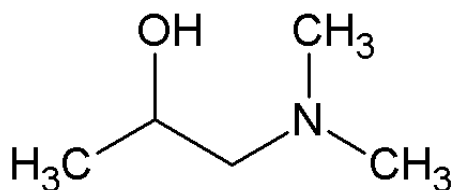


Bisomer[®] Amine D700

**Bisomer[®] Amine D700 in Waterborne Polymers,
Coatings, Inks, Adhesives & Pigment Dispersions**

Chemical Structure



CAS Number: 108-16-7

Typical Physical Properties *

Property	Value	Method
Appearance	Clear yellow liquid	(E284; 01-13)
Water content, % (mass)	22 - 24	(E203; 23-01)
Active matter, %	74 - 77.5	(04-56)
Colour number, Pt/Co	200 max	(D1209; 03-18)
Molecular weight, g / mol	103	

EUROPE

Charleston Road, Hardley,
Hythe, Southampton, Hampshire
SO45 3ZG UK
Call +44 2380 245 437

NORTH AMERICA

300 Brookside Avenue,
Building #23, Suite 100 Ambler,
PA 19002 USA

Call +1 215 773 9280 Toll

Free 888 519 3883

Email: PaintsandCoatings@geosc.com

www.geosc.com

* The typical values presented here are believed to be accurate; they should not, however be considered to constitute a specification.

Contents

Introduction	3
PRODUCT INFORMATION	
Sales specifications	3
Typical properties	4
Packaging	4
GENERAL APPLICATIONS	
Background	5
Benefits of Bisomer [®] Amine D700	5
Water-based systems	5
APPLICATION IN EMULSION COATINGS	
Formulation	7
Coating performance	8
APPLICATION AS A MULTIPURPOSE DISPERSANT	
Benefits of Bisomer [®] Amine D700	10
Millbase formulation	11
TiO ₂ slurry formulation	12
Dispersant demand plots	12
AMINE OVERVIEW	
Application comments	13
HSE comparisons	14
Handling and storage	14
Regulatory information & registration	15
Acknowledgements	15

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

INTRODUCTION

GEO Specialty Chemicals UK Ltd. manufactures a range of high quality chemicals used both in the raw materials and final formulations of coatings, inks and adhesives.

Bisomer[®] Amine D700 is the trade name for the amino alcohol produced by GEO and is used as a performance additive in the coatings, adhesives, inks and pigments industry.

Bisomer[®] Amine D700 finds application in a variety of waterborne systems as a capable problem solver. The key to its utility is the cost effective performance enhancement possible when using this versatile amino alcohol. **Bisomer[®] Amine D700** has a range of properties and features that, in total, offer significant benefits to formulators of water based systems. It is the sum of these features that produces a synergistic balance of cost effective benefits. This multifunctional effect is a key feature of **Bisomer[®] Amine D700**.

Bisomer[®] Amine D700 is a 77% aqueous solution of dimethylamino hydroxypropane (DMAHP). The product is colourless, mobile at low temperatures, fully water miscible and with a low viscosity to allow convenient handling at plant level. The volatility of DMAHP, enhanced by its hydrophilic nature and azeotropic effect with water, assists early dry time and minimises amine retention. With the useful property of surface tension reduction, DMAHP does not contribute to foaming.

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

Additional Properties	Dimethylamino Hydroxypropane	Bisomer [®] Amine D700
Density @ 20°C, g / ml	0.845 to 0.855	0.908 to 0.918
Boiling point @ 760 mmHg, °C	123.0 to 126.5	97 (azeotrope)
Vapour pressure @ 20°C, mmHg	8	20
Flash point, closed cup, °C	28	37
Auto-flammability / ignition temp., °C	225	
Pour point, °C	- 85	- 50
Viscosity @ 20°C, cP	1.5	3
Refractive index @ 20°C, nD	1.4189	
Coefficient of expansion per °C	0.00109	
Heat of vaporisation (liq.) @ 25°C, cal / g	94	
Specific heat @ 25°C, cal / (g.°C)	0.584	
Solubility		
In water	Fully miscible	
In methanol and acetone	Fully miscible	
In benzene	Very soluble	
In hexane	Soluble	
pH of 100 g / litre aqueous solution @ 20°C	12.1	
Surface tension @ 20°C, dynes / cm	24.5	

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

APPLICATIONS OF BISOMER[®] AMINE D700

Background

In order to avoid the use of alkaline metal bases that cause water sensitivity, hydrolysis and related problems in a range of polymer dispersion based products, volatile amines are often employed. The function of a volatile amine is to buffer, stabilise, neutralise acid functionalities and enhance formulation characteristics. Normally, a stable pH of 8 to 9 is desirable.

Typical applications include:

- Decorative paints
- Adhesives
- Industrial coatings
- Polymer dispersions
- Flexographic inks
- Polyurethane dispersions

Benefits of Bisomer[®] Amine D700

Bisomer[®] Amine D700 has a range of properties and features that, in total, offer significant benefits to formulators of water based systems. It is the sum of these features that produces a synergistic balance of cost effective benefits. This multi-functional effect is a key feature of **Bisomer[®] Amine D700** :

- High base strength
- Volatility - good film release
- Azeotropic effect with water
- Pigment dispersion
- Ammonia replacement
- Comparably low odour
- Improved pH / viscosity stability
- Enhanced bio resistance
- Good colour stability
- Reduced primary dispersant
- Improved scrub resistance

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

Application in Water-based Systems

Emulsion Coatings

Bisomer[®] Amine D700 functions as a neutralising agent and dispersant replacing ammonia to enhance pH stability and reduce odour levels. It should be used in both the grind and the let down stages to enhance pigment dispersion and prevent pH shock. The combined pH and viscosity stability improve the overall rheology performance with an optimum normally in the range of pH 8.5 to 9.0.

Bisomer[®] Amine D700 is a useful pigment dispersant fully compatible with the polyphosphate and polyacrylate anionics, as well as the widely used nonionics. In optimised formulations, it is possible to reduce the primary dispersant and this has a beneficial effect on both the formulation cost and scrub resistance of the latex film. The gradual release during drying enhances polymer flow and levelling and assists homogenous dispersion in the transition from the water phase to the organic phase just prior to drying. In this way flocculation control is enhanced.

Gloss Emulsion Coatings

Bisomer[®] Amine D700 is a useful co-dispersant with polyphosphates and polyacrylates and will enhance gloss levels in water based low odour gloss paints.

Neutraliser / Solubiliser

There are a number of carboxylated polymers that require a volatile base to effect aqueous solution and DMAHP is a suitable neutraliser / solubiliser. The benefits offered by **Bisomer[®] Amine D700** are particularly suitable in this area. Solvation can often be achieved at less than neutral pH in order to minimise initial free amine and odour.

Associative Thickeners

Alkali activated associative thickeners benefit from the pH stability and base strength afforded by **Bisomer[®] Amine D700**.

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

Water-based Inks

In water based inks, the solvation of carboxylated polymers using **Bisomer[®] Amine D700**, with its azeotropic effect, offers rapid, low temperature dry times and low amine retention.

Polyurethane Dispersions

Bisomer[®] Amine D700 can be used as a cost effective performance enhancer for polyurethane dispersions. PUDs are increasingly being used to coat a variety of substrates to meet the low VOC demands facing the coatings and allied industries.

Water Based Adhesives

As a neutraliser for crosslinking water based adhesives, e.g. ceramic and vinyl tile adhesives, **Bisomer[®] Amine D700** can be used to avoid ammonia odour and too rapid a set time.

Pigment Dispersions

Bisomer[®] Amine D700 is particularly suited for use as a volatile codispersant for both pigment production and the millbase stage of paint and ink manufacture. The dispersing nature of **Bisomer[®] Amine D700** provides a synergistic dispersing effect in combination with typical primary dispersants. Other applications where this dispersing effect is beneficial include pigment slurries & concentrates.

General

Bisomer[®] Amine D700 should be a useful problem solver where a combination of volatile alkaline buffering, acceptable dry times and pH and viscosity stability are required.

Such applications include pigment slurries, pigment concentrates and ammonia replacement in a range of polymer applications.

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

APPLICATION IN EMULSION COATINGS

Formulation

The various performance capabilities of **Bisomer[®] Amine D700** were assessed in standard acrylic eggshell and vinyl silk emulsion coating formulations. **Bisomer[®] Amine D700** was used as a weight for weight replacement for ammonia, as detailed in Table 1.

Table 1 - Emulsion coating formulations tested

Acrylic Eggshell			Vinyl Silk		
<u>Millbase</u>	A	B	<u>Millbase</u>	C	D
	%	%		%	%
Water	13.6	13.6	Water	11.3	11.3
Anionic acrylic dispersant	0.6	0.6	Anionic acrylic dispersant	0.5	0.6
Acticide FI	0.5	0.5	Acticide FI	0.2	0.2
Foamstopper 101	0.1	0.1	Foamstopper 101	0.1	0.1
Tioxide TR92	21.8	21.8	Natrosol 250 MR	14.5	14.5
Microdol H Extra	11.9	11.9	Tioxide TR92	19.0	19.0
Mowilith VDM 7002	3.0	3.0	Microdol H Extra	3.0	3.0
Ammonia	0.2	-	Ammonia	0.1	-
Bisomer[®] Amine D700	-	0.2	Bisomer[®] Amine D700	-	0.1
Propylene glycol	2.0	2.0	Propylene glycol	3.0	3.0
Coalescing solvent	2.0	2.0	Coalescing solvent	1.0	1.0
<u>Let down</u>			<u>Let down</u>		
Foamstopper 101	0.1	0.1	Foamstopper 101	0.1	0.1
Mowilith DM777	39.7	39.7	Emultex VV579	36.0	36.0
Water	4.5	4.5	Water	3.8	3.8
			Ropaque OP96	7.0	7.0
			Tilcom AT23	0.3	0.3
Total solids	53.0	53.0	Total solids	53.0	53.0
PVC	37.0	37.0	PVC	37.0	37.0
pH	7.8	7.8	pH	8.7	8.7

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

Performance Tests

All 4 formulations (A to D) detailed in Table 1 were subjected to testing to evaluate a number of performance attributes. Where available, BS or ASTM standard test methods were used.

pH / Rheology stability

Bisomer[®] Amine D700 provides improved pH stability for latexes and latex paint formulations.

Less pH drift affords more controllable paint production and enhanced bioresistance, as well as production-to-application rheology control.

Bisomer[®] Amine D700 should be used in both the grind and the let down to prevent pH shock.

Figures 1 & 2 below show the benefit of pH stability in a typical styrene acrylic latex and vinyl silk formulation (Table 1), respectively.

Formulation rheology relies to a great extent on the interaction of pH with the thickeners and rheology aids. A more stable pH provides for a higher degree of rheology control.

Biological activity is dependent on pH. Yeast and fungus more prevalent at < pH 8 and bacteria more prevalent at pH > 7.5. The ability to provide a more stable pH ensures that biocide performance (typically isothiazolinone based) may be optimised.

Pigment Dispersant Optimisation

Bisomer[®] Amine D700 is a useful codispersant providing a beneficial synergistic effect with typical primary dispersants. This enables the reduction of the primary dispersant in an optimised formulation, which in turn reduces formulation costs and improves scrub resistance performance.

Using the millbase stage of the acrylic eggshell formulation shown in Table 1, dispersant demand optimisation shows the potential for reducing the primary dispersant by as much as 25%. This is shown in Figure 3.

Latex pH Stability, 40°C
Styrene Acrylic Latex (Adjusted from 8.0pH to 9.0pH)

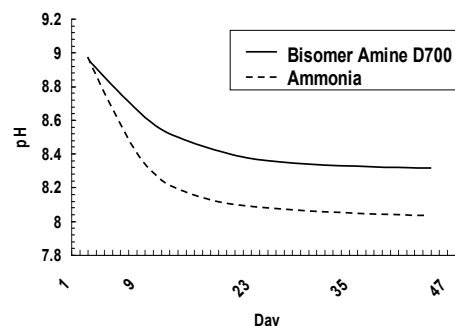


Figure 1

Vinyl Silk Paint, Ambient temperature
pH stability at 20°C

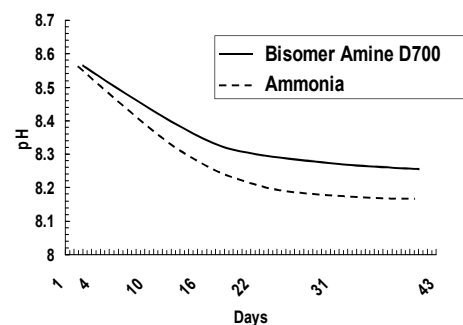
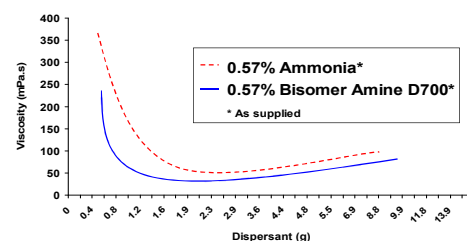


Figure 2

Millbase Dispersant Demand
Anionic Acrylic Dispersant



NB : Amine pre-added at 0.57% on total millbase weight
Brookfield viscosity@20°C, spindle No4

Figure 3

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

Gloss Enhancement

The use of **Bisomer[®] Amine D700** shows improved gloss in acrylic eggshell paints over the use of ammonia. This would potentially allow for higher filler levels in an optimised formulation and hence reduce the overall formulation cost.

Figure 4 shows the effect of replacing ammonia with **Bisomer[®] Amine D700** in the acrylic eggshell paint.

Coating Colour Stability

The use of **Bisomer[®] Amine D700** was found to have comparable UV and ammonia vapour colour stability in latex paints tested against the ammonia neutralised standard. Ammonia and **Bisomer[®] Amine D700** based acrylic eggshell coatings were exposed to ammonia vapour for 4 hours and both exhibited ΔE values of 0.2. Similarly, both formulations measured ΔE values of 0.2 after the 400 hours QUV exposure.

Dry Times / Residual Amine

The volatile nature of **Bisomer[®] Amine D700** and its ability to azeotrope with water both give rise to acceptable dry time measurements and minimum levels of residual amine in the dry paint film. These factors suggest optimum film performance during film formation and over prolonged exposure times.

Reduced Coalescing Solvent Level

Due to the gloss enhancement effect, the reduction of the cosolvent in emulsion coating formulations was found to be possible when using **Bisomer[®] Amine D700**. When testing the MFFT effect of **Bisomer[®] Amine D700** on acrylic latex containing varying levels of coalescent, it was found that reductions of 10-20% coalescing solvent were possible.

This is illustrated in Figure 5 which plots the MFFT vs. the co-solvent level at a standard **Bisomer[®] Amine D700** content.

Acrylic Eggshell Paint
60° Gloss at 60 and 80µm WFT (Mowilith DM777)

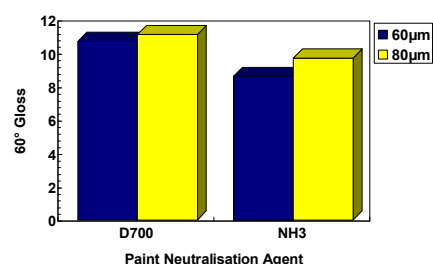


Figure 4

MFFT - Acrylic Latex
Bisomer Amine D700 Neutralised

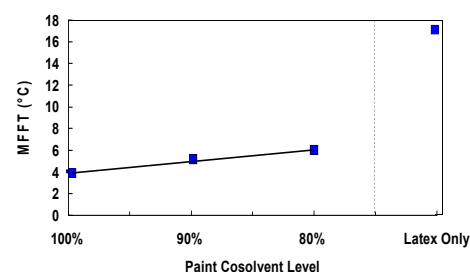


Figure 5

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

BISOMER[®] AMINE D700: A MULTIPURPOSE DISPERSANT

Benefits of Bisomer[®] Amine D700 as a Dispersant

Bisomer[®] Amine D700 is an extremely useful co-dispersant for waterborne systems providing a synergistic effect with typical primary dispersants. This enables the reduction of the primary dispersant in an optimised formulation, which in turn reduces formulation cost and improves physical film performance, e.g. scrub resistance. **Bisomer[®] Amine D700** is particularly suited for use as a volatile codispersant for both pigment production and the millbase stage of paint and ink manufacture.

Other applications where this dispersing effect is beneficial include pigment slurries and concentrates.

- Reduced formulation cost

When **Bisomer[®] Amine D700** is used in place of ammonia and other typical amines

- Significant reduction of primary dispersant
- Improved film physical properties
- Reduced formulation cost
- Improved coating water / scrub resistance
- Lower primary dispersant levels
- Less water sensitive components retained in film
- Good film colour stability

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

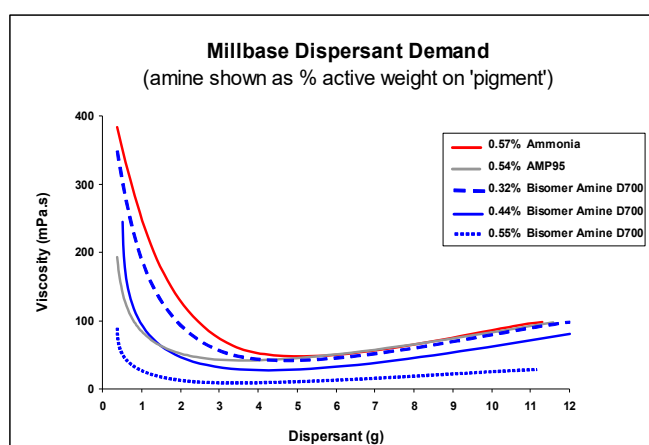
Millbase Dispersant Demand

Using the millbase of the acrylic eggshell formulation shown in Table 1, dispersant demands were used to establish the co-dispersant effect of **Bisomer[®] Amine D700** compared to ammonia and AMP95. Table 2 below outlines the test formulations used. Viscosity was measured using a Brookfield Viscometer, spindle No. 4 for 20 rpm at 20°C.

Table 2

	Ammonia	AMP95	Bisomer [®] Amine D700	Bisomer [®] Amine D700	Bisomer [®] Amine D700
% Amine weight on pigment as supplied	0.57	0.57	0.41	0.57	0.71
% Amine weight on pigment	-	0.54	0.32	0.44	0.55
Demineralised water	148.7	148.7	148.7	148.7	148.7
Foamstopper 101	1.0	1.0	1.0	1.0	1.0
Ammonia	2.1	-	-	-	-
AMP95	-	2.1	-	-	-
Bisomer [®] Amine D700	-	-	1.5	2.1	2.6
Tioxide TR92	238.2	238.2	238.2	238.2	238.2
Microdol Extra	130.0	130.0	130.0	130.0	130.0

The results displayed in Figure 6 below clearly indicate a significant benefit in using **Bisomer[®] Amine D700** over both ammonia and AMP95. In terms of active amine content, the plot shows that **Bisomer[®] Amine D700** is ca. 20% more efficient than AMP95 as a co-dispersant in a typical water-based millbase.



All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

Bisomer[®] Amine D700

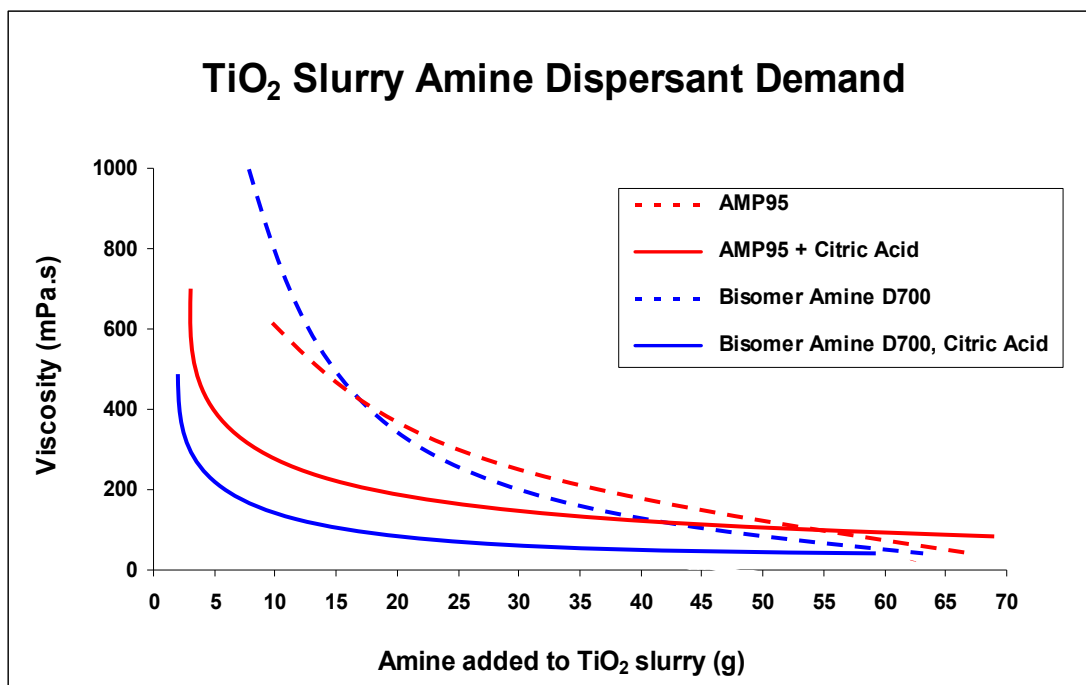
TiO₂ Slurry Dispersant Demand

The performance of **Bisomer[®] Amine D700**, compared with AMP95, was assessed in TiO₂ slurry formulations (with and without citric acid as a co-dispersant). Various formulations with amine levels ranging from 0 to 70g (0 - 13% wt/wt TiO₂) were tested using the same viscosity test used for the millbases in the previous section of this bulletin. The results are shown in Table 3.

Table 3	AMP95	AMP95 + citric acid	Bisomer [®] Amine D700	Bisomer [®] Amine D700
Demineralised water	139.1	139.1	139.1	139.1
100% Citric acid	-	0.23	-	0.23
Tioxide TR92	453.0	453.0	453.0	453.0
AMP95	0-70*	0-70*	-	-
Bisomer[®] Amine D700	-	-	0-70*	0-70*

(* = see figure 7)

Figure 7



All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

AMINE OVERVIEW

Application Comments

The following overview of commercially available amines is intended as a general guide to the formulator who is often presented with a number of apparently similar products.

Observations are incorporated on performance benefits in relation to price and - where applicable - other pertinent points are made.

Bisomer Amine[®] D700

Bisomer[®] Amine D700 is a multifunctional additive similar in performance to AMP and DMAMP. Forms an aqueous azeotrope that minimises dry time and maximises amine elimination. Surfactant effect provides enhanced dispersion, wetting and flow with additional benefits for water based system formulators. Tertiary amines are suitable for PUDs. Medium cost ensures a very attractive performance to cost ratio.

Amino Methyl Propanol (AMP)

Good all round buffer dispersant. Slow release on drying and comparatively poor volatility can cause long dry times and poor early scrub resistance. Low secondary amine impurities have caused toxicity concerns (nitrosamine / mutagenicity). AMP has benefits but high cost.

Dimethyl Amino Methyl Propanol (DAMP)

Good all round buffer dispersant with azeotropic action. However, very high cost often precludes its use. Tertiary amines are suitable for PUDs.

Dimethyl Amino Ethanol (DMAE) / Diethyl Amino Ethanol (DEAE)

Reasonable cost volatile amines, though can cause polymer yellowing, poor odour and have no additional surfactancy, dispersion or flow benefits. Do not azeotrope with water and air, forced dry can be slow.

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

AMINE OVERVIEW

Morpholine

Reasonable cost, volatile amine previously used in ink formulations. Concerns about secondary amine mutagenicity have resulted in limited current use.

Triethanolamine

Commodity alkanolamine though low base strength leads to high usage levels and costs with no discernible benefits. Displays slow dry times and no pigment dispersing benefits. Handling problem related to viscosity at low temperatures and concerns related to DEA (secondary amine) content.

Triethylamine

Flashpoint and toxicity cause major handling problems. Tendency to cause polymer yellowing with poor odour and exhibits limited additional benefits. Medium cost.

Monoethanolamine

Low pricing though low TLV of 3ppm causes major toxicity concerns. Malodorous and polymer yellowing are concerns with handling problems. Some grades could contain secondary amines (mutagenic concerns).

Ammonia

Low cost but this is its main merit. Difficult to handle and contains high odour. High volatility leads to pH instability and general poor rheology stability.

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

HSE Comparisons

Property	Dimethyl amino ethanol	Diethyl amino ethanol	Amino methyl propanol	Morpholine	Triethyl amine	Bisomer [®] Amine D700
Vapour pressure mmHg @ 20°C	4.0	1.0	< 1	7.0	54.0	20.0
Flashpoint (closed cup), °C	31	48	67	35	- 6	37
Labelling	Flammable Corrosive Harmful	Flammable Corrosive Causes Burns	Irritant Combustible	Flammable Corrosive Harmful	Highly flammable Corrosive Harmful	Flammable Corrosive Harmful
Possible mutagen	-	-	-	YES	-	-
Acute oral LD50 (rats), mg/kg	2000	1300	2900	1450	460	1890
TLV-TWA mg/m ³ , ppm	n/d	50(10)	n/d	71(20)	40(10)	n/d
Pungency ranking (1 = worst)	2	3	6	5	1	4

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.

Acknowledgements

The following products have been referenced in this publication:

Foamstopper	Harlow Chemical Co, UK
Acticide	Thor Chemicals Ltd, UK
Microdol	Omya
Mowilith	Harlow Chemical Co, UK
Emultex	Harlow Chemical Co, UK
Natrosol	ercules Ltd
Tioxide	Huntsman Tioxide
Ropaque	Rohm & Haas
Tilcom	Synetix

Product Compliance

Kosher Status of **Bisomer[®] Amine D700** : Pareve Passover (Copy of Kosher Certificate available on request)



Swiss Ordinance 817.023.21 – Listed (Part B)

Registration & Regulatory Information: Please refer to the safety datasheet.

Handling & Storage: This product can be stored for up to 3 years at ambient storage temperature and conditions without any deterioration. Please refer to the safety datasheet for more details.

Miscellaneous: Various pack types available; please contact your local GEO Specialty Chemicals representative for further information.

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

REVISION DATE: OCTOBER 2020

Bisomer[®] is a registered trademark of GEO Specialty Chemicals, Inc.