SUMITOMO SEIKA

SUMITOMO SEIKA CHEMICALS CO.,LTD.

PEO®

Water-Soluble Thermoplastic Resin

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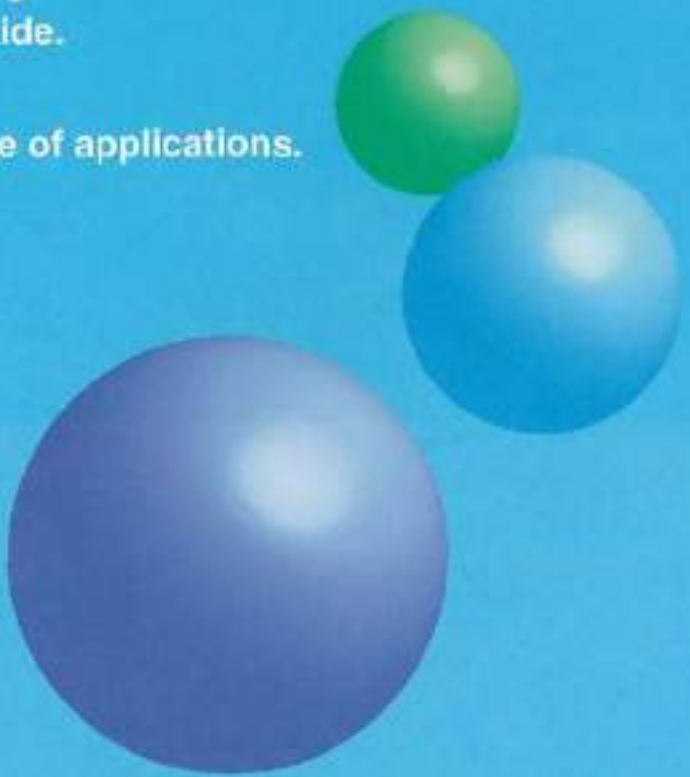
PEO is a nonionic water-soluble thermoplastic resin with properties that include excellent coagulation, binding effect, thickening, and friction reduction. As such, PEO can be used in a wide range of industrial applications.

PEO is a high-polymer polyethylene oxide with molecular weights ranging from 150,000 to 10 million, and is created through the polymerization of ethylene oxide.

PEO is being used in a wide range of applications.



Contents

1 Product Features

The following is a list of the product features offered by PEO.

- Water-soluble thermoplastic resin.
- Also soluble in various organic solvents.
- Nonionic.
- When dissolved, the solution shows high viscosity even at low density, making PEO an effective thickener.
- Products with high-molecular weights have dispersing and coagulation properties.
- Thermoplastic, so PEO can be used for extrusion molding, foundry molding, and calendaring molding.
- Cannot be broken down by bacteria.
- Aqueous solution reduces friction resistance.
- Forms associated molecules with chemical compounds with high polarity such as urea, acrylic resin, and phenol resin.

2 Physical Properties

Chemical Name ..... Polyethylene Oxide
Structural Formula ..... $-(CH_2CH_2O)_n-$
Appearance ..... White Powder
Melting Point ..... 65-67℃
Particle Size ..... 1000 μm throughout
Bulk Density ..... approx. 0.3 to 0.5kg/l

◆Grade List

Grades	Average Molecular Weight	Aqueous Solution Viscosity [mPa·s] at 25 ℃	
PEO-29	8,000,000-10,000,000	800-1,000 (0.5% soln.)	spindle no.2
PEO-27	6,000,000- 8,000,000	600- 800 (0.5% soln.)	spindle no.2
PEO-18	4,300,000- 4,800,000	250- 430 (0.5% soln.)	spindle no.1
PEO-15	3,300,000- 3,800,000	130- 250 (0.5% soln.)	spindle no.1
PEO- 8	1,700,000- 2,200,000	20- 70 (0.5% soln.)	spindle no.1
PEO- 4	1,100,000- 1,500,000	4,000-7,000 (5% soln.)	spindle no.3
PEO- 3	600,000- 1,100,000	2,500-5,500 (5% soln.)	spindle no.3
PEO- 2	400,000- 600,000	200-2,500 (5% soln.)	spindle no.1,2
PEO- 1	150,000- 400,000	50- 200 (5% soln.)	spindle no.1

Brookfield LVT type Viscometer 12 rpm

- Pulp Dispersing Agent Grade for Paper Manufacturing····· PFZ Series
- Cosmetics Grade·····1P, 3P, 8P, 15P, 18P, 27P

◆Application Examples and Grades

Application	Corresponding Grade	Function
■Paper Industry		
Pulp Dispersion Grade for Paper Manufacturing	PEO-PFZ Series	Pulp Dispersion, Friction Resistance Reduction
Yield Improver for Newsprint and Paper Boards	PEO-18, 27, 29	Coagulant
■Textile Industry		
Warp Adhesive	PEO-1, 2, 3, 4	Sizing, Coating
Printing Auxiliary Agent	PEO-1, 2, 3, 4	
Antistatic Agent for Synthetic Textiles	PEO-1, 2, 3, 4	
■Glass Industry		
Fiberglass Sizing Agent	PEO-1, 2, 3, 4	Sizing
■Civil Engineering and Construction		
Slurry Transport	PEO-18, 27, 29	Reduction of Friction Resistance and Modification of Fluidity
Extrusion Molded Construction Materials	PEO-1, 2, 3, 4, 8	Improvement of Sliding Properties
Polymer Cement	PEO-1, 2, 3, 4, 8, 15	Dispersing Agent
■Ceramics Industry		
Auxiliary Molding Agent	PEO-1, 2, 3, 4, 8, 15	Binding, Coating
■Adhesives Industry		
Adhesives for Securing the Ends of Paper Rolls	PEO-1, 2, 3, 4, 8	Wet Adhesive
■Coating Materials Industry		
Emulsion Paint Viscosity Improver	PEO-1, 2, 3, 4, 8	Viscosity Improvement
■Metals and Mining		
Elimination of Viscosity and Silica	PEO-18, 27, 29	Coagulant
Collection of Airborne Mineral Phosphate	PEO-18, 27, 29	
■Polymer Industry		
Auxiliary Agent for Suspension Polymerization	PEO-18, 27, 29	Surface Activation, Protective Colloid
■Cosmetics		
Viscosity Improver for Hair Wax, Lotion, etc.	PEO-1P, 3P, 8P, 15P, 18P, 27P	Viscosity Improvement, Surface Activation

3 Dissolving

Methods for Dissolving PEO in Aqueous Solution

PEO dissolves completely in water, but in order to achieve total dissolving, the PEO must first be completely dispersed.

One simple method for dissolving PEO is to slowly add it to water while the water is being stirred. Another method that can be used is to first make a slurry of PEO in water-soluble solvent medium, and then add water.

Sumitomo Seika can offer dissolving equipment plan proposals as needed for your company's laboratories, equipment, or facilities.

4 Package Format

PEO is available in the following to standard package formats, but can also be provided in other formats such as in big bags. Please contact Sumitomo Seika for additional information.

- 10kg Cardboard Box
- 50kg Fiberboard Drum

5 Storage and Handling

5-1 Storage

PEO should be stored in a cool dark place away from direct sunlight, rain, dew, high humidity, and heat sources. Temperature in the storage area should not exceed 30℃.
PEO should be used within three months after delivery.

5-2 Precautions to Be Observed in the Event of a Product Spill

If PEO powder spills onto the floor and gets wet, it will become extremely slippery, so please pay your attention when working around spilt PEO.

5-3 Dust Explosion

There is a risk of dust explosion when PEO is used in a closed area or around air circulation equipment and similar equipment. Please exercise the necessary caution in such cases.

6 Product Safety

Please refer to the material safety data sheet (MSDS) for information about safe product handling.

7 Uses Other Than Industrial Applications

PEO is manufactured for industrial applications. If PEO is to be used for other types of applications such as food products, food additives, pharmaceuticals, pharmaceutical additives, or cosmetics, please verify product safety and conformity to legal requirements.

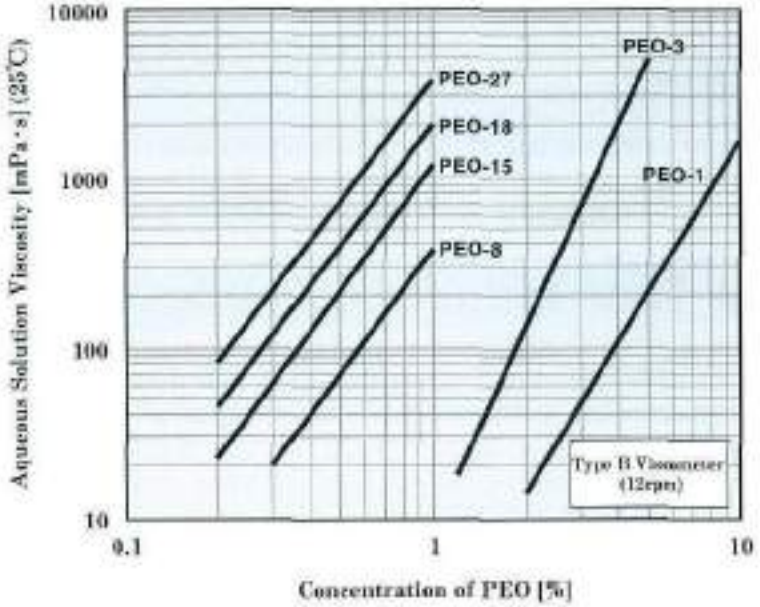
8 Appendix Table

◆PEO Solubility in Various Organic Solvents

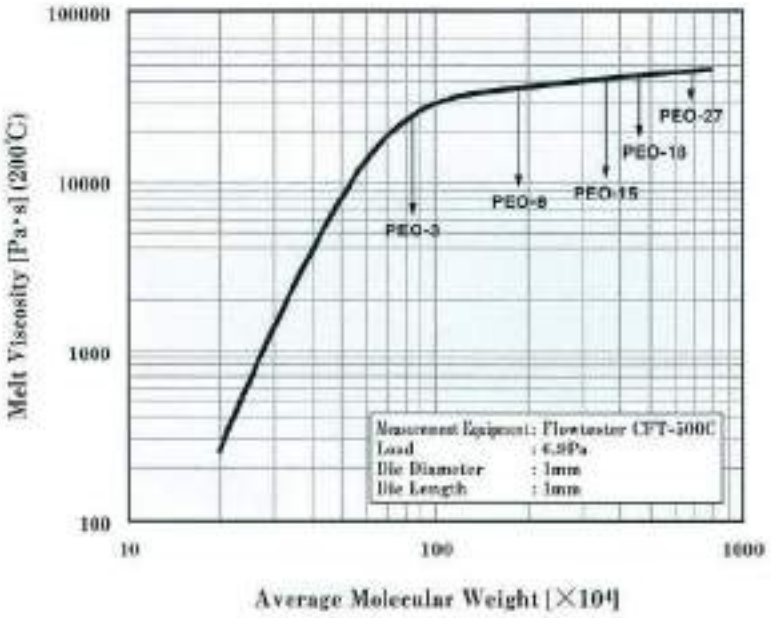
Temperature possible to dissolve	Aliphatic and Aromatic Hydrocarbons	Alcohols, Esters	Kentones, Ethers	Others
[℃]				Acetonitorile 1,2-Dichloro ethane Chloroform
30	Benzene			
	Toluene Xylene	Ethylene Carbonate Propylene Carbonate Methanol Ethanol Propanol	Tetrahydroturan 1,4-Dioxane Acetone Methyl Ethyl Ketone	Dimethylformamide
60				
Solvents in Which PEO Does Not Dissolve at Any Temperature	Pentane Hexane Heptane	Glycerol Ethylene Glycol	Ethyl Ether Propyl Ether Butyl Ether	

※ Solubility may vary slightly depending on molecular weight and viscosity.

◆Correlation between PEO Aqueous Solution Concentration and Viscosity

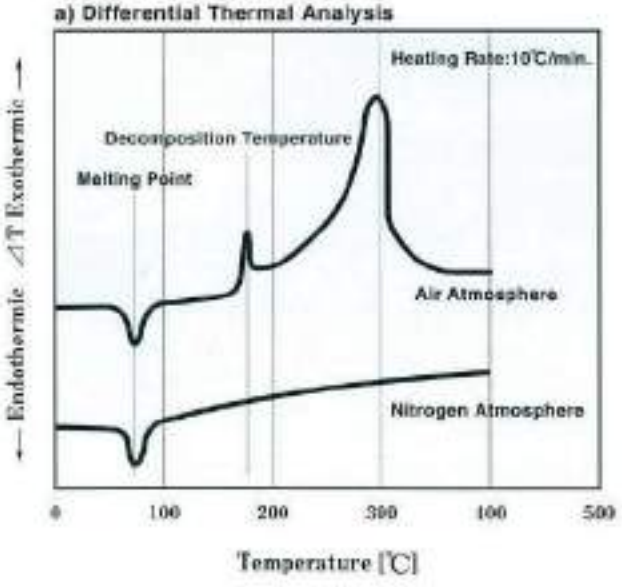


◆Correlation between PEO Molecular Weight and Melt Viscosity

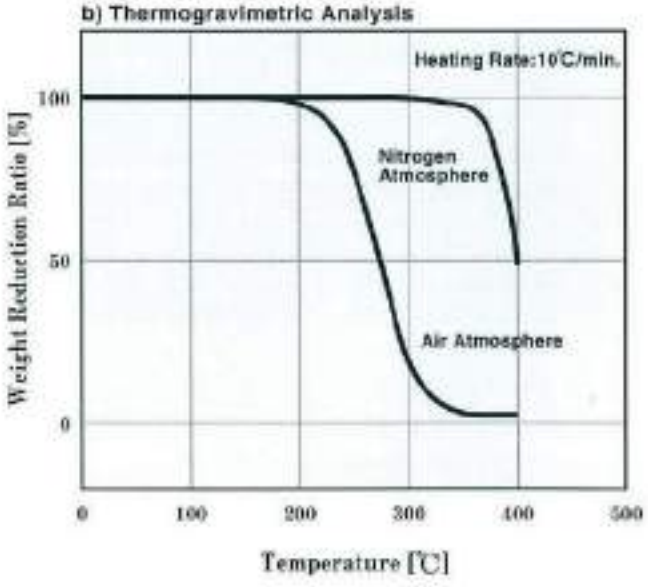


◆Thermal Analysis

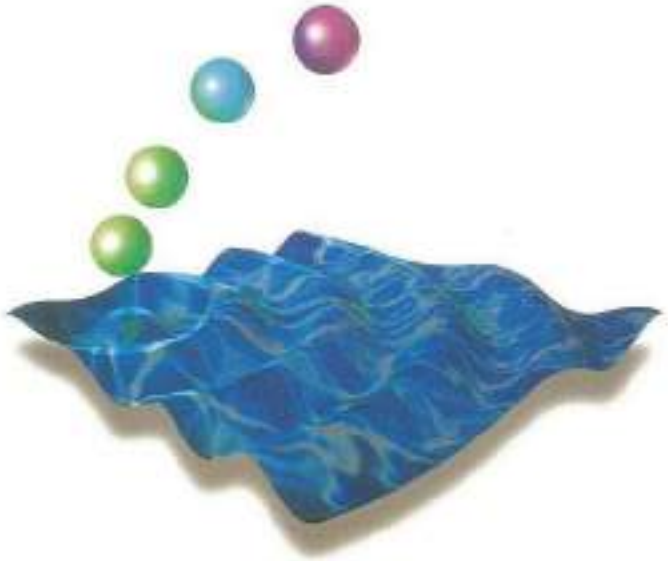
a) Differential Thermal Analysis



b) Thermogravimetric Analysis



※ The information shown is based on currently available materials and data. However, no guarantees are made with respect to the data or evaluation information listed herein.



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Intellectual Property Right Notice

SUMITOMO SEIKA CHEMICALS CO.,LTD.

FUNCTIONAL CHEMICALS DIVISION

Head office:

(Tokyo) Kudankita Chiyoda-ku, Tokyo, 102-0073, Japan
Tel. +81-3-3230-[illegible] Fax. +81-3-3230-0530

2009.6.30
FP-P-0902-PEO
0902-01-104D (E)