

## 1918 Nonionic Surfactants

10. A clear, colourless or light yellow, viscous liquid. Miscible with water, with alcohol, and with vegetable oils. Store in airtight containers.

### Profile

Octoxinols have surface active properties and may be used as solubilising agents. They are also used as spermicides.

### Preparations

**Proprietary Preparations** (details are given in Part 3)

**Austral.:** Ortho-Gynol; **NZ:** Ortho-Gynol; **USA:** Ortho-Gynol†.

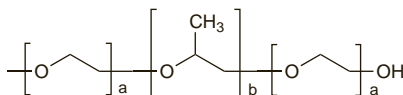
**Multi-ingredient:** **Austral.:** Summers Eve Feminine; **Chile:** Summer's Eve Hierbast†.

### Poloxamers

Polioxietilen-propilenglicol; Poloksamerit; Poloksamerai; Poloxamera; Poloxamerek; Poloxamerer; Poloxamères; Poloxameros; Poloxamery; Polyethylene-polypropylene glycol.  $\alpha$ -Hydro- $\omega$ -hydroxy-poly(oxyethylene)poly(oxypropylene)poly(oxyethylene) block copolymer.

Полюксамеры

CAS — 9003-11-6.



**Nomenclature.** Poloxamer is *BAN* and *rINN*. The name is followed by a figure, the first 2 digits of which, when multiplied by 100, correspond to the approximate average molecular weight of the polyoxypropylene portion and the third digit, when multiplied by 10, corresponds to the percentage by weight of the polyoxyethylene portion. *USAN* specifies Poloxamer 182D, Poloxamer 182LF, Poloxamer 188, Poloxamer 188LF, and Poloxamer 331.

Poloxalene (*BAN*, *USAN*, *rINN*) is also a poloxamer.

**Pharmacopoeias.** In *Eur.* (see p.vii). Also in *USNF*.

**Ph. Eur. 6.2** (Poloxamers). A synthetic block copolymer of ethylene oxide and propylene oxide represented by the general formula:  $\text{HO}(\text{C}_2\text{H}_4\text{O})_a(\text{C}_3\text{H}_6\text{O})_b(\text{C}_2\text{H}_4\text{O})_a\text{H}$ . It may contain a suitable antioxidant. Poloxamer 124 is a colourless or almost colourless liquid. Poloxamer 237 and poloxamer 338 are white or almost white, waxy powders, microbeads or flakes; m.p. about 50°. Poloxamers 124, 237, and 338 are very soluble in water and in alcohol; practically insoluble in petroleum spirit (50° to 70°). pH of a 10% solution in water is 5.0 to 7.5. Store in airtight containers.

**USNF 26** (Poloxamer). A synthetic block copolymer of ethylene oxide and propylene oxide with the general formula  $\text{HO}(\text{C}_2\text{H}_4\text{O})_a(\text{C}_3\text{H}_6\text{O})_b(\text{C}_2\text{H}_4\text{O})_a\text{H}$ . It may contain a suitable antioxidant. Poloxamer 124 is a colourless liquid with a mild odour. Poloxamers 237 and 338 are white, prilled or cast solids, odourless or with a mild odour. All poloxamers are freely soluble in water and in alcohol. Poloxamer 124 is freely soluble in isopropyl alcohol and in propylene glycol; poloxamer 237 is sparingly soluble in isopropyl alcohol and in xylene; poloxamer 338 is sparingly soluble in propylene glycol; poloxamer 124 is freely soluble in xylene. A 2.5% solution in water has a pH of 5.0 to 7.5. Store in airtight containers.

**Incompatibility.** Poloxamers have been reported to be incompatible with hydroxybenzoates and phenols.

### Poloxalene (*BAN*, *USAN*, *rINN*)

Poloxalène; Poloxaleno; Poloxalenum; SKF-18667.

Полюксален

CAS — 9003-11-6.

**Pharmacopoeias.** In *US* for veterinary use only.

**USP 31** (Poloxalene). A synthetic block copolymer of ethylene oxide and propylene oxide. A colourless or pale yellow liquid. Soluble in water, in chloroform, and in ethylene dichloride. A 2.5% solution in water has a pH of 5.0 to 7.5. Store in airtight containers at a temperature of 8° to 15°. Protect from light.

### Poloxamer 188 (*BAN*, *USAN*, *rINN*)

Poloxalkol; Poloxamère 188; Poloxámero 188; Poloxamerum 188.

Полюксамер 188

NOTE. Compounded preparations of poloxamer 188 may be represented by the following names:

- Co-danthramer *x/y* (*BAN*)—where *x* and *y* are the strengths in milligrams of dantron and poloxamer respectively.

**Pharmacopoeias.** In *Eur.* (see p.vii). Also in *USNF*.

**Ph. Eur. 6.2** (Poloxamers). Poloxamer 188 is a poloxamer in which *a* in the general formula given above is 75 to 85 and *b* is 25 to 30; it has an average molecular weight of 7680 to 9510. It is a white or almost white, waxy powder, microbeads, or flakes. M.p. about 50°. Very soluble in water and in alcohol; practically

insoluble in petroleum spirit (50° to 70°). pH of a 10% solution is 5.0 to 7.5. Store in airtight containers.

**USNF 26** (Poloxamer). Poloxamer 118 is a poloxamer in which *a* in the general formula averages 80 and *b* averages 27; it has an average molecular weight of 7680 to 9510. A white prilled or cast solid, odourless or with a very mild odour. M.p. about 52°. Freely soluble in water and in alcohol. Store in airtight containers.

### Poloxamer 407 (*BAN*, *rINN*)

Poloxamère 407; Poloxámero 407; Poloxamerum 407.

Полюксамер 407

**Pharmacopoeias.** In *Eur.* (see p.vii). Also in *USNF*.

**Ph. Eur. 6.2** (Poloxamers). Poloxamer 407 is a poloxamer in which *a* in the general formula given above is 95 to 105 and *b* is 54 to 60; it has an average molecular weight of 9840 to 14 600. It is a white or almost white, waxy powder, microbeads, or flakes. M.p. about 50°. Very soluble in water and in alcohol; practically insoluble in petroleum spirit (50° to 70°). pH of a 10% solution in water is 5.0 to 7.5. Store in airtight containers.

**USNF 26** (Poloxamer). Poloxamer 407 is a poloxamer in which *a* in the general formula averages 101 and *b* averages 56; it has an average molecular weight of 9840 to 14 600. A white, prilled or cast solid, odourless or with a very mild odour. M.p. about 56°. Freely soluble in water, in alcohol, and in isopropyl alcohol. Store in airtight containers.

### Precautions

Poloxamers may increase the absorption of liquid paraffin and other fat-soluble substances.

### Uses and Administration

Poloxamers are used as emulsifying agents for intravenous fat emulsions, as solubilising agents to maintain clarity in elixirs and syrups, and as wetting agents for antibacterials. They may also be used in ointment or suppository bases and as tablet binders or coaters.

Poloxamer 188 is used as a wetting agent in the treatment of constipation. It is usually given with a laxative such as dantron. It has also been used as an emulsifying agent in fluorocarbon blood substitutes. Poloxamer 188 has been investigated for its ability to improve blood flow in sickle-cell crisis; it has also been tried in myocardial infarction. Other investigational uses include the treatment of burns.

Poloxamer 407 is used in solutions for contact lens care, as is poloxamer 338.

Poloxalene is used as a defoaming agent in the treatment of bloat in ruminants.

### References

- Orringer EP, *et al.* Purified poloxamer 188 for treatment of acute vaso-occlusive crisis of sickle cell disease: a randomized controlled trial. *JAMA* 2001; **286**: 2099–2106.
- Gibbs WJ, Hagemann TM. Purified poloxamer 188 for sickle cell vaso-occlusive crisis. *Ann Pharmacother* 2004; **38**: 320–4.
- Dumortier G, *et al.* A review of poloxamer 407 pharmaceutical and pharmacological characteristics. *Pharm Res* 2006; **23**: 2709–28.

### Preparations

**Proprietary Preparations** (details are given in Part 3)

**Austral.:** Coloxyl; **Plagel†**; **Canad.:** Clerz†; **Fr.:** Alkenide†; **NZ:** Coloxyl; **S.Afr.:** Plagel.

**Multi-ingredient:** **IrL:** Ailax; **Codalax**; **Cotron**; **NZ:** Codalax†; **Conthram†**; **Thai:** Siduol; **UK:** Ailax†; **Codalax**; **Danlax**; **USA:** Baby Orajel Tooth and Gum Cleanser; **ControlRx**.

### Polyoxyl Castor Oils

Aceites de ricino polioxietilenados; Macroglyglycerol Ricinoleate; Macroglyglycérol, ricinoléate de; Macroglyglyceroli ricinoleas; Makrogol-glicerín-éter-ricinoléat; Makroglyglycerolio ricinoleatas; Makroglyglycerolricinoleat; Makroglyglyserolirisiinoleaatti; Makroglyglycerolu ricynolealin; Polyethoxylated Castor Oils; Polyoxyethylene Castor Oils.

Полиэтиленгликоля Касторовые Масла

**Pharmacopoeias.** In *Eur.* (see p.vii).

**Ph. Eur. 6.2** (Macroglyglycerol Ricinoleate; Polyoxyl Castor Oil BP 2008). It contains mainly ricinoleyl glycerol ethoxylated with 30 to 50 molecules of ethylene oxide (nominal value), with small amounts of macrogol ricinoleate and of the corresponding free glycols. It results from the reaction of castor oil with ethylene oxide. A clear, yellow, viscous liquid or semi-solid. Relative density about 1.05; viscosity, at 25°, 500 to 800 mPa s. Freely soluble in water and in alcohol; very soluble in dichloromethane. Protect from light.

### Polyoxyl 35 Castor Oil

Aceite de ricino polioxil 35.

Полиэтиленгликоля 35 Касторовое Масло

**Pharmacopoeias.** In *USNF*.

**USNF 26** (Polyoxyl 35 Castor Oil). A mixture of the tri-ricinoleate ester of ethoxylated glycerol with smaller amounts of macrogol ricinoleate and the corresponding free glycols. It is

produced by reacting 1 mole of glycerol ricinoleate with about 35 moles of ethylene oxide.

A yellow oily liquid with a faint characteristic odour. Sp. gr. 1.05 to 1.06; viscosity, at 25°, 650 to 850 mPa s. Very soluble in water, producing a practically odourless and colourless solution; soluble in alcohol and in ethyl acetate; insoluble in mineral oils. Store in airtight containers.

**Incompatibility.** Polyoxyl castor oils are reported to affect polyvinyl chloride containers and apparatus adversely.

### Adverse Effects

Polyoxyl castor oils (such as *Cremophor EL*) used as vehicles in intravenous injections have been associated with severe anaphylactoid reactions, hyperlipidaemias, alterations in blood viscosity, and erythrocyte aggregation. They may also lead to adverse effects due to alterations in the pharmacokinetics of the formulated drug.

### References

- Bagnarello AG, *et al.* Unusual serum lipoprotein abnormality induced by the vehicle of miconazole. *N Engl J Med* 1977; **296**: 497–9.
- Forrest ARW, *et al.* Long-term Althesin infusion and hyperlipidaemia. *BMJ* 1977; **2**: 1357–8.
- Dye D, Watkins J. Suspected anaphylactic reaction to Cremophor EL. *BMJ* 1980; **280**: 1353.
- Howrie DL, *et al.* Anaphylactoid reactions associated with parenteral cyclosporine use: possible role of Cremophor EL. *Drug Intell Clin Pharm* 1985; **19**: 425–7.
- Chapuis B, *et al.* Anaphylactic reaction to intravenous cyclosporine. *N Engl J Med* 1985; **312**: 1259.
- Siddall SJ, *et al.* Anaphylactic reactions to teniposide. *Lancet* 1989; **i**: 394.
- ten Tije AJ, *et al.* Pharmacological effects of formulation vehicles: implications for cancer chemotherapy. *Clin Pharmacokinet* 2003; **42**: 665–85.
- Hennenfent KL, Govindan R. Novel formulations of taxanes: a review. Old wine in a new bottle? *Ann Oncol* 2006; **17**: 735–49.

### Uses

Polyoxyl castor oils are macrogol esters used as emulsifying and solubilising agents. Polyoxyl 35 castor oil has been used as a solvent in vehicles for various intravenous injections.

### Polyoxyl Hydrogenated Castor Oils

Aceites de ricino hidrogenados y polioxietilenados; Macroglyglycerol Hydroxystearate; Macroglyglycérol, hydroxystéarate de; Macroglyglyceroli hydroxystearas; Makrogol-glicerín-éter-hidroxiszterát; Makroglyglycerolio hidrokissteratas; Makroglyglycerol-hydroxistearat; Makroglyglyserolihiidrokissteaatti.

Полиэтиленгликоля Касторовые Масла

Гидрогенизированные

**Pharmacopoeias.** In *Eur.* (see p.vii).

**Ph. Eur. 6.2** (Macroglyglycerol Hydroxystearate; Hydrogenated Polyoxyl Castor Oil BP 2008). It contains mainly trihydroxystearyl glycerol ethoxylated with 7 to 60 molecules of ethylene oxide (nominal value), with small amounts of macrogol hydroxystearate and of the corresponding free glycols. It results from the reaction of hydrogenated castor oil with ethylene oxide. Polyoxyl hydrogenated castor oil with less than 10 units of ethylene oxide per molecule is a yellowish, turbid, viscous liquid. Practically insoluble in water; dispersible in alcohol; soluble in acetone. Polyoxyl hydrogenated castor oil with more than 20 units of ethylene oxide per molecule is a white or yellowish, semi-liquid or pasty mass. Freely soluble in water, in alcohol, and in acetone; practically insoluble in petroleum spirit.

### Polyoxyl 40 Hydrogenated Castor Oil

Aceite de ricino hidrogenado polioxil 40.

Полиэтиленгликоля 40 Касторовое Масло

Гидрогенизированное

**Pharmacopoeias.** In *USNF*.

**USNF 26** (Polyoxyl 40 Hydrogenated Castor Oil). A mixture of mainly the trihydroxystearate ester of ethoxylated glycerol, with smaller amounts of macrogol trihydroxystearate and the corresponding free glycols. It is produced by reacting 1 mole of glycerol trihydroxystearate with about 40 to 45 moles of ethylene oxide.

A white to yellowish paste or pasty liquid with a faint odour. Congealing range 20° to 30°. Very soluble in water, producing an odourless, colourless solution; soluble in alcohol and in ethyl acetate; insoluble in liquid paraffin. Store in airtight containers.

### Profile

Polyoxyl hydrogenated castor oils are used as surfactants.

### Polysorbates

Polisorbatos.

Полисорбаты

**Description.** A series of mixtures of fatty acid esters of sorbitol and its anhydrides copolymerised with about 20 moles of ethylene oxide for each mole of sorbitol and its anhydrides.