

Polyaldo® 10-1-S Pastillated Polyglyceryl Ester Naturally Derived Emulsifier for Skin and Hair Applications



INCI: Polyglyceryl-10 Stearate
SAP #: 140661

Versatile O/W Emulsifier

- Polyglyceryl ester emulsifier with HLB value of 10
- Superior product aesthetics with great long-term stability
- Offers moisturizing and softening benefits for skin and hair applications
- Excellent PEG replacement

Naturally Derived

- ECOCERT and Soil Association approved
- Manufactured from 100% plant-derived raw materials

High Flexibility

- In conjunction with Polyaldo® HGDS KFG (6-2-S), forms highly stable emulsions
- Efficient in concentrations from 1–3%
- Suitable for a wide range of formulation types

Polyaldo® 10-1-S Pastillated Polyglyceryl Ester – a Natural Solution for Emulsification

Polyaldo® 10-1-S Pastillated Polyglyceryl Ester is an efficient ester emulsifier particularly suited for O/W emulsions and based on raw materials from 100% plant origin. In conjunction with Polyaldo® HGDS KFG (6-2-S), this versatile emulsifier creates high viscosity formulations for skin and hair care applications. Due to the non-ionic character of Polyaldo® 10-1-S Pastillated Polyglyceryl Ester, it is compatible with a broad range of co-emulsifiers. Furthermore, it is ECOCERT and Soil Association approved which makes Polyaldo® 10-1-S Pastillated Polyglyceryl Ester the smart choice for green and PEG-free formulations.

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

Extensive research has been conducted on Polyaldo® 10-1-S Pastillated Polyglyceryl Ester to optimize its functionality as an emulsifier. Lonza Inc. has discovered that Polyaldo® 10-1-S Pastillated performs exceptionally well in the presence of another polyglyceryl ester, Polyaldo® HGDS KFG (6-2-S), 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® 10-1-S Pastillated and Polyaldo® HGDS KFG (6-2-S) has to do with their molecular structures. Polyaldo® 10-1-S Pastillated is a linear emulsifier with a glyceryl chain length of ten units. Polyaldo® HGDS KFG (6-2-S) 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.

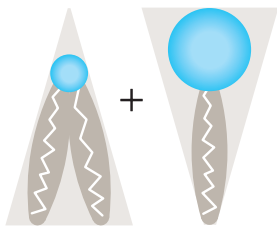


Fig. 2a

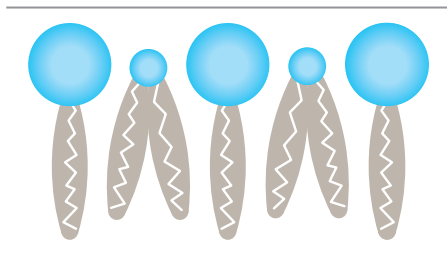


Fig. 2b

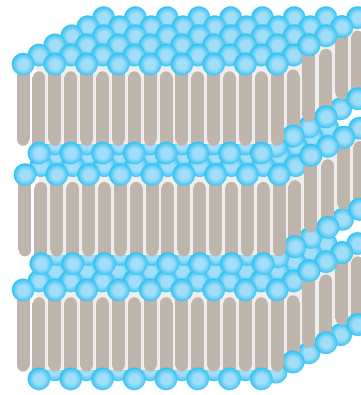


Fig. 2c

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

To confirm the efficacy of Polyaldo® 10-1-S Pastillated and Polyaldo® HGDS KFG (6-2-S), 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.

The results in figure 3 show the emulsion base made with Polyaldo® 10-1-S Pastillated and Polyaldo® HGDS KFG (6-2-S) 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® 10-1-S Pastillated and Polyaldo® HGDS KFG (6-2-S) 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 50%
- Adjust the fatty alcohol use level – reduce fatty alcohol by 50%
- Change the oil phase/emollients

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

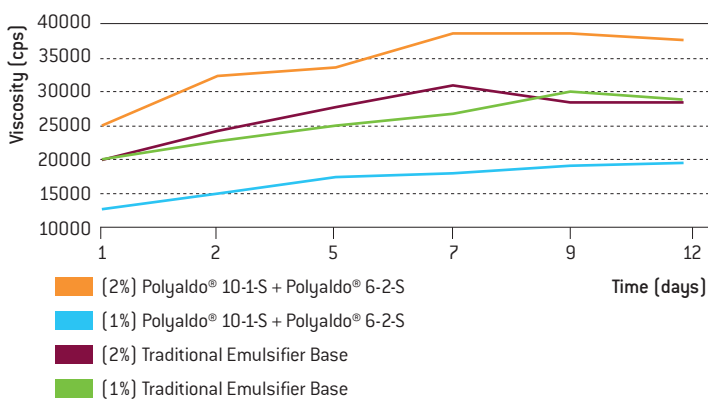


Fig. 4
Evaluation of Polyaldo® 10-1-S Pastillated + Polyaldo® HGDS KFG 6-2-S formulation versus a traditional emulsifier base [Steareth-2 + Steareth-21] when the emulsifier system is reduced by 50% [1.00% total emulsifier use level]

The results from figure 4 show when the Polyaldo® 10-1-S Pastillated and Polyaldo® HGDS KFG (6-2-S) 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® 10-1-S Pastillated + Polyaldo® 6-2-S vs. Traditional Emulsifier Base by Reducing Fatty Alcohol Use Level

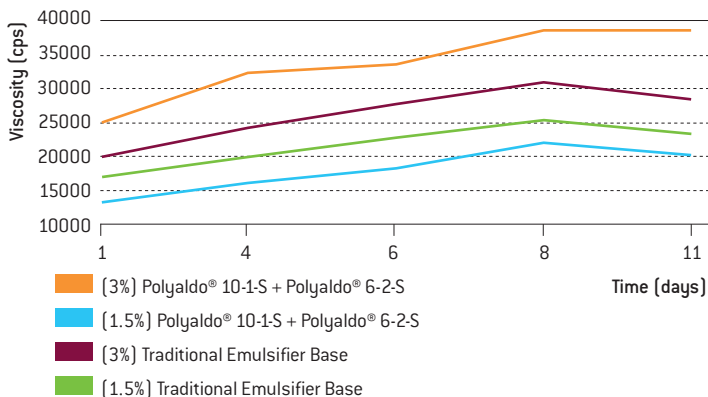


Fig. 5
Evaluation of Polyaldo® 10-1-S Pastillated + Polyaldo® HGDS KFG 6-2-S formulation versus a traditional emulsifier base [Steareth-2 + Steareth-21] when the fatty alcohol is reduced by 50% [1.50% use level]

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® 10-1-S Pastillated and Polyaldo® HGDS KFG (6-2-S) 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® 10-1-S Pastillated + Polyaldo® 6-2-S vs. Traditional Emulsifier Base with Different Triglycerides

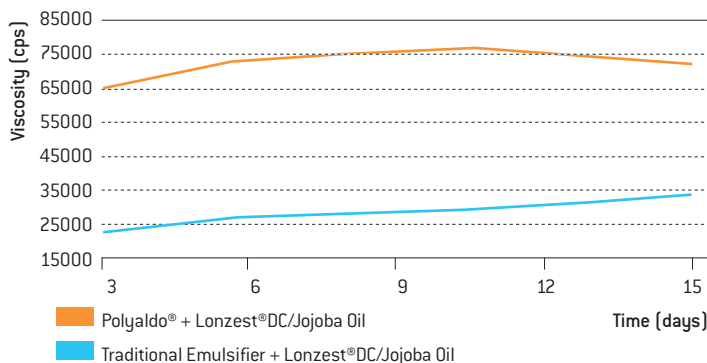


Fig. 6
Evaluation of Polyaldo® 10-1-S Pastillated + Polyaldo® HGDS KFG 6-2-S formulation versus a traditional emulsifier base [Steareth-2 + Steareth-21] when the oil phase/emollients are changed

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® 10-1-S Pastillated and Polyaldo® HGDS KFG (6-2-S) 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 Lonzest® DC (INCI: 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 Lonzest® DC 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.

Polyaldo® 10-1-S Pastillated Polyglyceryl Ester Hair Application Benefits

Objective

To evaluate the moisturizing and softening benefits of Polyaldo® 10-1-S Pastillated Polyglyceryl Ester in a basic formulation on hair tresses

Testing Procedure:

- Shampooed hair tresses and rinsed thoroughly
- Applied test formulation to each tress for 1 minute
- Rinsed and towel dried tresses
- Combed through tresses removing any tangles
- Dried the tresses with a blow dryer
- Nine panelists were asked to evaluate the after-feel of the tresses for softness and smoothness

Test Formulations and Controls:

- Control (water)
- Test formulation with 5% Polyaldo® 10-1-S Pastillated Polyglyceryl Ester

Table 2

Product	INCI Name	(% w/w)
Deionized Water	Deionized Water	94.75
Polyaldo® 10-1-S Pastillated	Polyglyceryl-10 Stearate	5.00
Glydant™	DMDM Hydantoin	0.75

Conclusion

Seven out of nine panelists reported the tress tested with 5% Polyaldo® 10-1-S Pastillated Polyglyceryl Ester felt softer and smoother than the control. Polyaldo® 10-1-S Pastillated Polyglyceryl Ester smoothes the hair surface and controls fly away strands without leaving a heavy residue (Figure 7).



Fig. 7
Hair Tress Comparison of Polyaldo® 10-1-S Pastillated Polyglyceryl Ester vs. Control Formulation

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