

Polyaldo® 6-2-S Polyglyceryl Ester

Natural Emulsifier for Enhanced Formulation Thickening



INCI Name: Polyglyceryl-6 Distearate

SAP Code: 01007160

Preservative: None

Nonionic O / W Emulsifier

- O / W emulsifier with HLB = 6
- Good for skin and hair applications
- Multiple formulation bases; thick creams, facial serums, milks
- Offers excellent viscosity build in conjunction with other Polyaldo® Polyglyceryl Esters (patent-pending application)

From Nature

- ECOCERT approved– Kosher food grade (KFG)
- Manufactured from 100% plant-derived raw materials

Cost Efficient

- Highly efficient in concentrations of 1 – 3 %
- Forms emulsions with improved viscosity, enhanced thickening
- Simplifies formulations and reduces costs by eliminating the need of multiple emulsifiers and reducing rheology builders

Thicken Your Formulation with Naturally-Derived Polyaldo® Emulsifiers

Polyaldo® 6-2-S polyglyceryl ester is a naturally-derived O/W emulsifier based on 100% plant derived raw materials. With an HLB of 6, this multi-functional emulsifier can help create a stable, aesthetically pleasing emulsion and can range from heavy cold creams to light-as-air sprayable milks. When used in conjunction with Polyaldo® 10-1-S Pastillated, Polyaldo® 6-2-S polyglyceryl ester has been shown to thicken a formulation by increasing the viscosity.

Thicken Your Formulation with Naturally-Derived Polyaldo® Emulsifiers

Polyaldo® 6-2-S polyglyceryl ester is composed of two parts; a hydrophilic head and hydrophobic tail. The hydrophilic head is composed of six (6) units of glycerin while the hydrophobic tail is made of stearic acid. Polyaldo® 6-2-S polyglyceryl ester is a diester and, therefore, has two hydrophobic tails, making the molecule more hydrophobic than hydrophilic (fig. 1)

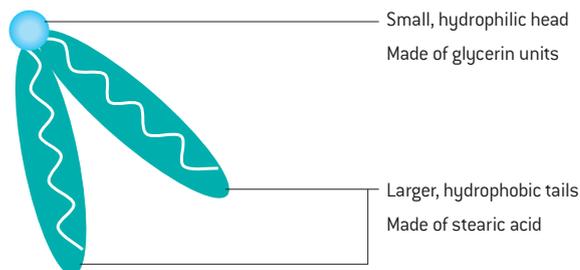


Fig. 1

Molecular representation of Polyaldo® 6-2-S polyglyceryl ester. The red represents the smaller, hydrophilic head. The two yellow tails represent the larger, hydrophobic tails.

A Perfect Match! Polyaldo® 6-2-S and Polyaldo® 10-1-S Pastillated Polyglyceryl Esters

Extensive research has been conducted on Polyaldo® 6-2-S polyglyceryl ester to optimize its functionality as an emulsifier. Lonza Inc. has discovered that Polyaldo® 6-2-S performs exceptionally well in the presence of another polyglyceryl ester, Polyaldo® 10-1-S Pastillated, and fatty alcohol. This patent-pending Polyaldo® emulsifier combination has been shown to outperform traditional emulsifier systems by increasing formulation viscosity and provide formulators with enhanced formulation thickening.

The synergy between Polyaldo® 6-2-S and Polyaldo® 10-1-S Pastillated has to do with their molecular structures. Polyaldo® 6-2-S polyglyceryl ester has a twin tail molecular structure, with a smaller hydrophilic head and larger hydrophobic tails (fig. 2a). When the two emulsifiers are combined in a formulation, they create a novel order at the oil/water interface (fig. 2b). The packing of Polyaldo® emulsifiers creates lamellar structures (fig. 2c), ideal structure formations for quality emulsions with increased viscosity and improved stability.

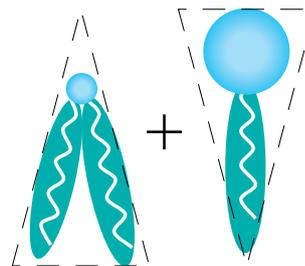


Fig. 2a

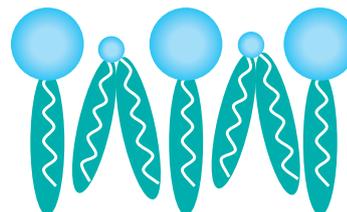


Fig. 2b

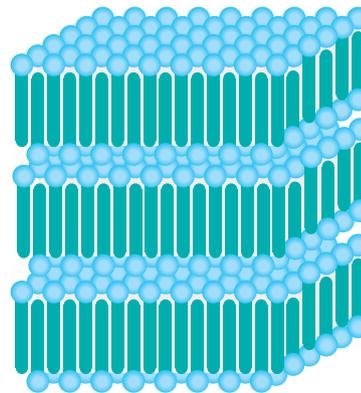


Fig. 2c

Fig. 2a, b, c The combination of Polyaldo® 6-2-S and Polyaldo® 10-1-S Pastillated form a novel order at the oil/water interface, creating lamellar structures.

To confirm the efficacy of Polyaldo® 6-2-S and Polyaldo® 10-1-S Pastillated, a base emulsion was created utilizing the two emulsifiers and compared against a traditional emulsifier system, Steareth-2 and Steareth-21. The combined emulsifiers were used at a 2% use level in the presence of 15% oil phase and 3% fatty alcohol. The emulsions were created under identical conditions and evaluated concurrently.

Evaluation of Polyaldo® 6-2-S + Polyaldo® 10-1-S Pastillated vs. Traditional Emulsifier Base

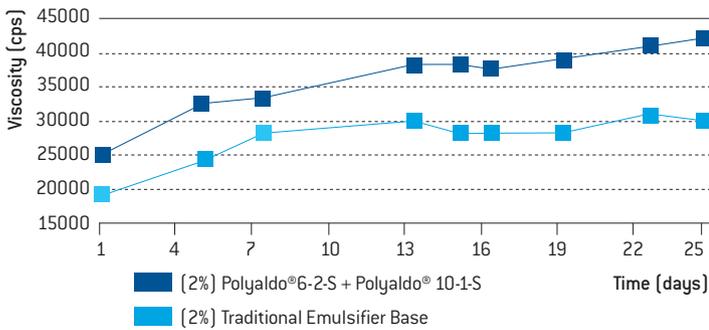


Fig. 3
Evaluation of Polyaldo® 6-2-S + Polyaldo® 10-1-S Pastillated formulation versus a traditional emulsifier base (Stearth-2 + Steareth-21)

The results in figure 3 show the emulsion base made with Polyaldo® 6-2-S and Polyaldo® 10-1-S Pastillated had a higher viscosity compared to the traditional emulsifier system. The combined Polyaldo® emulsifier system had a 30% higher overall viscosity compared to the traditional emulsifier system. The improvement in viscosity provided by the Polyaldo® emulsifier system is a solution for formulators dealing with lackluster emulsion bases without having to increase the use level of costly rheology modifiers.

While the improvement in viscosity is an excellent benefit for using the Polyaldo® 6-2-S and Polyaldo® 10-1-S Pastillated emulsifier system, it represents only one formulating situation. Lonza went a step further and analyzed the effect other ingredients may have on the viscosity of the emulsion. The following components of the formulation were adjusted to analyze the effect they may have on the overall emulsion:

- Adjust the emulsifier use level – reduce emulsifier by half
- Adjust the fatty alcohol use level – reduce fatty alcohol by half
- Change the oil phase/emollients

Evaluation of Polyaldo® 6-2-S + Polyaldo® 10-1-S Pastillated vs. Traditional Emulsifier Base at 1% Use Level

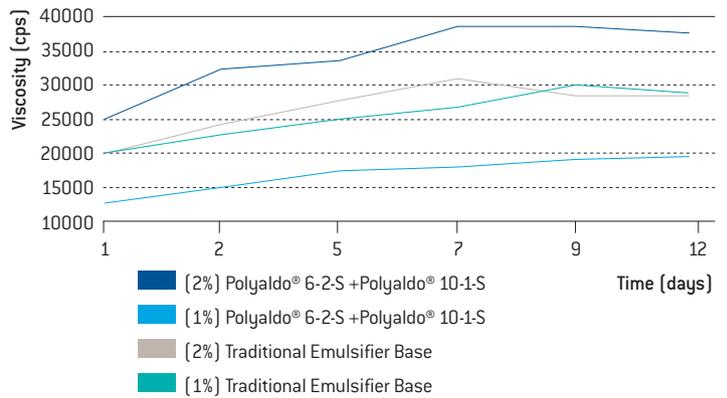


Fig. 4
Evaluation of Polyaldo® 6-2-S + Polyaldo® 10-1-S Pastillated formulation versus a traditional emulsifier base (Stearth-2 + Steareth-21) when the emulsifier system is reduced by 50% (1.00% total emulsifier use level)

The results from figure 4 show when the Polyaldo® 6-2-S and Polyaldo® 10-1-S Pastillated emulsifier system is reduced by 50%, there is a direct impact to the formulation viscosity, reducing viscosity by 50% on average. Compare this to the traditional emulsifier system, which reduced viscosity by only 4% on average. The combined Polyaldo® emulsifier is directly connected with the viscosity of the emulsion and provides the formulator a variable (in this case, the emulsifier use level) to help fine tune formulation aesthetics to create the ideal formulation base.

Evaluation of Polyaldo® 6-2-S + Polyaldo® 10-1-S Pastillated vs. Traditional Emulsifier Base by Reducing Fatty Alcohol Use Level

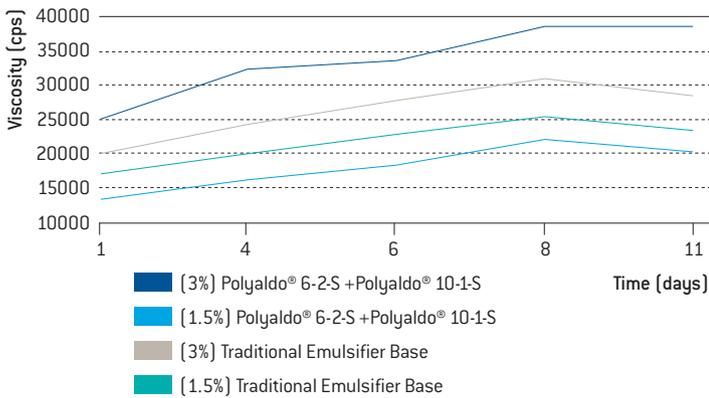


Fig. 5
Evaluation of Polyaldo® 6-2-S + Polyaldo® 10-1-S Pastillated formulation versus a traditional emulsifier base (Steareth-2 + Steareth-21) when the fatty alcohol is reduced by 50% (1.50% use level)

The results from figure 5 show when the fatty alcohol is reduced by 50%, there is a direct impact to the viscosity of the Polyaldo® 6-2-S and Polyaldo® 10-1-S Pastillated emulsifier system compared to the traditional emulsifier system. On average, there is a 38% reduction in viscosity of the combined Polyaldo® emulsifier system versus a 13% reduction in the traditional emulsifier system. The combined Polyaldo® emulsifier system provides another variable (fatty alcohol use level) a formulator can adjust and hone to create the targeted product form.

Evaluation of Polyaldo® 6-2-S + Polyaldo® 10-1-S Pastillated vs. Traditional Emulsifier Base with Different Triglycerides

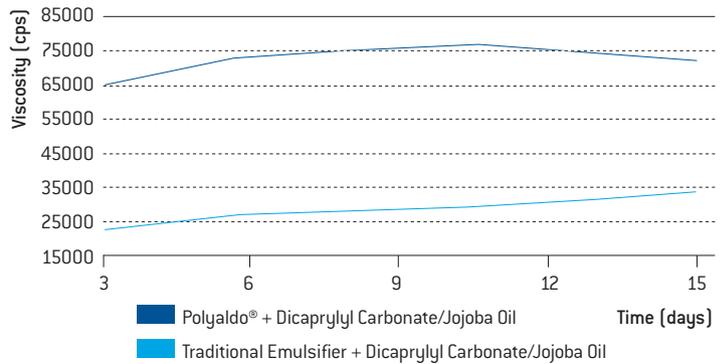


Fig. 6
Evaluation of Polyaldo® 6-2-S + Polyaldo® 10-1-S Pastillated formulation versus a traditional emulsifier base (Steareth-2 + Steareth-21) when the oil phase/emollients are changed

The results from figure 6 show when the oil phase/emollients incorporated in the formulation are changed, there is, yet again, a direct impact to the viscosity of the Polyaldo® 6-2-S and Polyaldo® 10-1-S Pastillated emulsifier system compared to the traditional emulsifier system. The purpose of this evaluation is to show how the combined Polyaldo® emulsifier system can improve formulation viscosity by optimizing the oil phase/emollients incorporated. In figure 7, the dicaprylyl carbonate and jojoba oil emollient system takes full advantage of the combined Polyaldo® emulsifier system, averaging 71,000cps, compared to the original emollients package of caprylic/capric triglycerides and shea butter, which averaged 34000cps. When utilizing the dicaprylyl carbonate and Jojoba oil emollient package, a formulator can scale back the use level of expensive rheology modifiers, reduce the emulsifier use level, or adjust the fatty alcohol used to achieve the viscosity they want. The traditional emulsifier system, on the other hand, maintained the same viscosity for both oil phase/emollient packages used.

Naturally-Derived Emulsifier for Enhanced Formulation Thickening

Polyaldo® 6-2-S polyglyceryl ester is your naturally-derived emulsifier solution for enhanced formulation thickening. When combined with Polyaldo® 10-1-S Pastillated, your formulation viscosity is greatly enhanced. In addition, the combined Polyaldo® emulsifier system is easily adjustable to meet your formulation needs. Formulators can create multiple formulation bases using one Polyaldo® emulsifier system by fine tuning the emulsifier use level, adjusting the fatty alcohol incorporated, or changing the oil phase/emollient package. The Polyaldo® emulsifier system provides you the flexibility to create a cost effective formulation base ideal for your next project.

Polyaldo® 6-2-S polyglyceryl ester Skin Moisturization Study

Objective

To measure the moisturization efficacy of Polyaldo® 6-2-S against a commercial product

Clinical Testing Protocol

- Test Panel: mix of male and female subjects
- Conditions: ambient temp 20-23°C with humidity 50-55% RH
- Instrumentation: efficacy measured using the Corneometer CM 820
- Test Formulations: formulation containing 2.5% Polyaldo® 6-2-S polyglyceryl ester and a control
- Dosage & Test Site: 50 mg of each product was applied to a 5 x 5 cm site on the inner forearms of the panelists
- Test Period: averages of 6 readings were taken per test site. A baseline measurement was taken followed by an initial reading 20 minutes after application of the product. Hourly measurements were recorded at 1, 2, 4, 5 & 6 hours

Results

Over a 6 hour period, the Polyaldo® 6-2-S polyglyceryl ester formulation consistently outperformed the commercial product as demonstrated in Figure 7. In addition to providing moisturization benefits, Polyaldo® 6-2-S polyglyceryl ester simplified the formulation, eliminating the need for multiple emulsifiers. At a 2.5% use level, Polyaldo® 6-2-S polyglyceryl ester stabilized the formulation system reducing the emulsifier levels by 4% (Figure 1).

Polyaldo® 6-2-S Polyglyceryl Ester Moisturization Comparison

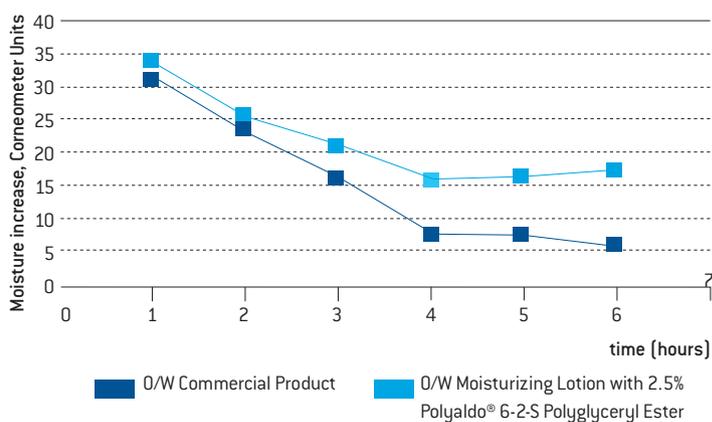


Fig. 7

Oil-in-Water Moisturizing Lotion, SPF 15

Table 1

Ingredients	Commercial Product	Lonza Prototype
Octyl Methoxycinnamate	8.00	8.00
Benzophenone-3	2.00	2.00
Water, Deionized	q.s.	q.s.
PPG-1 Isoceteth Acetate	4.50	–
Myristyl Propionate (Lonzest® 143-S)	–	4.50
Glycerin	4.00	4.00
Emulsifying Wax N.F.	2.50	–
Glyceryl Stearate	2.00	–
PEG 100 Stearate	1.50	–
Polyaldo® 6-2-S	–	2.50
Dimethicone	1.00	1.00
PEG 6000 Monostearate	0.50	–
Triethanolamine	0.50	0.50
Carbomer 934	0.30	0.30
Preservative (Geogard® 221 or Geogard® Ultra)	q.s.	q.s.
Physical Characteristics		
Viscosity	24,000 cps	37,000 cps
% Solids	27%	23%

*Viscosity is increased with reduced solids

USA

Lonza Consumer Care
70 Tyler Place
South Plainfield, NJ 07080
Tel +1 908 561 5200

Switzerland

Lonza Ltd
Muenchensteinerstrasse 38
4002 Basel
Tel +41 61 316 81 11

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