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# Lauroyl Macrogolglycerides

General Notices

*(Ph. Eur. monograph 1231)*

**Action and use**

Excipient.

Ph Eur

## DEFINITION

Mixtures of monoesters, diesters and triesters of glycerol and monoesters and diesters of macrogols with a mean relative molecular mass between 300 and 1500.

They are obtained by partial alcoholysis of saturated oils mainly containing triglycerides of lauric (dodecanoic) acid, using macrogol, or by esterification of glycerol and macrogol with saturated fatty acids, or by mixing glycerol esters and condensates of ethylene oxide with the fatty acids of these hydrogenated oils.

## CHARACTERS

**Appearance**

Pale yellow waxy solid.

**Solubility**

Dispersible in hot water, freely soluble in methylene chloride.

## IDENTIFICATION

A. Thin-layer chromatography (2.2.27).

*Test solution* Dissolve 1.0 g of the substance to be examined in *methylene chloride R* and dilute to 20 mL with the same solvent.

*Plate* *TLC silica gel plate R*.

*Mobile phase* *hexane R*, *ether R* (30:70 *V/V*).

*Application* 10 µL.

*Development* Over a path of 15 cm.

*Drying* In air.

*Detection* Spray with a 0.1 g/L solution of *rhodamine B R* in *ethanol (96 per cent) R* and examine in ultraviolet light at 365 nm.

*Results* The chromatogram shows a spot due to triglycerides with an $R_F$ value of about 0.9 ($R_{st}$ 1) and spots due to 1,3-diglycerides ($R_{st}$ 0.7), to 1,2-diglycerides ($R_{st}$ 0.6), to monoglycerides ($R_{st}$ 0.1) and to esters of macrogol ($R_{st}$ 0).

B. Hydroxyl value (see Tests).
C. Saponification value (see Tests).
D. Composition of fatty acids (see Tests).

## TESTS

**Drop point** (*2.2.17*)

Introduce into the cup the substance to be examined, which has been melted by heating for 1 h in an oven at 100 ± 2 °C, and allow to stand for 5 h at about 5 °C.

| Ethylene oxide units per molecule (nominal value) | Type of macrogol | Drop point |
|---|---|---|
| 6 | 300 | 33 - 38 |
| 8 | 400 | 36 - 41 |
| 12 | 600 | 38 - 43 |
| 32 | 1500 | 42.5 - 47.5 |

**Acid value** (*2.5.1*)

Maximum 2.0, determined on 2.0 g.

**Hydroxyl value** (*2.5.3, Method A*)

Use 1.0 g.

| Ethylene oxide units per molecule (nominal value) | Type of macrogol | Hydroxyl value |
|---|---|---|
| 6 | 300 | 65 - 85 |
| 8 | 400 | 60 - 80 |
| 12 | 600 | 50 - 70 |
| 32 | 1500 | 36 - 56 |

**Peroxide value** (*2.5.5, Method A*)

Maximum 6.0, determined on 2.0 g.

**Saponification value** (*2.5.6*)

Use 2.0 g.

| Ethylene oxide units per molecule (nominal value) | Type of macrogol | Saponification value |
|---|---|---|
| 6 | 300 | 190 - 204 |
| 8 | 400 | 170 - 190 |
| 12 | 600 | 150 - 170 |
| 32 | 1500 | 79 - 93 |

**Alkaline impurities**

Introduce 5.0 g into a test tube and carefully add a mixture, neutralised if necessary with *0.01 M hydrochloric acid* or with *0.01 M sodium hydroxide*, of 0.05 mL of a 0.4 g/L solution of *bromophenol blue R* in *ethanol (96 per cent) R*, 0.3 mL of *water R* and 10 mL of *ethanol (96 per cent) R*. Shake and allow to stand. Not more than 1.0 mL of *0.01 M hydrochloric acid* is required to change the colour of the upper layer to yellow.

**Free glycerol**

Maximum 3.0 per cent.

Dissolve 1.20 g in 25.0 mL of *methylene chloride R*. Heat if necessary. After cooling, add 100 mL of *water R*. Shake and add 25.0 mL of *periodic acetic acid solution R*. Shake and allow to stand for 30 min. Add 40 mL of a 75 g/L solution of *potassium iodide R*. Allow to stand for 1 min. Add 1 mL of *starch solution R*. Titrate the iodine with *0.1 M sodium thiosulfate*. Carry out a blank titration.

1 mL of *0.1 M sodium thiosulfate* is equivalent to 2.3 mg of glycerol.

**Composition of fatty acids** (*2.4.22, Method A*)

*Composition of the fatty-acid fraction of the substance*:

— *caprylic acid*: maximum 15.0 per cent;

— *capric acid*: maximum 12.0 per cent;

— *lauric acid*: 30.0 per cent to 50.0 per cent;

— *myristic acid*: 5.0 per cent to 25.0 per cent;

— *palmitic acid*: 4.0 per cent to 25.0 per cent;

— *stearic acid*: 5.0 per cent to 35.0 per cent.

**Ethylene oxide and dioxan** (*2.4.25*)

Maximum 1 ppm of ethylene oxide and maximum 10 ppm of dioxan.

**Water** (*2.5.12*)

Maximum 1.0 per cent, determined on 1.00 g. Use a mixture of 30 volumes of *anhydrous methanol R* and 70 volumes of *methylene chloride R* as solvent.

**Total ash** (*2.4.16*)

Maximum 0.1 per cent.

## LABELLING

The label states the type of macrogol used (mean relative molecular mass) or the number of units of ethylene oxide per molecule (nominal value).

## FUNCTIONALITY-RELATED CHARACTERISTICS

*This section provides information on characteristics that are recognised as being relevant control parameters for one or more functions of the substance when used as an excipient (see chapter 5.15). Some of the characteristics described in the Functionality-related characteristics section may also be present in the mandatory part of the monograph since they also represent mandatory quality criteria. In such cases, a cross-reference to the tests described in the mandatory part is included in the Functionality-related characteristics section. Control of the characteristics can contribute to the quality of a medicinal product by improving the consistency of the manufacturing process and the performance of the medicinal product during use. Where control methods are cited, they are recognised as being suitable for the purpose, but other methods can also be used. Wherever results for a particular characteristic are reported, the control method must be indicated.*

*The following characteristics may be relevant for lauroyl macrogolglycerides used as self-emulsifying agents, solubilisers, modified-release agents and wetting agents for powders and tablets.*

**Hydroxyl value**

(see Tests).

**Saponification value**

(see Tests).

**Composition of fatty acids**

(see Tests).