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VANDERBILT *Report*

VEEGUM[®] and VANZAN[®] in Skin Care Products

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VEEGUM[®] and VANZAN[®] in Skin Care Products

VEEGUM and **VANZAN** are natural rheology control additives that are particularly suited for optimizing the stability and esthetics of skin care products.

VEEGUM (INCI Name: Magnesium Aluminum Silicate) is natural smectite clay that has been water-washed to optimize purity and performance. It is valued for its ability to tailor the rheological properties of aqueous compositions, and it is the formulator's choice to stabilize suspensions, perfect emulsions, and to optimize flow properties and skin feel. These benefits are also present in synergistic combinations with organic gums, such as **VANZAN** xanthan gum, and polymeric thickeners.

VANZAN (INCI Name: Xanthan Gum) is a natural high molecular weight exocellular polysaccharide derived from *Xanthomonas campestris* using an aerobic fermentation process. Because of its protective function in nature, it is more resistant to shear, heat, bacterial, enzyme, and UV degradation than are most gums. **VANZAN** is soluble in hot or cold water and gives thick, neutral pH, pseudoplastic solutions with emulsion and suspension stabilizing properties. These solutions provide viscosity stability at temperature extremes, as well as over the pH 2 to pH 12 range. Of the organic gums, xanthan gum is among the most tolerant of electrolytes, acids and bases, and it has a unique ability to thicken glycerin. **VANZAN** is compatible with most nonionic and anionic gums, and features useful synergism with **VEEGUM**.

HYDRATING VEEGUM PRODUCTS

VEEGUM products must be properly dispersed in water to achieve their best performance. No other materials, especially preservatives, should be present in the water, because they can interfere with proper hydration and colloidal structure formation. The degree of clay hydration is directly proportional to the amount of energy used to disperse the product. The degree of hydration therefore increases as mixing time, mixing intensity or water temperature increase. One grade, **VEEGUM Ultra**, is relatively unaffected by changes in these mixing factors; adequate hydration can be achieved quickly, using room temperature water and a simple, slow-speed propeller mixer.

The following table provides guidelines for the minimum amounts of time suggested for the hydration of **VEEGUM** products. Actual hydration times, in the laboratory or in production, will depend on the particular combination of batch size, mixer shear, and water temperature used. Whichever mixing conditions are used, it is very important that they be carefully controlled to achieve reproducible results in the final formulation.

Water Temp.	Mixer Type	Mixer Speed rpm	Minimum Suggested Mixing Time		
			VEEGUM & VEEGUM HV	VEEGUM PLUS	VEEGUM <i>Ultra</i>
25°C	Homogenizer	3000	30 min.	20 min.	10 min.
25°C	Propeller	800	120 min.	30 min.	15 min.
75°C	Propeller	800	45 min.	20 min.	10 min.

DISSOLVING VANZAN

VANZAN products are soluble in both cold and warm water, with little effect on the dissolution rate. When dissolving **VANZAN**, the mixer should develop a deep vortex in the water in the mix tank, and the gum should be slowly sifted into the upper wall of the vortex. The gum should never be dumped into the water, and large amounts of **VANZAN** should not be allowed to float on the surface of the water during mixing. This can cause the formation of lumps or "fish eyes" that take much longer to dissolve. High efficiency mixers that keep the gum particles well dispersed until they dissolve are preferred. Pre-dispersion of the gum in a water-miscible liquid such as an alcohol or glycol helps to prevent the formation of lumps. A ratio of gum to water-miscible liquid between 1:2 and 1:10 is recommended. Dry-blending the gum with another dry ingredient, such as **VEEGUM**, can also be helpful in avoiding the formation of lumps. Mixing should continue until the solution is smooth and uniform, which usually takes about 30 minutes, or longer for larger batches.

RECOMMENDED FOR SKIN CARE

Smectite Clays:

- VEEGUM** The original grade of water-washed smectite clay, widely used in all types of pharmaceutical, cosmeceutical and personal care products.
- VEEGUM *Ultra*** A unique white and bright, slightly acidic (pH 4.7) product, and the easiest of all the grades to hydrate.
- VEEGUM HV** A higher viscosity grade with properties similar to those of VEEGUM.
- VEEGUM PLUS** The grade with very high thickening efficiency and yield value. It is easy to hydrate, white and bright, and ideal for liquid compositions.

Xanthan Gum:

- VANZAN NF** The general purpose xanthan gum, suitable for most topical applications.
- VANZAN NF-C** A clear solution grade for transparent products.

PROTOTYPE FORMULATIONS

Following are a number of prototype formulations that have been developed in our R&D laboratories to demonstrate how the various grades of **VEEGUM** and **VANZAN** are used. Formulations that have been developed by others are also included, with credit given to their source.

1. Moisturizing Creams and Lotions

Ultra Moisturizing Skin Cream No. 512

Ingredients	wt. %
A VEEGUM <i>Ultra</i> ¹ , Magnesium Aluminum Silicate	2.0
Carbomer (Carbopol® Ultrez 10) ²	0.2
Deionized Water	72.5
B Glycerin	5.0
Butylene Glycol	3.0
Polysorbate 20 (Tween® 20) ⁸	1.0
C Cetyl Alcohol	0.5
Glyceryl Monostearate SE (Dermalcare® GMS SE) ⁴	3.0
Caprylic/Capric Triglyceride (Neobee® M-5) ⁵	5.0
C ₁₂₋₁₅ Octanoate (Finester® EH-25) ⁶	3.0
Dimethicone (DC 200 Fluid, 350 cSt) ⁷	1.0
Steareth-2 (Brij® 72) ⁸	1.1
Steareth-21 (Brij 721) ⁸	1.1
Laureth-23 (Brij 35) ⁸	0.5
Isosorbide Laurate (Arlamol® ISML) ⁸	1.0
D Etidronic Acid	0.1
Triethanolamine to pH 6.0 ± 0.5	q.s.
E Preservative, Fragrance	q.s.

Procedure: Begin heating the water to 75-80°C. Slowly add the VEEGUM *Ultra* and carbomer sequentially or as a dry blend to the water agitated at maximum available shear. Mix until hydrated. Add the remaining water phase ingredients from Part B, mixing until uniform. Maintain the water phase at 75-80°C. Blend the Part C oil phase ingredients and heat to 75-80°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing; add the Part D and Part E ingredients when the emulsion is <35°C.

Moisturizing Cream (Uniqema)

Ingredients	wt. %
A Stearic Acid	2.0
Cetyl Alcohol	2.0
Isopropyl Myristate	2.0
Lanolin Oil (Lantrol® 1673) ¹⁴	10.0
Glyceryl Stearate(and) PEG-100 Stearate (Arlacel® 165) ⁸	3.0
B VEEGUM ¹ , Magnesium Aluminum Silicate	1.5
Deionized Water	74.5
C Glycerin	4.0
Triethanolamine, 99%	1.0
D Preservative, Fragrance	q.s.

Procedure: Begin heating the water to 70-75°C. Slowly add the VEEGUM to the water agitated at maximum available shear. Mix until hydrated. Add the remaining water phase ingredients from Part C, mixing until uniform. Maintain the water phase at 70-75°C. Blend the Part A oil phase ingredients and heat to 70-75°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing; add the Part D ingredients when the emulsion is <35°C.

No Heat, Water-in-Oil Moisturizing Lotion No. 325

Ingredients	wt. %
A VEEGUM ¹ , Magnesium Aluminum Silicate	1.30
Deionized Water	55.70
Magnesium Sulfate	0.50
B Mineral Oil	9.00
Hydrogenated Polyisobutylene (Polysynlane®) ¹⁰	10.00
Mineral Oil (and) Lanolin Alcohol (Amerchol® L-101) ¹¹	16.50
Sorbitol Solution, 70%	5.00
Oleamide DEA (Witcamid® 511C) ¹²	2.00
C Preservative, Fragrance	q.s.

Procedure: Add the VEEGUM to the water slowly, agitating continuously until hydrated. Add the magnesium sulfate and mix until smooth. Blend Part B well and add Part A to Part B; mix until smooth and uniform. Add Part C and mix until uniform.

No Heat, Moisturizing Concentrate No. 506

Ingredients	wt. %
A VANZAN NF-C ¹ , Xanthan Gum	1.0
Glycerin	40.0
B Deionized Water	44.0
C Soluble Collagen (Collasol®) ¹³	5.0
D Hydrogenated Polyisobutylene (Polysynlane) ¹⁰	4.0
Mineral Oil (and) Lanolin Alcohol (Amerchol L-101) ¹¹	3.0
C ₁₀₋₃₀ Cholesterol/Lanosterol Esters (Super Sterol Ester) ¹³	2.0
DEA-Oleth-3 Phosphate (Crodafo® N-3 Neutral) ¹³	1.0
E Preservative, Fragrance	q.s.

Procedure: Thoroughly disperse the VANZAN NF-C in the glycerin. Add the water and mix until the gum is dissolved. Add Part C. Blend Part D well and then add; mix until smooth and uniform. Add Part E and mix until uniform.

Super Moisturizing Lotion No. 437

Ingredients	wt. %
A VEEGUM ¹ , Magnesium Aluminum Silicate	1.00
VANZAN NF ¹ , Xanthan Gum	0.50
Deionized Water	74.50
B Sodium PCA (Ajidew® N-50) ⁹	3.00
Glycerin	5.00
C Hydrogenated Polyisobutylene (Polysynlane) ¹⁰	4.00
Mineral Oil (and) Lanolin Alcohol (Amerchol L-101) ¹¹	3.00
Cetyl Alcohol	2.00
Isopropyl Myristate	2.00
Sorbitan Palmitate	1.20
Polysorbate 40 (Tween 40) ⁸	3.80
D Citric Acid to pH 5.5	q.s.
Preservative, Fragrance	q.s.

Procedure: Begin heating the water to 50-55°C. Dry blend the VEEGUM and VANZAN NF; add to the water slowly, mixing with maximum available shear until hydrated. Add Part B and mix until dissolved. Maintain at 50-55°C. Mix Part C ingredients and heat to 50°C. Add the oil phase to the water phase with good agitation; mix until uniform. Avoid incorporating air. Cool with mixing. Add the Part D ingredients when the emulsion is <35°C.

Dry Touch Emollient Lotion No. 377

Ingredients	wt. %
A VEEGUM ¹ , Magnesium Aluminum Silicate	0.50
Water	85.50
B Triethanolamine	0.10
Glycerin	3.50
Mineral Oil	3.60
Petrolatum	0.40
Stearic Acid XXX	1.60
C Cetyl Alcohol	0.80
Glyceryl Stearate SE (Kessco [®] GMS-SE) ⁵	1.40
Cetyl Acetate(and)Acetylated Lanolin Alcohol (Acetulan [®]) ¹¹	2.00
Dimethicone, 350 cs.	0.60
D Preservative, Fragrance	q.s.

Procedure: Begin heating the water to 75-80°C. Slowly add the **VEEGUM** to the water agitated at maximum available shear. Mix until hydrated. Add the remaining water phase ingredients from Part B, mixing until uniform. Maintain the water phase at 75-80°C. Blend the Part C oil phase ingredients and heat to 75-80°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing; add the Part D ingredients when the emulsion is <35°C.

Moisturizing Lotion (Inolex Chemical Company)

Ingredients	wt. %
Glyceryl Stearate(and)PEG-100 Stearate (Lexemul [®] 561)	2.00
Isopropyl Myristate (Lexol [®] IPM) ¹⁵	1.00
Glyceryl Stearate (Lexemul EGMS) ¹⁵	0.50
Mineral Oil	0.50
A Acetylated Lanolin Alcohol	1.00
Cetyl Alcohol	1.00
Stearic Acid	1.00
Cyclomethicone	0.50
Propylparaben (Lexgard [®] P) ¹⁵	0.05
Deionized Water	87.80
B VEEGUM ¹ , Magnesium Aluminum Silicate	0.30
Sorbitol, 70%	4.00
Methylparaben (Lexgard M) ¹⁵	0.15
Carbomer (Carbopol 934) ²	0.20
C Triethanolamine, 99% to pH 7.0	q.s.

Procedure: Begin heating the Part B water to 70-75°C. Slowly add the **VEEGUM** to the water agitated at maximum available shear. Mix until hydrated. Add the sorbitol, preservative and carbomer in order, mixing after each until smooth. Maintain the water phase at 70-75°C. Blend the Part A oil phase ingredients and heat to 70-75°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing; add the triethanolamine when the emulsion is 40°C. Continue cooling until the emulsion is <35°C.

Moisturizing Lotion (Rhodia)

Ingredients	wt. %
Pentaerythrityl Tetralaurate	5.00
Glyceryl Stearate(and)PEG-100 Stearate	5.00
Mineral Oil	2.50
A Acetylated Lanolin Alcohol	1.00
Dimethicone	1.00
Stearic Acid	1.00
Stearyl Alcohol	0.50
Cetyl Alcohol	0.50
Deionized Water	78.00
B VEEGUM HV ¹ , Magnesium Aminum Silicate	0.30
Carbomer, 3% Solution, (Carbopol 934) ²	5.00
C Triethanolamine	0.20
D Preservative, Fragrance	q.s.

Procedure: Begin heating the Part B water to 75-80°C. Slowly add the **VEEGUM HV** to the water agitated at maximum available shear. Mix until hydrated. Prepare the 3% carbomer solution in accordance with the manufacturer's recommendations and add to the **VEEGUM HV** dispersion, mixing until uniform. Maintain the water phase at 75-80°C. Blend the Part A oil phase ingredients and heat to 75-80°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing; add the triethanolamine when the emulsion is 45°C. Add the Part D ingredients when the emulsion is <35°C.

Hand and Body Lotion No. 370

Ingredients	wt. %
VEEGUM ¹ , Magnesium Aluminum Silicate	1.00
A Cellulose Gum (CMC 7 MF) ¹⁶	0.15
Deionized Water	80.75
Simethicone (Dow Corning Antifoam AF) ⁷	0.10
Mineral Oil	5.00
Mineral Oil (and) Lanolin Alcohol (Amerchol L-101) ¹¹	4.00
B Stearic Acid XXX	3.00
Glyceryl Stearate(and)PEG-100 Stearate (Arlacel 165) ⁸	4.00
Lanolin Oil	2.00
C Preservative, Fragrance	q.s.

Procedure: Begin heating the water to 70-75°C. Slowly add the **VEEGUM** and CMC as a dry blend to the water agitated at maximum available shear. Mix until hydrated. Add the simethicone with slow speed mixing. Maintain the water phase at 70-75°C. Blend the Part B oil phase ingredients and heat to 70-75°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing; add the Part C ingredients when the emulsion is <35°C.

2. Skin Treatments

Hydrator Concentrate No. 507

Ingredients	wt. %
A VANZAN NF-C ¹ , Xanthan Gum	1.0
Glycerin	40.0
B Deionized Water	44.0
Petrolatum	3.0
Hydrogenated Polyisobutylene (Polysynlane) ¹⁰	2.0
C Mineral Oil (and) Lanolin Alcohol (Amerchol L-101) ¹¹	3.0
C ₁₀₋₃₀ Cholesterol/Lanosterol Esters (Super Sterol Ester)	2.0
DEA-Oleth-3 Phosphate (Crodafo N-3 Neutral) ¹³	1.0
Glyceryl Stearate(and)PEG-100 Stearate (Arlacel 165) ⁸	4.0
D Preservative, Fragrance	q.s.

Procedure: Thoroughly disperse the **VANZAN NF-C** in the glycerin. Add the water and mix until the gum is dissolved. Heat to 60-65°C. Blend Part C well and heat to 60-65°C, then add to Part A+B. Mix until smooth and uniform. Cool with mixing, avoiding the incorporation of air. Add the Part D ingredients when the emulsion is <35°C.

Vitamin Enriched Barrier Cream No. 490

Ingredients	wt. %
A VEEGUM <i>Ultra</i> ¹ , Magnesium Aluminum Silicate	0.80
Carbomer (Carbopol 934) ²	0.30
Deionized Water	79.00
B Glycerin	2.00
Butylene Glycol	2.00
Cetyl Alcohol	0.50
Glyceryl Monostearate SE (Dermalcare GMS SE) ⁴	2.00
Caprylic/Capric Triglyceride (Neobee M-5) ⁵	2.00
C ₁₂₋₁₅ Octanoate (Finester EH-25) ⁶	2.00
C Castor Oil Polyurethane (Polyderm PPI CO) ¹⁶	1.00
Phenyl Dimethicone (DC 556 Fluid) ⁷	3.00
Dimethicone (DC 200 Fluid, 350 cSt) ⁷	1.00
Bois Oil ¹⁷	0.50
Steareth-2 (Brij 72) ⁸	0.95
Steareth-21 (Brij 721) ⁸	0.95
D Panthenol	1.00
Vitamin E Acetate	0.50
Vitamin A Palmitate	0.50
Triethanolamine to pH 5.8 ± 0.3	q.s.
E Preservative, Fragrance	q.s.

Procedure: Begin heating the water to 75-80°C. Slowly add the **VEEGUM Ultra** and carbomer sequentially or as a dry blend to the water agitated at maximum available shear. Mix until hydrated. Add the remaining water phase ingredients from Part B, mixing until uniform. Maintain the water phase at 75-80°C. Blend the Part C oil phase ingredients and heat to 75-80°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing; add the Part D and Part E ingredients when the emulsion is <35°C.

Dry Skin Treatment Lotion No. 362

Ingredients	wt. %
A VEEGUM ¹ , Magnesium Aluminum Silicate	1.40
VANZAN NF ¹ , Xanthan Gum	0.35
Water	72.25
Glycerin	4.00
Cetyl Acetate(and)Acetylated Lanolin Alcohol (Acetulan®) ¹¹	4.00
C ₁₂₋₁₅ Alkyl Benzoate (Finsolv® TN) ⁶	4.00
B Hydrogenated Polyisobutylene (Polysynlane) ¹⁰	3.00
Cocoa Butter	4.00
Petrolatum	2.00
Glyceryl Stearate(and)PEG-100 Stearate (Arlacel 165) ⁸	5.00
C Preservative, Fragrance	q.s.

Procedure: Begin heating the water to 70-75°C. Dry blend the **VEEGUM** and **VANZAN NF**; add to the water slowly, mixing with maximum available shear until hydrated. Add the glycerin and maintain at 70-75°C. Mix Part B ingredients and heat to 70-75°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing. Add the Part C ingredients when the emulsion is <35°C.

Skin Rejuvenating Cream No. 462

Ingredients	wt. %
A VEEGUM PLUS ¹ , Magnesium Aluminum Silicate	0.95
Deionized Water	64.62
VANZAN NF ¹ , Xanthan Gum	0.29
B Glycerin	4.75
Triethanolamine, 99%	0.71
Cetyl Alcohol	2.85
Glyceryl Stearate(and)PEG-100 Stearate (Arlacel 165) ⁸	4.28
C Stearic Acid	1.43
Isopropyl Palmitate	4.28
Mineral Oil (and) Lanolin Alcohol (Amerchol L-101) ¹¹	4.28
Dimethicone (DC 200 Fluid, 350 cSt) ⁷	1.43
D Glycolic Acid (67% Solution)	7.13
Sodium Hydroxide (50% Solution)	3.00
Preservative, Fragrance	q.s.

Procedure: Begin heating the water to 70-75°C. Dry blend the **VEEGUM PLUS** and **VANZAN NF**; add to the water slowly, mixing with maximum available shear until hydrated. Add the Part B ingredients in order and maintain at 70-75°C. Mix Part C ingredients and heat to 70-75°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing. Add the Part D ingredients in order when the emulsion is <40°C. Adjust as necessary to pH 4.2-4.5.

Ultra Intensive Moisturizing Cream No. 484

Ingredients		wt. %
A	VEEGUM <i>Ultra</i> ¹ , Magnesium Aluminum Silicate	1.5
	VANZAN NF ¹ , Xanthan Gum	0.3
	Deionized Water	56.6
B	Glycerin	3.4
	Butylene Glycol	2.0
C	Cetyl Alcohol	0.5
	Glyceryl Monostearate SE (Dermalcare GMS SE) ⁴	3.0
	Petrolatum	10.0
	Mineral Oil	2.0
	Caprylic/Capric Triglyceride (Neobee M-5) ⁵	3.0
	C ₁₂₋₁₅ Octanoate (Finester EH-25) ⁶	2.0
	Dimethicone (DC 200 Fluid, 350 cSt) ⁷	1.0
	Steareth-2 (Brij 72) ⁸	1.5
	Steareth-21 (Brij 721) ⁸	1.5
	Isosorbide Laurate (Arlamol ISML) ⁸	0.5
D	Lactic Acid USP, 88%	2.6
	Sodium Lactate (PATLAC NAL) ³	2.6
	Glycolic Acid, 70%	3.0
	Triethanolamine (to pH 3.75 ± 0.25)	3.0
E	Preservative, Fragrance	q.s.

Procedure: Begin heating the water to 75-80°C. Dry blend the **VEEGUM** and **VANZAN NF**; add to the water slowly, mixing with maximum available shear until hydrated. Add the remaining water phase ingredients from Part B, mixing until uniform. Maintain the water phase at 75-80°C. Blend the Part C oil phase ingredients and heat to 75-80°C. Add the oil phase to the water phase with good agitation; mix until uniform. Cool with mixing. Add the Part D and Part E ingredients when the emulsion is <40°C. Adjust as necessary to pH 3.75 ± 0.25.

VEEGUM and VANZAN are registered trademarks of R.T. Vanderbilt Company, Inc.

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Raw Material Suppliers

1. R.T. Vanderbilt Company, Inc., Norwalk, CT
2. The B.F. Goodrich Company, Brecksville, OH
3. R.I.T.A. Corporation, Woodstock, IL
4. Rhodia, Cranbury, NJ
5. Stepan Chemical Co., Northfield, IL
6. Finetex, Inc., Elmwood Park, NJ
7. Dow Corning Corporation, Midland, MI
8. Uniqema, Wilmington, DE
9. Ajinomoto USA, Inc., Teaneck, NJ
10. Polyesther Corporation, Southampton, NY
11. Amerchol Corporation, Edison, NJ
12. Witco Chemical Company, Greenwich, CT
13. Croda Inc., Parsippany, NJ
14. Henkel, Organic Products Division, Ambler, PA
15. Inolex Chemical Company, Philadelphia, PA
16. ALZO International, Sayreville, NJ
17. Barnet Products Corp., Englewood Cliffs, NJ

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