDDS Formulation 1 (High solubility, slow digestion)

This example shows high concentrations of Kolliphor® EL, this will result in moderate droplet sizes upon self-emulsification (120 nm) and slow digestion. Ethanol may be used in place of water to increase drug content.

Compound	Content
Kolliphor® EL	68 %
Kollisolv® MCT 70	10 %
Glyceryl Monooleate	12 %
Water / Ethanol	10 %

Example SEDDS Formulation 2 (Faster digestion, larger droplets)
This example shows higher oil concentrations, which will result in faster digestion and smaller oil droplets (35 nm). Ethanol may be used in place of water to increase drug content.

Compound	Content
Kolliphor® RH 40	42.5 %
Kollisolv® MCT 70	40.0 %
Glyceryl Monooleate	7.5 %
Water / Ethanol	10.0 %

Important note

The fine dispersion of compounds that can be achieved with the aid of Kolliphor® EL improves their absorption characteristics and efficacy.

Kolliphor® EL promotes the penetration of a number of active substances and can exert either activating or inactivating effects on others, e. g. antibiotics. Therefore, before Kolliphor® EL preparations are used in practice, it is advisable to subject them to thorough pharmacological tests.

Kolliphor® EL is subjected to thorough quality controls involving comprehensive chemical and physical tests. The individual production batches are not, however, subjected to biological tests. For this reason, producers of preparations that contain Kolliphor® EL must carry out their own tests to check the suitability of the respective material and of the final preparations.

Cattle that have been given certain vaccines or medicaments parenterally and have subsequently been injected with preparations containing Kolliphor® EL or similar solubilizers have displayed anaphylactic reactions in isolated cases involving exceptional circumstances. Anaphylactic reactions have occasionally been observed in humans after injections containing Kolliphor® EL. For this reason, the health authorities in the Federal Republic of Germany and the UK, for instance, have laid down that the content of polyethoxylated castor oil in injections for parenteral administration to humans must be declared, and that attention must be drawn to the possibility of side effects in the package insert. This is an aspect to which companies producing pharmaceuticals for human use must pay particular attention.

No side effects of this kind have been observed after oral administration of preparations containing Kolliphor® EL.

4. Safety data sheet

Safety data sheets are available on request and are sent with every consignment.

5. Retest date and storage conditions

Please refer to Quality & Regulatory Product Information (QRPI).

6. Specification

For current specification, please speak to your local BASF sales or technical representative.

7. Toxicological data

The toxicological abstracts are available on request.

8. PRD and Article numbers

PRD-No.*	Product name	Article numbers	Packaging
30554032	Kolliphor® EL	50539398	0.5 kg Plastic bottle
		50259799	0.5 kg Plastic bottle
		50251533	60 kg Steel drum

* BASF's commercial product number.

9. Publications

http://pharmaceutical.basf.com/en.html

August 2019