CLARIANT

A multifunctional neutralizer for ecolabel certified paints

GENAMIN® GLUCO 50

ECOTAIN®

what is precious to you?

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How should we paint our future?

We spend around 90 percent of our lives indoors. Our health is affected by the indoor environment, so it is important that the offices and buildings we work in and the homes we live in are environmentally safe. The right coatings choice can play a major role to a healthy indoor climate. That is why water-borne paints that are free from air pollutants, hazardous substances and allergens are becoming more popular. For consumers it can be difficult to keep track of the different critical substances, therefore they rely on ecolabels in their buying decision.

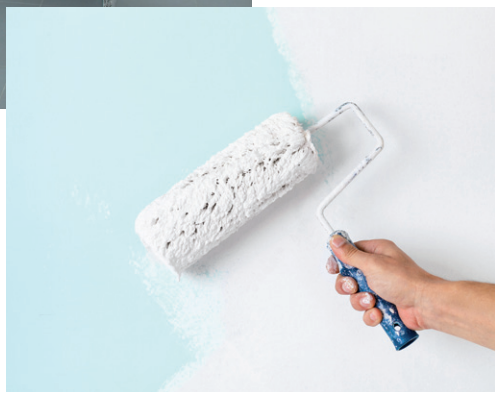
With the currently available raw materials and additives, it is no easy task for a paint formulator to develop a high-quality paint that offers performance advantages, is easy-to-use and at the same time fulfills the stringent ecolabel criteria. The VOC/SVOC-limits of the German Blue Angel label for example represent a real challenge. Even by using low VOC/SVOC paint ingredients, the formulation might already exceed the limit of 1 g/L for indoor paints or 2 wt.% for lacquers. Although additives are used in low concentrations in the paint, they can play a decisive role in meeting ecolabel criteria.

A multifunctional neutralization agent for ecolabel certified paints

Clariant's latest innovation for the paint industry is Genamin® Gluco 50 – a renewable-based, VOC/SVOC-free[1] multifunctional additive without any hazard labeling; thus the ideal ingredient for ecolabel certified paints.

Genamin® Gluco 50 is a neutralizing agent for waterborne paints used to adjust the pH-value to around 8 - 10 to create a stable paint system with minor interactions between the paint components. In contrast to standard neutralizing agents such as caustic soda or ammonia, Genamin® Gluco 50 additionally enhances the performance and quality profile of the paint formulation as is has favorable effects for instance on the storage and freeze-thaw stability as well as on the compatibility with pigments and the flash-rust inhibition. Even in comparison to multifunctional compounds such as aminomethyl propanol (AMP), Genamin® Gluco 50 often shows superior performance.

Genamin® Gluco 50 is therefore a suitable ingredient to reduce formulation complexity by minimizing the number of additives in the paint recipe, resulting in less raw material handling and logistic costs.



1 VOC/SVOC-free means that the VOC/SVOC content of Genamin® Gluco 50 is below the detection limit, according to ISO 11890-2 and 16000-9.

Sustainability benefits of Genamin® Gluco 50

Various aspects need to be considered in the evaluation of a product's sustainability profile, such as its renewable content, eco-tox profile or VOC/SVOC concentration. The objectives of Clariant's sustainable products are to ensure safety during the production process, safe use and handling for consumers and finally to reduce the impact on the environment.

Genamin® Gluco 50 has been awarded the EcoTain® label for its outstanding sustainable profile. EcoTain® is Clariant's label for sustainability excellence products and solutions that significantly exceed sustainability market standards, have best-in-class performance and contribute overall to sustainability efforts of the company and our customers. In the EcoTain® evaluation, Genamin® Gluco 50 underwent a thorough screening process of 36 criteria.

ECOTAIN®

The following table gives an overview on Genamin® Gluco 50 sustainability profile with regard to the most important criteria in comparison to the market standard aminomethyl propanol (AMP).

SUSTAINABILITY DIMENSION	SUSTAINABILITY ASPECTS	GENAMIN® GLUCO 50		AMINOMETHYL PROPANOL (AMP)	
Planet	Renewable content	75%	✓	0%	✗
	Free of environmental hazard label	yes	✓	H412	✗
	German water hazardous class (WGK)	1	✓	1	✓
	Readily biodegradable	yes	✓	yes	✓
People	Free of physical hazard label	yes	✓	H227	✗
	Free of human hazard label	yes	✓	H303, H315, H319	✗
	Hazard symbol GHS	no	✓	Warning	✗
	VOC-free	yes[2]	✓	no[3]	✗
	SVOC-free	yes[2]	✓	yes	✓

H227 Combustible liquid
H303 May be harmful if swallowed
H315 Causes skin irritation
H319 Causes serious eye irritation
H412 Harmful to aquatic life with long-lasting effects

2 VOC/SVOC-free means that the VOC/SVOC content of Genamin® Gluco 50 is below the detection limit, according to ISO 11890-2 and 16000-9.
3 Aminomethyl proponal is VOC-exempted by the US EPA authority as it is not considered as a greenhouse gas that contributes to global warming. As AMP has a boiling point <250°C it is defined as a volatile organic substance for paints and coatings according to ISO 11890-2.

Most of the sustainability aspects listed on the previous page are relevant for ecolabel certification. Although eco-labels are applicable to the finished paints only and paint ingredients cannot be certified, Clariant evaluated Genamin® Gluco 50 on its suitability for selected ecolabels to give an orientation to paint formulators.

The following table provides the maximum use concentrations by ecolabel and paint category, assuming that no other ingredient in the final formulation contributes to the hazard classification and VOC/SVOC level[4].

As shown in the table, Genamin® Gluco 50 can either be used without limitation or at higher concentrations than aminomethyl propanol (AMP).

ECOLABEL	VERSION	VOC-METHOD	SVOC-METHOD	PAINT CATEGORY	GENAMIN® GLUCO 50	AMINOMETHYL PROPANOL (AMP)
Blue Angel	Lacquers, RAL-UZ 12a, Nov 15	ISO 16000-9	ISO 16000-9	1+2+3	99%	<1.0%
	Indoor paints, RAL UZ 102, Jan 15	ISO 17895	not applicable	-	99%	<0.07%
Nordic Swan	Indoor paints and varnishes, Version 3.0, 11/2015-12/2019	ISO 11890-2	ISO 11890-2	matte	99%	<1.1%
				gloss	99%	<4.5%
French Décret	Peintures, vernis et produits connexes, 2011-321	ISO 16000-9	ISO 16000-9	A+	99%	<2.5% *
EU Ecoflower	Indoor paints and varnishes, 2008/4453/EC	ISO 11890-2	ISO 11890-2	A	99%	<0.5%
				B	99%	<0.5%
				C	99%	<0.5%
				D	99%	<1.0%
US Green Seal	Low-emission and low-pollutant paints, coatings, stains, sealers. GS-11, edition 3.2, Oct. 2015	ASTM D6886, SCAQMD Method 313 or ISO 11890-2	not applicable	flat	99%	< 5.6%
				nonflat	99%	< 11.2%
				high gloss	99%	< 16.8%

* Only the hazard label has been considered in the calculation of the maximum use concentration. It is assumed that the AMP's VOC content has a further limiting impact on the percentage amount.

4 This information is based on our knowledge at the time of publication. It is the responsibility of the user to assess his final product and to ensure the compliance with the requirements of the standard.

Performance benefits of Genamin® Gluco 50

In addition to its impressive sustainability benefits, Genamin® Gluco 50 offers performance boosting properties for water-borne coatings. Next to its main function of being a neutralizing agent, Genamin® Gluco 50 provides the following functionalities and advantages:

	**Improving lifetime of the paint. Storage stability is given even in colder regions**	Even after storage in the oven at 50°C for 28 days, gloss lacquers containing Genamin® Gluco 50 do neither show syneresis or sedimentation nor changes the pH-value or viscosity of the formulation. The lacquer also remains stable even after 5 freeze-thaw cycles[5].
	**Increasing tinting strength thanks to better pigment compatibility**	Waterborne paints as well as pigment dispersions that are neutralized with Genamin® Gluco 50 show higher tinting strength. Exchanging components in a tinted formulation can cause shift of shades. If ammonia is considered as standard neutralizing agent and exchanged by Genamin® Gluco 50, the shift of shades is comparable to AMP.
	**Enhanced metal protection due to reduced flash rust formation**	Genamin® Gluco 50 in water-based paints is able to reduce the flash rust inhibition on ferrous metals. The product also helps to protect the coating film against discoloration which is often caused by rust.
	**Meeting consumer demand for low-odor, easy-to-use paints**	Genamin® Gluco 50 is especially suitable for low-odor paints, not only because the additive is VOC/SVOC-free[6], but also due to its pleasant smell which has been confirmed in an anonymous odor test[7]. Furthermore, Genamin® Gluco 50 has a positive influence on the leveling behavior or brushability of the coatings, thus allowing an easier paint application.
	**No negative influence on paint properties such as gloss or drying**	Extensive testing in our laboratories also confirmed that Genamin® Gluco 50 has no or marginal impact on gloss and on the drying behavior or hardness of the coating film.

5 One cycle is defined by freezing the paint for 12 hours at -18°C, followed by a thawing period of 12 hours at room temperature
6 VOC/SVOC-free means that the VOC/SVOC content of Genamin® Gluco 50 is below the detection limit, according to ISO 11890-2 and 16000-9.
7 Odor test with 30 test persons, male and female mixed, no smokers

Performance highlights: storage stability, pigment compatibility, flash rust inhibition

At Clariant's Innovation Center in Frankfurt we scrutinize and optimize our additives to enhance paints and lacquers. Only when meeting the set performance standards, our additives are launched to the market.

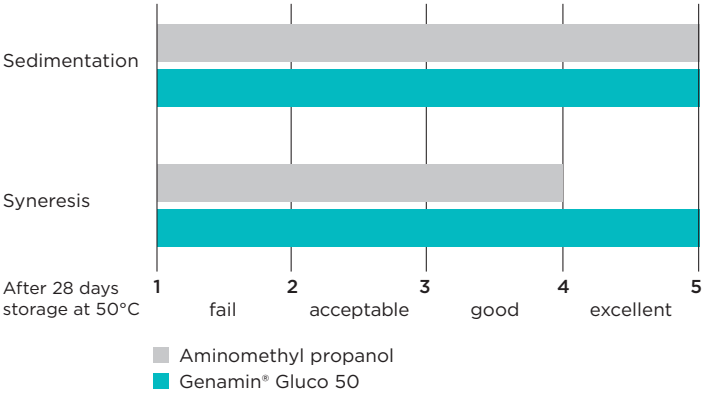
Genamin® Gluco 50 underwent our thorough test program in the global Paints & Coatings laboratory. Selected results are shown hereafter. If you wish to get further insights in the test results, please consult your local Clariant representative or contact us via our website www.paints-coatings.clariant.com.

STORAGE STABILITY

According to the guide recipe on page 11, a gloss lacquer and a semi-gloss lacquer were formulated using aminomethyl propanol as neutralizing agent. Same formulations were prepared by exchanging the additive with Genamin® Gluco 50. All paint formulations were stored for 28 days at 50°C and then evaluated with regard to syneresis, sedimentation, pH-value and viscosity.

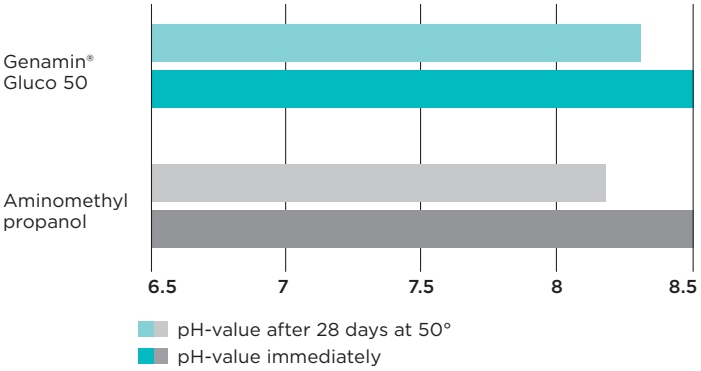
Genamin® Gluco 50 has shown excellent results for all performance parameters. Outstanding is the product's ability to prevent syneresis and a viscosity change especially in semi-gloss lacquers.

Syneresis and sedimentation of gloss and semigloss lacquer



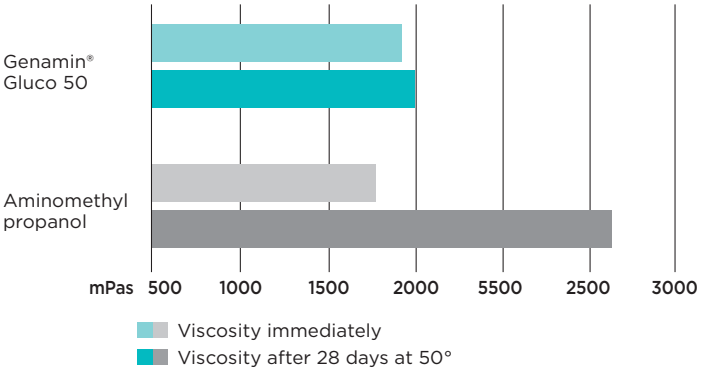
Paint without sedimentation or synresis

Change in pH-value of gloss and semigloss lacquer



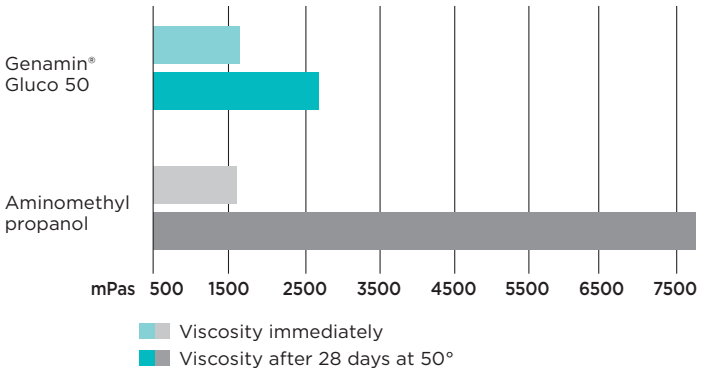
Paint with strong syneresis

Viscosity change of gloss lacquer



Paint with strong sedimentation

Viscosity change of semigloss lacquer



PIGMENT COMPATIBILITY

A colorant based on a pigment red iron oxide was formulated by using either caustic soda, aminomethyl propanol or Genamin® Gluco 50 as neutralizing agent to adjust the pH value to 8.5. The colorant was then used to tint a dispersion paint which in a next step underwent a rub-out test.

As shown in following picture, Genamin® Gluco 50 shows the best results with regard to tinting strength.

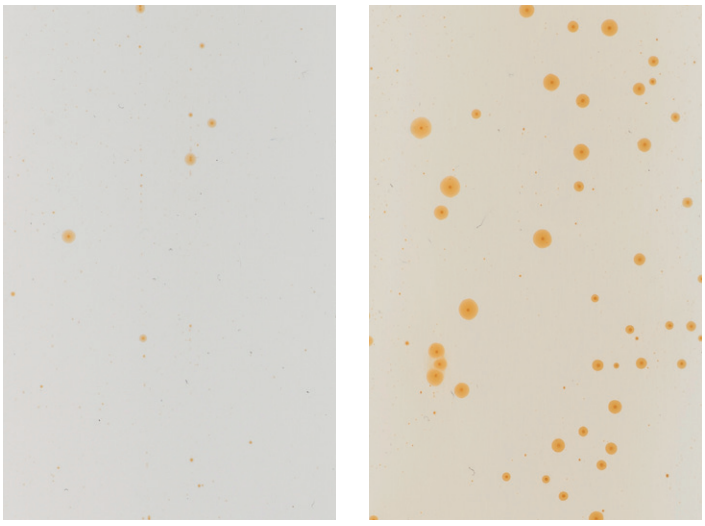
CAUSTIC SODA	GENAMIN® GLUCO 50	AMINOMETHYL PROPANOL

FLASH RUST INHIBITION

Another test in our Paints & Coatings laboratory is the evaluation of the additives' influence on the flash rust inhibition according to ASTM D610. One gloss lacquer was formulated with Genamin® Gluco 50 and another with aminomethyl propanol.

As demonstrated in the following pictures, the coated metal plate with Genamin® Gluco shows almost no rust spots and also did the coating film not change its color.

GENAMIN® GLUCO 50	AMINOMETHYL PROPANOL



Technical data and guide formulations

TECHNICAL DATA OF GENAMIN® GLUCO 50	
Active substance content	Approx. 50 %
Appearance at 25 °C	Clear liquid
Hazen Color Index	Max. 230
Density at 20 °C	Approx. 1.14 g/cm³
Viscosity at 20 °C	Approx. 20 mPa•s
pH value, 1% in water	Approx. 10.9
pKa-value	9.2
Tertiary amine content	Min. 99.5 %
Amine value	125-140 mg KOH/g
Point of solidification	Min. -15 °C

GUIDE FORMULATION FOR GLOSS AND SEMI-GLOSS LACQUERS				
POS	**INGREDIENT**		**%-DOSAGE GLOSS LACQUER**	**%-DOSAGE SEMI-GLOSS LACQUER**
1	Solvent	Water	14.50%	14.50%
2	Binder	Pure acrylate	15.00%	15.00%
3	Dispersing agent	Polyacrylate	0.20%	0.20%
4	Filler	TiO_2	17.50%	17.50%
5	Defoamer	Polysiloxane	0.20%	0.20%
6	Matting agent	Coated silica	0.00%	2.00%
7	Binder	Pure acrylate	45.00%	43.00%
8	Solvent	Water	1.00%	1.00%
9	Thickener	HASE	2.60%	1.80%
10	Preservative	Isothiazolinone	0.10%	0.10%
11	Defoamer	Polysiloxane	0.20%	0.20%
12	Solvent	Water	1.50%	2.30%
			97.80%	**97.80%**
13	Neutralization agent	Genamin® Gluco 50	Increase pH-value to 8.5	
14	Solvent	Water	add up to 100%	

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