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VANDERBILT *Formulary*

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Hard Surface Cleaners and Polishes

VAN GEL® Magnesium Aluminum Silicate and **VEEGUM**® Magnesium Aluminum Silicate comprise R.T. Vanderbilt Company, Inc.'s product line of natural, purified smectite clays. When mixed with water, these clays form opaque, colloidal dispersions. The resulting colloidal structure enhances emulsion stability, suspends abrasives and thickens the formulation. Formulators can prepare cleaners that spread or spray easily, coat evenly and cling to vertical surfaces.

As stabilizing agents and rheology modifiers, **VAN GEL** and **VEEGUM** products are effective over a wide pH and temperature range. Whether combined with organic gums, like **VANZAN**® Xanthan Gum, or used alone, these products provide superior stability, suspending power and pour characteristics.

RECOMMENDED GRADES FOR HARD SURFACE CLEANERS AND POLISHES

VAN GEL B	General purpose, most economical grade for a variety of hard surface cleaners and polishes.
VAN GEL C	For use in highly alkaline (> pH 12) formulations.
VAN GEL ES	For use in systems containing high levels of dissolved electrolytes.
VAN GEL O	For use in systems containing sodium hypochlorite.
VEEGUM	General purpose, widely used grade.
VEEGUM T	General purpose, industrial grade that is particularly useful in high pH formulations.

HYDRATION OF VAN GEL AND VEEGUM PRODUCTS

VAN GEL and **VEEGUM** products must be properly dispersed in water for optimum performance. No other materials 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.

The following table provides suggested minimum hydration times for each of the **VAN GEL** and **VEEGUM** products. Actual hydration times will depend on the particular combination of batch size, mixer shear, and water temperature used. It is very important that mixing conditions be carefully controlled in order to achieve reproducible results in the final formulation.

			Minimum Suggested Mixing Time, Minutes		
			VAN GEL B VANGEL C	VAN GEL ES VAN GEL O	VEEGUM VEEGUM T
Water Temp., °C	Mixer Type	Mixer Speed, rpm			
25	Propeller	800	120	30	120
75	Propeller	800	45	20	45
25	Homogenizer	3000	30	20	30
75	Homogenizer	3000	15	10	15

PROTOTYPE FORMULATIONS

Liquid Cleanser with Bleach No. 552

		Wt.%
A	**VAN GEL O**[1] Magnesium Aluminum Silicate	4.0
	Water	62.0
B	NaOH, 50% solution	1.0
	Commodity NaOCl, 12.5% solution	12.0
	Sodium Dodecyl Diphenyl Oxide Disulfonate (CALFAX® DB-45[2])	1.0
	Calcium Carbonate (MARBLE DUST™[3])	20.0

1. Sift the **VAN GEL O** into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Slowly add the NaOH solution while mixing. Careful control of the mixing speed is required during this step because the viscosity of the batch will increase. Mix until smooth.
3. Check the pH of the batch: it should be >pH 12. Reduce the mixing speed and slowly add the NaOCl.
4. Reduce the mixing speed to a minimum, then add the surfactant. Avoid air entrapment.
5. Slowly add the calcium carbonate and mix very slowly until homogeneous. Avoid air entrapment.

Note: The amount of NaOH in the formula is critical: percentages above or below that listed will be detrimental to the physical and/or bleach stability of the formula. Some of the other factors that can influence both the physical stability and bleach stability of this formula are: any factor that will accelerate bleach decomposition, e.g. metallic contaminants; the amount and source of the commodity bleach; the source of the caustic; the amount and type of surfactant; and the storage conditions of the finished product. It is recommended that the physical and bleach stability profile of this formula be verified.

Liquid Cleanser No. 531

		Wt.%
A	**VAN GEL ES**[1] Magnesium Aluminum Silicate	3.5
	Water	69.7
B	Calcium Carbonate (MARBLE DUST[3])	20.0
C	Sodium methyl-2-sulfo C_{12}-C_{18} ester (and) Disodium 2-sulfo C_{12}-C_{18} fatty acid (ALPHA-STEP® MC-48 [4])	2.5
	Fatty Alkanolamide (NINOL® 11-CM [4])	2.0
	Sodium Hydroxide, 50% solution	0.3
	Sodium Chloride	2.0
D	Preservative	qs

1. Sift the **VAN GEL ES** into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Add the calcium carbonate and mix until uniform.
3. Reduce the mixing speed to a minimum; add the Part C and D ingredients in order, mixing after each addition until uniform. Avoid air entrapment.

Liquid Cleanser No. 580

		Wt.%
A	**VAN GEL B**[1] Magnesium Aluminum Silicate	1.1
	VANZAN[1] Xanthan Gum	0.4
	Water	73.5
B	Sodium Linear Alkyl Benzene Sulfonate, 60% (CALSOFT® L-60[2])	5.0
	Octylphenoxypolyethoxyethanol Nonionic Surfactant (TRITON® X-100[7])	5.0
C	Aluminum Silicate (KAOPOLITE® SF[8])	10.0
D	Orange Oil (Tech Grade d-limonene[15])	5.0
E	Preservative	qs

1. Blend the **VAN GEL B** and **VANZAN** and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Reduce the mixing speed to a minimum and add the Part B ingredients in order, mixing after each addition until uniform. Avoid air entrapment.
3. Add the Part C, D and E ingredients in order, mixing after each addition until uniform.

Acid Bowl Cleaner No. 342

		Wt.%
A	**VEEGUM**[1] Magnesium Aluminum Silicate	0.90
	VANZAN® [1] Xanthan Gum	0.45
	Water	75.40
B	Tetrasodium EDTA	1.00
	Oleyl Hydroxyethyl Imidazoline (MONAZOLINE™ O[5])	1.00
	Hydrochloric Acid, 37%	20.00
	Benzalkonium Chloride (BARQUAT® MB-80 [6])	1.25

1. Blend the **VEEGUM** and **VANZAN** and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Reduce the mixing speed and add the Part B ingredients in order, mixing after each addition until uniform.

Liquid Tile Cleaner No. 396

		Wt.%
A	**VAN GEL B**[1] Magnesium Aluminum Silicate	1.5
	Water	76.5
B	**DARVAN® 7**[1] Sodium Polymethacrylate	2.0
	Octoxynol-13 (TRITON® X-102[19])	5.0
	Sodium Alkylbenzene Sulfonate (CALSOFT® L-40[2])	5.0
	Pine Oil	5.0
	Aluminum Silicate (KAOPOLITE® SF[8])	5.0
C	Preservative	qs

1. Sift the **VAN GEL B** into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Reduce the mixing speed and add the Part B and C ingredients in order, mixing after each addition until uniform.

Bathroom Cleaner No. 393

		Wt.%
A	**VAN GEL B**[1] Magnesium Aluminum Silicate	1.00
	VANZAN[1] Xanthan Gum	0.35
	Deionized Water	86.65
B	Diatomaceous Earth (SUPER-FINE SUPER FLOSS®[9])	5.00
	Tetrasodium EDTA	2.75
	Sodium o-Phenylphenate (DOWICIDE® A[7])	0.25
	Sodium Alkylbenzene Sulfonate (CALSOFT® L-40 [2])	3.00
	Glycol Ether Solvent (BUTYL CELLOSOLVE®[19])	1.00
C	Preservative	qs

1. Blend the **VAN GEL B** and **VANZAN** and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Reduce the mixing speed and add the Parts B and C ingredients in order, mixing after each addition until uniform.

Thickened Bleach Cleaner No. 543

		Wt %
A	**VAN GEL O**[1] Magnesium Aluminum Silicate	2.50
	Water	32.37
B	Carbomer, 1% Pre-gel*	50.00
	NaOH, 50% solution	2.13
	Commodity NaOCl, 12.5% solution	12.00
	Sodium Dodecyl Diphenyl Oxide Disulfonate (CALFAX DB-45 [2])	1.00

1. Sift the **VAN GEL O** into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Slowly add the neutralized 1% Carbopol pre-gel to the **VAN GEL O** dispersion with mixing. Careful control of the mixing speed is required during this step due to a rapid increase in viscosity, followed by a decrease.
3. Slowly add the 50% NaOH solution. Check the pH and adjust if necessary to pH =12.7±0.1.
4. Reduce the mixing speed and slowly add the NaOCl solution while mixing. A drop in formula viscosity occurs.
5. Reduce the mixing speed to a minimum and add the surfactant
6. If necessary, adjust the mixture with additional 50% NaOH solution to pH=12.6±0.1.

Carbopol Pre-gel:

CARBOPOL® C-676[10]	1.00
Water	96.05
NaOH, 50% solution	2.95

Procedure for Pre-gel:

1. Carefully sift the Carbopol C-676 into an established vortex in the water. Avoid lumping. Mix with good agitation for a minimum of 45 minutes.
2. Very slowly add the 50% NaOH solution with good mixing. Rapid thickening will occur, followed by some decrease in viscosity as the pH increases. Adjust the pH as necessary with additional 50% NaOH solution to pH 12.4±0.1.

Note:
Strict control of the NaOH level to adjust the formula pH is required because it affects the initial viscosity and physical stability of the formula, due to the inherent properties of the carbomer. Proper pH control is also essential for bleach stability. Some of the other factors that can influence both the physical stability and bleach stability of this formula are: any factor that will accelerate bleach decomposition, e.g. metallic contaminants; the amount and source of the commodity bleach; the source of the caustic; the amount and type of surfactant; and the storage conditions of the finished product. It is recommended that the physical and bleach stability profile of this formula be verified.

Toilet Bowl Cleaner No. 544

		Wt.%
A	**VAN GEL O**[1] Magnesium Aluminum Silicate	0.5
	Water	19.8
B	Carbomer, 0.75% Pre-gel*	66.7
	Commodity NaOCl, 12.5%	12.0
	Sodium Dodecyl Diphenyl Oxide Disulfonate (CALFAX DB-45[2])	1.0

1. Sift the **VAN GEL O** into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Slowly add the neutralized 0.75% Carbopol pre-gel to the **VAN GEL O** dispersion with mixing. Careful control of the mixing speed is required during this step due to a rapid increase in viscosity, followed by a decrease.
3. Check the formula at this point and if necessary, adjust the pH to 12.4±0.1.
4. Reduce the mixing speed and slowly add the NaOCl solution while mixing. A drop in formula viscosity occurs.
5. Reduce the mixing speed to a minimum and add the surfactant.
6. Adjust the pH with additional 50% NaOH solution, if necessary, to pH = 12.4 ± 0.1.

Carbopol Pre-gel:

CARBOPOL® C-676[10]	0.75
Water	97.05
NaOH, 50% solution	2.20

Procedure for Pre-gel:

1. Carefully sift the Carbopol C-676 into an established vortex in the water. Avoid lumping. Mix with good agitation for a minimum of 45 minutes.
2. Very slowly add the 50% NaOH solution with good mixing. Rapid thickening will occur, followed by some decrease in viscosity as the pH increases. Adjust the pH as necessary with additional 50% NaOH solution to pH 12.4±0.1.

NOTE:
Strict control of the NaOH level to adjust formula the pH is required because it affects the initial viscosity and physical stability of the formula, due to the inherent properties of the carbomer. Proper pH control is also essential for bleach stability. Some of the other factors that can influence both the physical stability and bleach stability of this formula are: any factor that will accelerate bleach decomposition, e.g. metallic contaminants; the amount and source of the commodity bleach; the source of the caustic; the amount and type of surfactant; and the storage conditions of the finished product. It is recommended that the physical and bleach stability profile of this formula be verified.

Oven Cleaner No. 461

		Wt.%
A	**VAN GEL C**[1] Magnesium Aluminum Silicate	3.00
	Water	75.25
B	Sodium Hydroxide, 50% solution	5.00
C	Glycol Ether Solvent (BUTYL CARBITOL®[19])	10.00
	Aminomethyl Propanol, 95%	1.50
	Sodium Cocoamphoacetate (MONATERIC™ CM-36S[5])	0.25
	Sodium Hydroxide, 50% solution	5.00

1. Sift the **VAN GEL C** into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Slowly add the Part B NaOH solution, adjusting the mixing speed as necessary to compensate for the viscosity increase. Mix until smooth.
3. Reduce the mixing speed and add the Part C ingredients in order, mixing after each addition until uniform. Avoid air entrapment.

Solvent-Free Oven and Grill Cleaner No. 227

		Wt.%
A	**VEEGUM T**[1] Magnesium Aluminum Silicate	0.75
	VANZAN[1] Xanthan Gum	0.25
	Water	77.00
B	Sodium Hydroxide, 50% solution	20.00
	Sodium Cocoamphoacetate (MONATERIC™ CM-36S[5])	2.00

1. Blend the **VEEGUM T** and **VANZAN** and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Slowly add the NaOH solution while adjusting the mixing speed as necessary to compensate for the viscosity increase. Mix until smooth and then slowly add the surfactant. Avoid air entrapment.

NaOH-Free Oven Cleaner No. 480

		Wt.%
A	**VAN GEL C**[1] Magnesium Aluminum Silicate	1.5
	VANZAN[1] Xanthan Gum	0.3
	Water	54.2
B	Triethanolamine	10.0
	Tripropyleneglycol Methyl Ether Solvent (DOWANOL® TPM[7])	5.0
	Potassium Carbonate, 25% Solution	28.0
	Sodium Cocoyl Sarcosinate, 30% Solution	1.0

1. Blend the **VAN GEL C** and **VANZAN** and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Reduce the mixing speed and add the Part B ingredients in order, mixing after each addition until uniform. Avoid air entrapment.

Low Foam Spray Alkaline Cleaner No. 561

		Wt.%
A	**VAN GEL B**[1] Magnesium Aluminum Silicate	1.66
	VANZAN[1] Xanthan Gum	0.33
	Deionized Water	73.91
B	Sodium Metasilicate-9-hydrate	4.50
	C_3-C_9 Acid Carboxylate DETERGE™ LF-7315[13])	8.00
	Complex Carboxylic Acid Derivative (DECORE™ IMT-100LF[13])	5.00
	Alkoxylated Linear Alcohol (DEIONIC™ LF-EP-25[13])	3.00
	Sodium Hydroxide, 50% solution	3.60

1. Blend the **VAN GEL B** and **VANZAN** and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Add the sodium metasilicate-9-hydrate and dissolve with mixing.
3. Reduce the mixing speed and add the remaining Part B ingredients in order, mixing after each addition until uniform.

Aerosol Protective Oven Film No. 251

		Wt.%
A	**VEEGUM T**[1] Magnesium Aluminum Silicate	2.9
	Water	86.4
B	Ethylene Oxide/Propylene Oxide Copolymer (PLURONIC® F-127 [11])	4.3
	Dimethicone, 60,000 cs (DC-200 Fluid[12])	6.4
C	Preservative	qs

1. Sift the **VEEGUM T** into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Reduce the mixing speed and add the Part B and C ingredients in order, mixing after each addition until uniform.

Copper and Brass Cleaner No. 394

		Wt.%
A	**VAN GEL B**[1] Magnesium Aluminum Silicate	1.5
	Water	43.0
B	Diatomaceous Earth (SUPER-FINE SUPER FLOSS®[9])	15.0
	Ammonium hydroxide	1.0
C	Mineral Spirits	30.0
	Oleic Acid	8.0
	Oleamide DEA (NINOL® 201[4])	1.5
D	Preservative	qs

1. Sift the **VAN GEL B** into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Add the Part B ingredients in order, mixing after each addition until uniform.
3. Mix the Part C ingredients until the mixture is clear and then add to the water phase at maximum available shear until emulsified.
4. Add part D and mix until uniform.

Acid Cleaner No. 540

		Wt.%
A	**VAN GEL ES**[1] Magnesium Aluminum Silicate	2.0
	VANZAN[1] Xanthan Gum	0.5
	Water	62.5
B	Phosphoric Acid, 85%	30.0
	Octoxynol-9 (TRITON® X-100[19])	5.0

1. Blend the **VAN GEL ES** and **VANZAN** and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Reduce the mixing speed and add the Part B ingredients in order, mixing after each addition until uniform.

Liquid Silver Cleaner No. 398

		Wt. %
A	**VEEGUM**[1] Magnesium Aluminum Silicate	2.0
	Cellulose Gum (CMC 7MT[14])	0.3
	Water	77.2
B	Diatomaceous Earth (SNOW FLOSS®[9])	15.0
C	Octoxynol-13 (TRITON® X-102[19])	5.0
	VANCHEM® NATD[1], Disodium Dimercaptothiadiazole	0.5
D	Preservative	qs

1. Blend the **VEEGUM** and CMC and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Add Part B and mix until smooth.
3. Reduce the mixing speed and add the Part C ingredients in order, mixing after each addition until uniform.
4. Add part D and mix until uniform.

Oxalic Acid Gel No. 466

		Wt.%
A	**VAN GEL B**[1] Magnesium Aluminum Silicate	2.5
	VANZAN[1] Xanthan Gum	0.8
	Water	53.7
B	Oxalic Acid Dihydrate, 12.5% Aqueous Soln.	40.0
	Polysorbate 40 (TWEEN® 40 [5])	3.0

1. Blend the **VAN GEL B** and **VANZAN** and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Reduce the mixing speed and add the Part B ingredients in order, mixing after each addition until uniform.

Non-Silicone Furniture Polish No. 579

		Wt.%
A	**VAN GEL B**[1] Magnesium Aluminum Silicate	1.10
	VANZAN[1] Xanthan Gum	0.40
	Water	73.15
B	Beeswax Emulsion (BE 720[16])	10.00
	Carnauba™ Emulsion (Kahl CE-404A[16])	10.00
C	Emulsifing Agent (PLURONIC® L44 [17])	0.35
	Orange Oil (Tech Grade d-limonene[15])	5.00
D	Preservative	qs

1. Blend the **VAN GEL B** and **VANZAN** and sift into an established vortex in the water. Mix at maximum available shear until fully hydrated.
2. Add the Parts B, C and D ingredients in order, mixing after each addition until uniform. Avoid air entrapment

Cold-Process Car Polish No. 581

		Wt.%
A	**VANZAN**[1] Xanthan Gum	1.00
	Water	52.15
B	Polydimethylsiloxane emulsion (Dow Corning® 346 Emulsion[12])	11.50
	Carnauba Emulsion (Kahl CE-404A[16])	10.00
C	Emulsifing Agent (PLURONIC® L44[17])	0.35
	Isoparaffinic Solvent (ISOPAR® M Fluid[18])	10.00
D	Aluminum Silicate (KAOPOLITE® SF[8])	15.00
E	Preservative	qs

1. Sift the **VANZAN** into an established vortex in the water. Mix until fully dissolved.
2. Add the Part B ingredients in order, mixing after each addition until uniform.
3. Add the Part C ingredients in order, mixing after each addition until uniform.
4. Add Parts D and E and mix until uniform.

Raw Material Suppliers

1. R.T. Vanderbilt Company, Inc., Norwalk, CT
2. Pilot Chemical Company, Santa Fe Springs, CA
3. Imerys Kaolin, Inc., Roswell, GA
4. Stepan Company, Northfield, IL
5. ICI Americas Inc.
6. Lonza, Inc., Fairlawn, NJ
7. Dow Chemical Company, Midland, MI
8. Imerys Kaolin, Inc., Roswell, GA
9. Celite Corporation, Lompoc, CA
10. Lubrizol Advanced Materials, Inc., Cleveland, OH
11. BASF Corporation, Mount Olive, NJ
12. Dow Corning Corp., Midland, MI
13. DeForest Enterprises, Inc., Boca Raton, FL
14. Silicon Valley Chemicals, Inc.
15. Florida Chemical, Winter Haven, FL
16. Lambent Technologies Corp., Gurnee, IL
17. BASF Corporation, Mount Olive, NJ
18. ExxonMobil Corporation, Irving, TX
19. Union Carbide Chemicals & Plastics Technology Corporation

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