

R. T. VANDERBILT COMPANY, INC.
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Handwritten signature
CABLE ADDRESS
BILTVAN NEW YORK

January 23, 1973

Mr. Frederick F. Roesch, V. P.
Whittaker, Clark & Daniels
1000 Coolidge Street
South Plainfield, New Jersey 07080

Subject: Correction of Definition of Commercial Talc.

Dear Mr. Roesch:

Please substitute the enclosed talc definition for that accompanied our letter of January 19th. Inadvertently, serpentine dolomite were omitted from the earlier version.

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

Sharon Berani

Secretary to Allan M. Harvey

sb
Enclosure

PLAINTIFF'S
EXHIBIT
WCD-48



CK-HAPPY-24

TALC

MINERAL TALC: The mineral talc is a very soft hydrous magnesium silicate, $\text{Mg}_6(\text{Si}_8\text{O}_{20})(\text{OH})_4$, having a layered structure in which a sheet of octahedrally coordinated magnesium ions is sandwiched between two sheets of linked silica (SiO_4) tetrahedra.

COMMERCIAL TALC: Commercial talc is a product varying in mineral composition from something approaching the theoretical composition of the mineral talc to mixtures of mineral talc and other naturally associated minerals such as tremolite, $\text{Ca}_2\text{Mg}_5(\text{Si}_8\text{O}_{22})(\text{OH})_2$, serpentine, $\text{Mg}_3(\text{Si}_2\text{O}_5)(\text{OH})_4$, dolomite, $\text{CaMg}(\text{CO}_3)_2$, etc., which, in varying amounts, contribute various physical and chemical properties desirable in the numerous industrial applications.

FILE NO. 2692-11

EVALUATION OF M.P.M. TALCS

11- Evaluate Flatting Efficiency of M.P.M. Microtalcs

Copies to: J. P. Bartels
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Research Center
Easton, Pennsylvania
March 9, 1970

Minerals, Pigments & Metals
Chas. Pfizer & Company, Inc.
David S. Young

APR 5 1972

EASTON, PA.

INTRODUCTION

This investigation was designed to measure the flattening effect of stir-in Victorville and Barrett Microtals [20 micron top size] in several air dry alkyd type paints. Included in this study as competitive flattening pigments were Johns Manville's "Celite" Diatomaceous Silicas and International Tals - Eastern Platy Talc P-725. The effect of each talc on the physical properties of the aged paint film was also investigated. Several Microtals and Celite pigments were also evaluated in an interior white polyvinyl acetate latex paint.

Pigments evaluated in this study were Microtals CP 10-40, CP 14-35, CP 20-30, MP 10-52, MP 12-50, MP 15-38, MP 20-40, International Talc P-725 and Celite 281, 499 and Superfloss SF.

SUMMARY

The following properties were measured on all the talc and diatomaceous pigments:

I. Physical

A. Dispersibility

1. On Cowles

- [a] In raw linseed oil
- [b] In long oil alkyd [gloss and flat wall enamels]
- [c] In polyvinyl acetate latex emulsion paint

2. In porcelain ball mill

- [a] In flat wall enamel - alkyd vehicle only

II. Paint Use Properties in gloss alkyd enamel, interior flat wall alkyd enamel and polyvinyl acetate [PVAc] copolymer emulsion interior flat.

A. Viscosity

B. Paint film

1. Gloss

- [a] Gloss as related to grind time in ball mill

2. Holdout [flats]

3. Flexibility - Initial and aged

4. Impact resistance - Initial and aged

5. Wash and scrub resistance [PVAc]

6. Burnishing [Gloss increase on washing with PVAc]

CONCLUSIONS

1. All the Microtalcs, P-725, Celites S.F. Superfloss and 499 can be regarded as stir-in flattening pigments while Celite 281 cannot be considered too suitable for stir-in applications.
2. At use levels of 2 to 3 lbs. per gallon, all Microtalcs with 40 or lower oil absorptions, impart significantly lower viscosities to enamels than do Microtalcs MP 10-52 and 12-50, P-725 and Celites 281, 499 and Superfloss.
3. At stir-in levels of low concentration [1#/gallon or less] in a gloss enamel, the Celites [and in particular Celite 281] are more effective in lowering gloss than are the Microtalcs and P-725; at high levels [2 to 3 #/gal.] Celites 281 and 499 are considerably more effective in lowering gloss than any of the talcs. The Montana talcs and P-725 are comparable to Superfloss while the California talcs as a class have the poorest flattening efficiency. Microtalcs MP 10-52 and MP 12-50 are MPM's best talcs for stir-in flattening efficiency.
4. In a flat wall alkyd enamel dispersed in a porcelain ball mill, the Celites produce better low angular sheen properties than do the Microtalcs providing the grinding time is not over 8 hours. The Celites, especially 281, increase in low angular sheen quite rapidly between 8 and 24 hours while the Microtalcs maintain about the same sheen. MPM's best Microtalcs for flat wall alkyd formulations appear to be CP 14-35 and MP 15-38.
5. The Celites, 281 and 499 are considerably more efficient in producing good low angular sheen properties in polyvinyl acetate latex films than are the Microtalcs. Microtalcs CP 14-35 was the most efficient Microtalcs.
6. The Microtalcs, P-725 and Celites all had comparable hold out properties in the gloss and flat alkyd enamels and also in the PVAc latex.
7. At high use levels [2#/gal.] in a gloss alkyd enamel, S.F. Super-gloss and the Montana Microtalcs have very little effect on flexibility. Celite 281, P-725 and the California Microtalcs reduce flexibility very slightly while Celite 499 was significantly poorer in regard to flexibility properties upon the aging of the paint films.

8. The Celites, especially S.F. Superfloss, have significantly better direct and reverse impact resistance when 1# to 2#/gal. levels are used in a gloss alkyd enamel than do the Microtalcs and P-725. The Montana Microtalcs appear to be very slightly better than the California Microtalcs for impact resistance properties.
9. In a PVAc latex, the Microtalcs are slightly superior to the Celites for stain removal by washing but are slightly inferior for stain removal by scrubbing. The Celites are far superior to the Microtalcs for burnish resistance [gloss increase on washing].

*
OBSERVATIONS

I. Dispersibility

A. On Cowles

All the Microtalcs and International's P-725 will disperse easily to a 6 to 7 Hegman fineness on the Cowles. Superfloss S.F. is the only Celite pigment to give a 6 Hegman. Celite 499 disperses to a 5 or 5 1/2 Hegman while Celite 281 is definitely not a good stir in grade with Hegmans on the Cowles of only 2 to 3.

B. In Porcelain Ball Mill

Hegman readings of each pigment in the flat wall alkyd enamel were taken after 1, 4, 8 and 24 hours grinding time. All pigments tested, except Celite 281, gave Hegman readings of from 5 to 7 in 1 to 4 hours of grinding. Celite 281 had a 4 Hegman after 4 hour grinding. Very little or no improvement in Hegman readings were obtained after 4 hours grinding except in the case of Celite 281 which increased from a 4 Hegman to a 6 1/4 Hegman after 24 hours grinding.

II. Viscosity of Finished Paints

In the gloss alkyd enamel, the addition of up to 1#/gal. of each pigment tested showed relatively the same increase in viscosity [5 to 10 K.U.]. However when 2 and 3#/gal. of each pigment was added to the gloss enamel, all the Microtalcs with a 40 oil absorption or less imparted viscosities which were 20 to 30 K.U. less than those imparted by MP 10-52, MP 12-50, International's P-725 and the three Celite pigments.

*For discussion on flattening per cost - see page 6a.

III. Gloss of Paint Films

A. Incorporation under Cowles in Alkyd Gloss Enamel

1. 1/4#/gal. - None of the pigments lowered the 60° or 85° degree gloss readings of the control enamel more than 2°.
2. 1/2#/gal. - Celite 281 and 499 lowered the 60° gloss readings by 10° to 15°, the other pigments had little effect on gloss.
3. 1#/gal. - The Celite pigments dropped the 60° gloss readings from 20 to 30°, the talcs were still not very effective at this level. Celite 281 was the only pigment to significantly lower the 85° gloss reading [from 98° to 74°].
4. 2#/gal. - Celite 499 and 281 were very effective in lowering both the 60° and 85° gloss readings to 15° or less. MP 10-52, MP 12-50 and P-725 gave 60° readings in the twenties and thirties; Superfloss, MP 20-40, CP 10-40 and MP 15-38 gave 60° readings in the forties and fifties and CP 14-35 and CP 20-30 gave 60° readings in the low seventies. Only Celite 499 and 281 were effective in lowering the 85° gloss [or low angular sheen] of the gloss enamel.
5. 3#/gal. - Only the Microtalcs and P-725 were evaluated at this level. MP 10-52, MP 12-50, MP 20-40 and P-725 gave 60° gloss readings of 10° or less; MP 15-38 about 15°, CP 10-40 and CP 14-35 between 20° and 30° and CP 20-30 was by far the highest with a 60° reading of 58°. Only CP 20-30 and CP 10-40 were not too effective in lowering the 85° gloss at this high level. The remaining Microtalcs and P-725 gave readings in the thirties. However, none of the Microtalcs are nearly as effective in producing low angular sheen as are Celite 281 and 499.

B. Gloss of Flat Wall Alkyd Enamel versus Grinding Time in Porcelain Ball Mill.

1. 60° gloss readings - All the Microtalcs and Celites gave 7° maximum gloss readings up to 8 hours grinding time except CP 20-30 which had gloss readings of about 35°. All the Microtalcs [except CP 20-30] and also P-725 and Superfloss S.F. maintain this 7° or slightly less gloss reading through 24 hours of ball milling. However, the enamels containing Celite 281 and 499 increased in gloss when the grinding time was increased

from 8 to 24 hours. The Celite 281 paint increased from 6° to 21° and the Celite 499 paint from 4° to 12°. The CP 20-30 still had a gloss of 25° after 24 hours grinding.

2. 85° gloss readings - From 1 to 8 hours grinding time, the three Celites are the most effective in giving low angular sheen [readings of 2° to 4°]. However, if they are ground 24 hours, the 85° sheen increases to about 15° on Celite 499 and Superfloss S.F. and to 38° on Celite 281. The Microtals with the lowest gloss readings are CP 14-35 and MP 15-38 with readings of about 12° to 15° and MP 20-40 and CP 10-40 with readings of approximately 20° to 25°. MP 12-50 and P-725 give readings of about 30° to 35° while MP 10-52 is poor with 40° to 50° gloss. CP 20-30 again is unusual in that the gloss decreases from 50° to 37° with continued grinding.

- C. Gloss of PVAc Latex - Only MP 12-50, MP 20-40, CP 14-35 and Celites 281 and 499 were evaluated. The white latex only contained these pigments for flattening and the level was about 3#/gal. All five pigments produced 60° gloss readings of 3°. The two Celites produced 85° gloss readings of 2° or under while the 3 Microtals produced readings of 6° to 13° with CP 14-35 giving the lowest reading.

IV. Hold Out

- A. Gloss and Flat Alkyd Enamels - No significant difference in hold out between the Microtals, P-725 and the 3 Celite pigments.
- B. PVAc Latex - No significant difference in hold out between the Microtals MP 12-50, MP 20-40, CP 14-35 and Celites 281 and 499.

V. Flexibility

- A. Gloss Enamel - The addition of 1/4, 1/2 and 1#/gal. of any of the pigments tested did not cause the films to break when bent over a conical mandrel with a radius of bend as sharp as 1/16 inch. The addition of 2#/gal. showed MP 10-52, MP 12-50, MP 15-38, CP 20-30, MP 20-40 and Superfloss S.F. to have excellent flexibility and to be slightly superior to Celite 281, CP 10-40, CP 14-35 and P-725 and significantly superior to Celite 499.

VI. Impact Resistance

A. Gloss Enamel - [All readings taken on 22 gauge steel panels aged 30 days at room temperature]

- [1] Direct Impact - None of the pigments significantly lower the direct impact resistance at levels up to 1#/gal. However, at 2#/gal. all the Microtals and P-725 lower the direct impact resistance from 160 in/# to approximately 80 to 90 in/#. Superfloss S.F. had no effect on the direct impact and Celites 281 and 499 very little effect.
- [2] Reverse Impact - At the 1/2#/gal level, CP 20-30 and P-725 are showing significantly poorer impact resistance while MP 10-52, MP 15-38 show a moderate drop in resistance. 1#/gal. levels show only Superfloss S.F. to have maintained excellent reverse impact resistance. Celite 499 and MP 20-40 had still good impact properties while Celite 281 and MP 15-38 had fair impact and the remaining pigments very poor impact resistance properties. In the 2#/gal levels Superfloss S.F. again had the best impact with a reading of 40 in/#, Celite 499 and 281 had readings of about 20 in/#. All the Microtals and P-725 had readings of 10 or below. MP 10-52 gave the highest reading of any of the Microtals with a reading of 10 in/#.

VII. Stain Removal from PVAc Films [Only Celite 281 and 499 and Microtals MP 12-50 and MP 20-40 were evaluated.]

- A. Washability - The two Microtals were slightly better than Celite 499 and significantly better than Celite 281 in regard to the removal of carbon paper, crayon and pencil marks by ASTM wash cycle tests.
- B. Scrubbability - Celite 499 was slightly superior to Celite 281 and significantly superior to MP 12-50 and MP 20-40 in removing stains by ASTM scrub cycle tests. MP 12-50 had better stain removal in general than MP 20-40.
- C. Burnishing - [100 wash cycles] Both Microtals increased in 85° gloss approximately 40° while the Celite pigments maintain a gloss of about 2°.
- D. Erosion - Both Celite 281 and 499 [at a high use loading] produced very cheesy films that eroded quite quickly as compared to the PVAc films containing high levels of Microtalc MP 12-50 or 20-40.

DISCUSSION

In general, Celites 281 and 499 are about 50% more efficient flatting pigments than are the Montana Microtals and about 100% more efficient than the California Microtals. S.F. Superfloss is about equal to the Montana Microtals [slightly better for low angular sheen] for flatting efficiency and slightly more efficient than the California Microtals.

On a cost basis, Celite 281 [\$69.00 a ton F.O.B. California] gives by far the best flatting per unit cost as compared to any of the MPM Microtals. However, Celite 281 is not quite fine enough to be considered a stir in grade pigment and therefore its greatest use would be ball mill dispersions.

Celite 499 [\$95.00 a ton F.O.B. California] is a good stir in grade pigment and in flatting efficiency per unit cost, it is only very slightly superior to MP 12-50, MP 15-38, MP 20-40 and CP 14-35 but Celite 499 is a much better buy than MP 10-52, CP 10-40 and CP 20-30. However Celite 499 reduces the flexibility of paint films significantly more than the Microtals.

S.F. Superfloss [\$210.00 a ton F.O.B. California] based on flatting efficiency per unit cost is a much poorer buy than any of the Microtals except CP 20-30. However, at high use levels, S.F. Superfloss has the least effect on flexibility and impact resistance as compared to the other Celites or to any of the Microtals.

EXPERIMENTAL

TABLE #1

Cowles Dispersibility in Raw Oil

Disperse on the Cowles at 3900 RPM at 75% raw linseed oil and 25% pigment. Check Hegman after 1, 2, 3, 5 and 8 minutes.

	1'	2'	3'	5'	8'
Celite 281	0-2	1-2	1-2	1 1/2-2 1/2	2-2 1/2
Celite 499	4	4 1/4	4 1/2	4 3/4	4 3/4
S.F. Superfloss	5 3/4	6	6	6	6
Microtalc CP 10-40	6	6	6 1/4	6 1/4	6 1/2
" MP 10-52[4002]	6 1/2	6 3/4	6 3/4	6 3/4	7
" MP 12-50	6	6	6	6	6 1/4
" MP 15-38[3005]	5 3/4	6	6	6	6
" CP 14-35	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2
" CP 20-30[9000]	5 1/2	5 1/2	5 1/2	5 3/4	5 3/4
" MP 20-40[3023]	6	6	6 1/4	6 1/4	6 1/4
International Talc P-725	6 1/2	6 1/2	6 1/2	6 1/2	6 3/4

TABLE II

Gloss White Alkyd Enamel Base - Used in Flatting [Table III]

Parts by Weight

TiO ₂ [R-750]	305
Duraplex D-65A [56% N.V.]	100
Mineral Spirits	20
Premix on Cowles - Then one tight pass on 3-roll mill	
Reduction	
Duraplex D-65A [70% N.V.]	530
Mineral Spirits	60
24% Lead Naph.	4
6% Cobalt Naph.	4
	<u>1023#</u> or 100 gallons
Hegman Fineness	7.5
Viscosity	88 KU
PVC	15.5
Non-volatile by weight	71.5%
" " volume	56.2%

TABLE III

Physical Properties of Films Containing 1/4#/gal. of each Flatting Pigment

Use 454 grams of gloss white alkyd base [Table #III] and add 11.5 grams of each extender. Disperse on Cowles at 3900 RPM for 4 minutes. 1/4#/gal. level.

	H.F.	Visco- sity	60° gloss	85° gloss	Over Glass		#1	#2		#3		#4	
					60°	85°		A	B	A	B	A	B
Celite 281	3-4	90 KU	85	96	88	99	90	>160	>160	85	140	OK	OK
Celite 499	5 1/2-6	83 KU	85	98	87	99	90	>160	>160	130	150	OK	OK
S.F. Super- floss	6-6 1/2	86 KU	87	97	88	99	90	>160	>160	140	>160	OK	OK
CP 10-40	6 1/2-7	82 KU	88	98	88	99	90	>160	>160	150	>160	OK	OK
MP 10-52	7+	86 KU	88	100	89	98.5	90	>150	>160	140	>160	OK	OK
MP 12-50	6 1/2-7	81 KU	87	99	89	98.5	90	150	>160	140	>160	OK	OK
MP 15-38	6 1/2	95 KU	87	101	89	98.5	90	>160	>160	>160	>160	OK	OK
CP 14-35	6 1/2	95 KU	88	100	88	98.5	90	>160	>160	120	130	OK	OK
CP 20-30	6 1/2	95 KU	87	99	89	98	90	>160	>160	90	100	OK	OK
MP 20-40	6 3/4	88 KU	88	99	88	98	90	>160	>160	150	>160	OK	OK
Int. P-275	7	84 KU	88	97	89	99	90	>160	>160	120	150	OK	OK
Control	7 1/2	88 KU	87	98	89	98	90	>160	>160	>160	>160	OK	OK

- #1. 60° gloss of gloss white control over flattened enamel over un-sealed chart.
 #2. Direct Impact A/Aged 10 days B/Aged 30 days
 #3. Reverse Impact A/Aged 10 days B/Aged 30 days
 #4. Conical Mandrel A/Aged 10 days B/Aged 30 days

TABLE IV

Physical Properties of films containing 1/2#/gal. of each flattening pigment

Use 454 grams of gloss white alkyd base [Table II] and add 23 grams of each extender. Disperse on Cowles at 3900 RPM for 4 minutes. 1/2#/gal. level.

	H.F.	Visco- sity	60° gloss	85° gloss	Over Glass		#1	#2		#3		#4	
					60°	85°		A	B	A	B	A	B
Celite 281	2-3	99 KU	73	89	79	94	90	140	>160	120	>160	OK	OK
Celite 499	5 1/2	100 KU	79	96	81	97.5	90	>160	>160	120	>160	OK	OK
S.F. Super- floss	6 1/2	98 KU	82	97	83	97.5	90	>160	>160	>160	>160	OK	OK
CP 10-40	6 3/4	97 KU	86	98	87	98	90	>160	>160	70	>160	OK	OK
MP 10-52	7	101 KU	85	98	85	98	90	120	>160	50	90	OK	OK
MP 12-50	6 3/4	97 KU	85	98	86	99	90	150	>160	100	150	OK	OK
MP 15-38	6 1/2	95 KU	85	97	85	98	90	140	>160	70	90	OK	OK
CP 14-35	6 1/2	92 KU	83	97	85	98	90	150	>160	90	130	OK	OK
CP 20-30	6 1/4	91 KU	85	96	86	98.5	90	>160	>160	40	40	OK	OK
MP 20-40	6 1/2	92 KU	85	97	84	98	90	140	>160	80	150	OK	OK
Int.P-275	7	101 KU	87	99	88	98.5	90	130	>160	50	40	OK	OK
Control	7 1/2	88 KU	87	98	89	98	90	>160	>160	>160	>160	OK	OK

- #1. 60° gloss of gloss white control over flattened enamel over un-sealed chart.
 #2. Direct Impact A/Aged 10 days B/Aged 30 days
 #3. Reverse Impact A/Aged 10 days B/Aged 30 days
 #4. Conical Mandrel A/Aged 10 days B/Aged 30 days

TABLE V

Physical Properties of Films Containing 1#/gal. of Each Flatting Pigment

Use 454 grams of gloss white alkyd base [Table II] and add 45.4 grams of each extender.
Disperse on Cowles at 3900 RPM for 4 minutes. 1#/gal level.

	H.F.	Visco- sity	60° gloss	85° gloss	Over Glass		#1	#2		#3		#4	
					60°	85°		A	B	A	B	A	B
Celite 281	2-3	110 KU	54	74	63	84	90	140	>160	30	50	OK	OK
Celite 499	5	106 KU	52	85	61	93	90	140	>160	70	90	OK	OK
S.F. Super- floss	6	104 KU	63	94	63	93	90	>160	>160	>160	>160	OK	OK
CP 10-40	6 3/4	98 KU	82	99	82	98	90	120	>160	10	20	OK	OK
MP 10-52	7	111 KU	78	99	69	96.5	90	90	140	14	30	OK	OK
MP 12-50	6 1/2	109 KU	81	95	77	98	90	90	140	3	16	OK	OK
MP 15-38	6 1/4	97 KU	81	98	78	97	90	130	>160	30	50	OK	OK
CP 14-35	6 1/4	106 KU	82	97	77	97	90	90	130	16	16	OK	OK
CP 20-30	6 1/4	102 KU	83	96	81	97	90	100	>160	4	10	OK	OK
MP 20-40	6 1/2	102 KU	79	97	82	97	90	100	>160	10	80	OK	OK
Int. P-725	7	109 KU	79	97	82	96.5	90	130	120	10	16	OK	OK
Control	7 1/2	88 KU	87	98	89	98	90	>160	>160	>160	>160	OK	OK

- #1. 60° gloss of gloss white control over flattened enamel over un-sealed chart.
 #2. Direct Impact A/Aged 10 days B/aged 30 days
 #3. Reverse Impact A/Aged 10 days B/aged 30 days
 #4. Conical Mandrel A/Aged 10 days B/aged 30 days

TABLE VI

Physical Properties of Films Containing 2#/gal. of Each Flatting Pigment

Use 454 grams of gloss white alkyd base [Table II] and add 90 grams of each extender. Disperse on Cowles at 3900 RPM for 4 minutes. 2#/gal. level.

	H.F.	Visco- sity	60° gloss	85° gloss	Over 60°	glass 85°	#1	#2		#3		#4	
								A	B	A	B	A	B
Celite 281	1-2	137 KU	15	17	17	18	90	100	120	10	16	1/8"	OK
Celite 499	4 1/2	141 KU	5	3	5	3	90	100	130	6	20	1/2"	1/4"
S.F. Super- floss	6	130 KU	45	88	52	92	90	110	>160	30	40	OK	OK
CP 10-40	6 1/2	118 KU	54	90	64	92	90	60	80	2	2	1/16"	OK
MP 10-52	7-	137 KU	20	73	22	73	90	80	90	4	10	OK	OK
MP 12-50	6 1/2	130 KU	35	76	39	79	90	70	90	4	6	OK	OK
MP 15-38	6	114 KU	52	85	60	88	90	60	80	4	2	OK	OK
CP 14-35	6	109 KU	68	92	70	93	90	50	70	4	2	1/4"	OK
												V.F.	
CP 20-30	6	104 KU	76	97	76	97	90	50	110	4	4	OK	OK
MP 20-40	6 1/4	113 KU	46	86	60	90	90	80	90	6	4	OK	OK
Int. P-725	7-	132 KU	32	76	37	80	90	70	70	4	4	1/16"	OK
Control	7 1/2	88 KU	87	98	89	98	90	>160	>160	>160	>160	OK	OK

- #1. 60° gloss of gloss white control over flattened enamel over un-sealed chart.
 #2. Direct Impact A/Aged 10 days B/Aged 30 days
 #3. Reverse Impact A/Aged 10 days B/Aged 30 days
 #4. Conical Mandrel A/Aged 10 days B/Aged 30 days

TABLE VII.

Physical Properties of Films Containing 3#/gal. of Each Flatting Pigment

Use 454 grams of gloss white alkyd base [Table II], 35 grams of Mineral Spirits and add 135 grams of each extender. Disperse on Cowles at 3900 RPM for 4 minutes. 3#/gal. level.

	H.F.	Visco- sity	60° gloss	85° gloss	Over glass		#1	#2		#3		#4	
					60°	85°		A	B	A	B	A	B
MP 10-52	6 3/4	126 KU	4	41	4	42	90	30	70	4	4	1/4"	1/4"
MP 12-50	6 1/2	108 KU	6	30	6	28	90	70	90	8	8	7/16"	1/2"
MP 20-40	6	97 KU	10	32	11	28	90	100	90	40	20	1/2"	1/2"
Int.P-725	6 3/4	120 KU	8	37	8	39	90	80	80	10	4	1/2"	3/4"
Control	7 1/2	88 KU	87	98	89	98	90	160	160	160	160	OK	OK
The following were evaluated at a later time using a new control													
Control	7.5	64 KU	89	96	90	98	90	N	E		A		
MP 15-38	6.75	79	16	28	13	24	90	O	V		T		
CP 10-40	6.5	77	30	55	23	48	90	T		A	E		
CP 14-35	6.0	78	24	29	18	27	90			L	D		
CP 20-30	6.0	69	58	75	54	70	90			U			

- #1. 60° gloss of gloss white control over flattened enamel over un-sealed chart.
 #2. Direct Impact A/Aged 10 days B/Aged 30 days
 #3. Reverse Impact A/Aged 10 days B/Aged 30 days
 #4. Conical Mandrel A/Aged 10 days B/Aged 30 days

TABLE VIII

Hegman Fineness at Various Time Intervals of Flat Wall Alkyd Dispersed in Procelain Mill

	1	2	3	4	5	6	7	8	9	10	11	12
R-750 T10 ₂	300	300	300	300	300	300	300	300	300	300	300	300
Celite 281		150										
Celite 499			150									
Superfloss S.F.				150								
CP 10-40					150							
MP 10-52						150						
MP 12-50							150					
MP 15-38								150				
CP 14-35									150			
CP 20-30										150		
MP 20-40											150	
P-725												150
Aroflat 3025-												
MO-40	342	342	342	342	342	342	342	342	342	342	342	342
Mineral												
Spirits		100	100	75	75	125	125	75	75	75	75	125
#1 Ground 18 hrs.												
Ground Paste	64	79	79	79	79	79	79	79	79	79	79	79
Reduction												
[Below]		25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
H.F. 18 hrs.		7 1/2										
H.F. 1 hr.	-	2-3	4 1/2-5	5-6	4-6	3-5	4-5	4-6	3-6	2-5	4-6	3-5
H.F. 4 hrs.	-	4-4 1/2	5-5 1/2	6	6-6 1/2	6-7	6-6 1/2	6-6 1/2	6 1/4	6	6-6 1/2	6
H.F. 8 hrs.	-	4 1/2-5	5 1/2	6-6 1/4	6-6 1/2	6 1/2-7	6-6 1/2	6-6 1/2	6-6 1/2	6	6-6 1/2	6-6 1/2
H.F. 24 hrs.	-	6 1/4	6 1/4-6 1/2	6 3/4	6 1/2-6 3/4	7	6 1/2-6 3/4	6-6 1/2	6-6 1/2	6	6 1/2	6-6 3/4

Reduction:

Aroflat 3025-MO-40

125

Mineral Spirits

191

6% Co Naph.

1.00

24% Pb Naph.

3.75

A.S.A.

1.25

322.00

TABLE VIII [a]

Gloss of Flat Alkyd Films Dispersed at Various Time Intervals in Porcelain Ball Mill

	Ball Mill 1 Hr.				Ball Mill 4 Hrs.				Ball Mill 8 Hrs.				Ball Mill 24 Hrs.			
	Sealed		Unsealed		Sealed		Unsealed		Sealed		Unsealed		Sealed		Unsealed	
	60°	85°	60°	85°	60°	85°	60°	85°	60°	85°	60°	85°	60°	85°	60°	85°
Celite 281	3	0	3	0	3	1	3	1	6	3	3	1	21	38	4	9
Celite 499	3	1	3	1	3	1	3	1	4	1	3	1	12	20	3	5
S.F. Super-floss	3	2	3	2	3	3	3	3	3	4	3	3	5	15	3	8
CP 10-40	4	21	4	18	4	22	4	21	4	23	4	20	4	27	4	22
MP 10-52	4	42	4	39	4	45	4	42	4	46	4	41	4	49	4	43
MP 12-50	4	29	4	26	4	33	4	29	4	33	4	31	4	34	4	33
MP 15-38	4	14	4	10	4	14	4	12	4	15	4	12	4	17	4	13
CP 14-35	7	11	3	8	7	12	4	9	7	11	4	9	5	13	4	10
CP 20-30	33	52	4	7	35	55	4	7	32	47	4	7	25	37	4	10
MP 20-40	4	23	4	19	4	19	4	17	4	20	4	18	4	24	4	22
P-725	4	31	4	28	4	35	4	32	4	34	4	32	4	38	4	34
TiO ₂ Control-	-	-	-	-	-	-	-	-	-	-	-	-	90	100	15	80

TABLE IX

Flat White Polyvinyl Acetate Latex Formulas Containing Microtals and Celites

	1	2	3	4	5
RA-47 T10 ₂	150	150	150	150	150
Celite 281	343				
Celite 499		343			
MP 12-50			343		
MP 20-40				343	
CP 14-35					343
Water	375	435	330	270	300
Tamol 731 [25%]	5	5	5	5	5
Surfynol TG	3	3	3	3	3
Carbitol Acetate	12	12	12	12	12
Ethylene Glycol	30	30	30	30	30
WP-4400 [3%]	50	50	50	50	50
Disperse on Cowles 10 at 3900 RPM					
Nopco NDW	2	2	2	2	2
WP-4400 [3%]	70	70	70	70	70
Water	-	-	120	110	75
Wallpol 40-120	220	220	220	220	220
Hegman Fineness	1-2	4 1/2	4-6	4-5	5 1/2
Initial Viscosity	67 KU	64 KU	75 KU	77 KU	75 KU
60° Gloss	3	3	3	3	3
85° Gloss	0	2	13	10	6

TABLE X
Wash & Scrubbability Properties of Latex Paints in Table IX

Wash- ability cycles to remove		Celite 281	Celite 499	MP 12-50	MP 20-40
	Carbon Paper Wax Crayon 6B Pencil	35 100 60	20 40 20	10 20 10	10 30 10
Scrubb- ability cycles to remove					
	Carbon Paper Wax Crayon 6B Pencil	130 170 80	75 105 75	205 305 180	400 500 300
	85° Gloss Original	0	2	13	10
	85° Gloss 100 Wash Cycles	1	1	55	50
The two Celites, 281 and 499, produce very soft cheesy films. Both Celites erode quickly and the films wear through.					

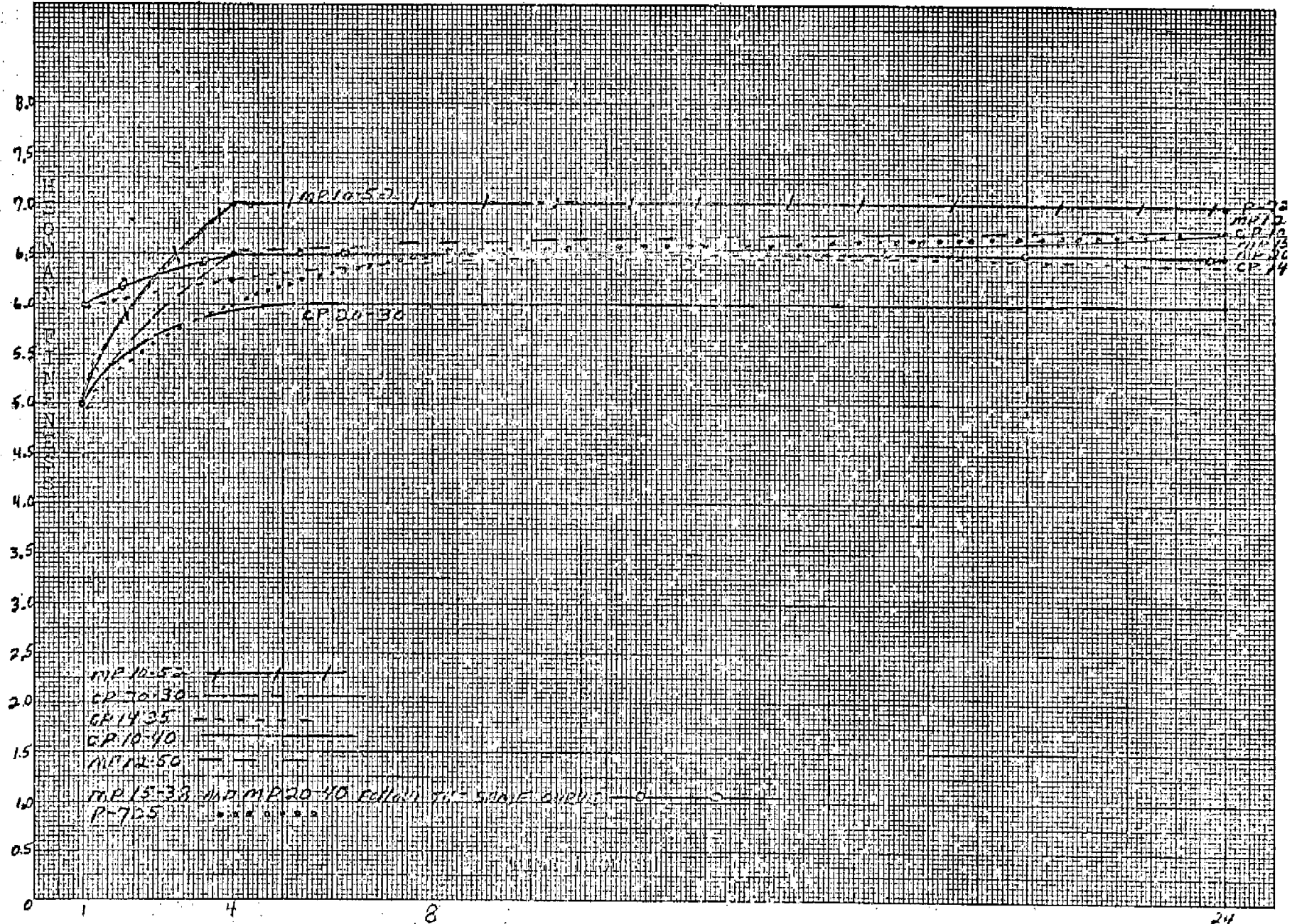
David S. Young
David S. Young

DSY:acs

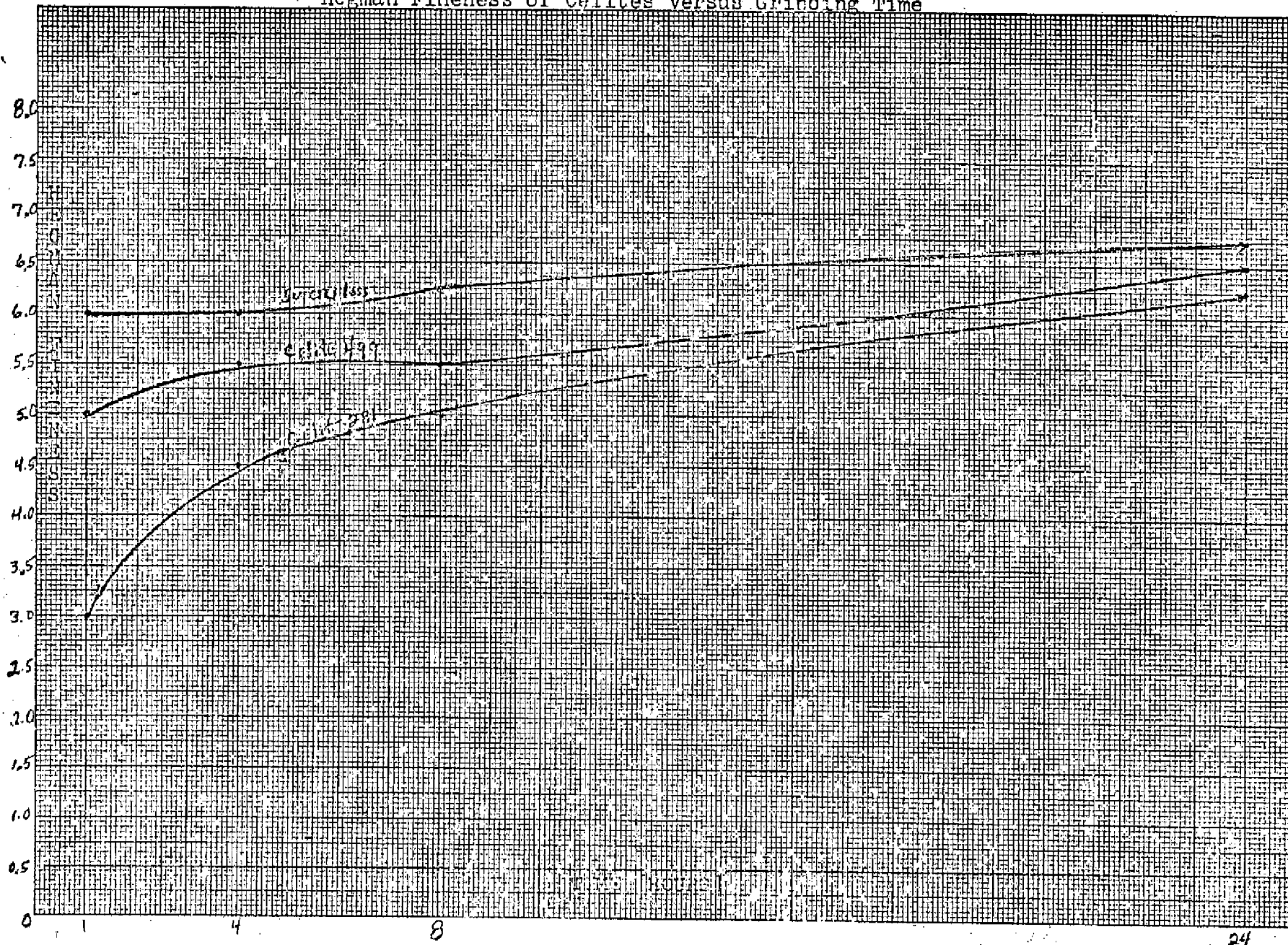
Graph #1 -- Flat Wall Alkyd -- Porcelain Ball Mill
Hegman Fineness of Microtales versus Grinding Time

H
E
G
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A
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F
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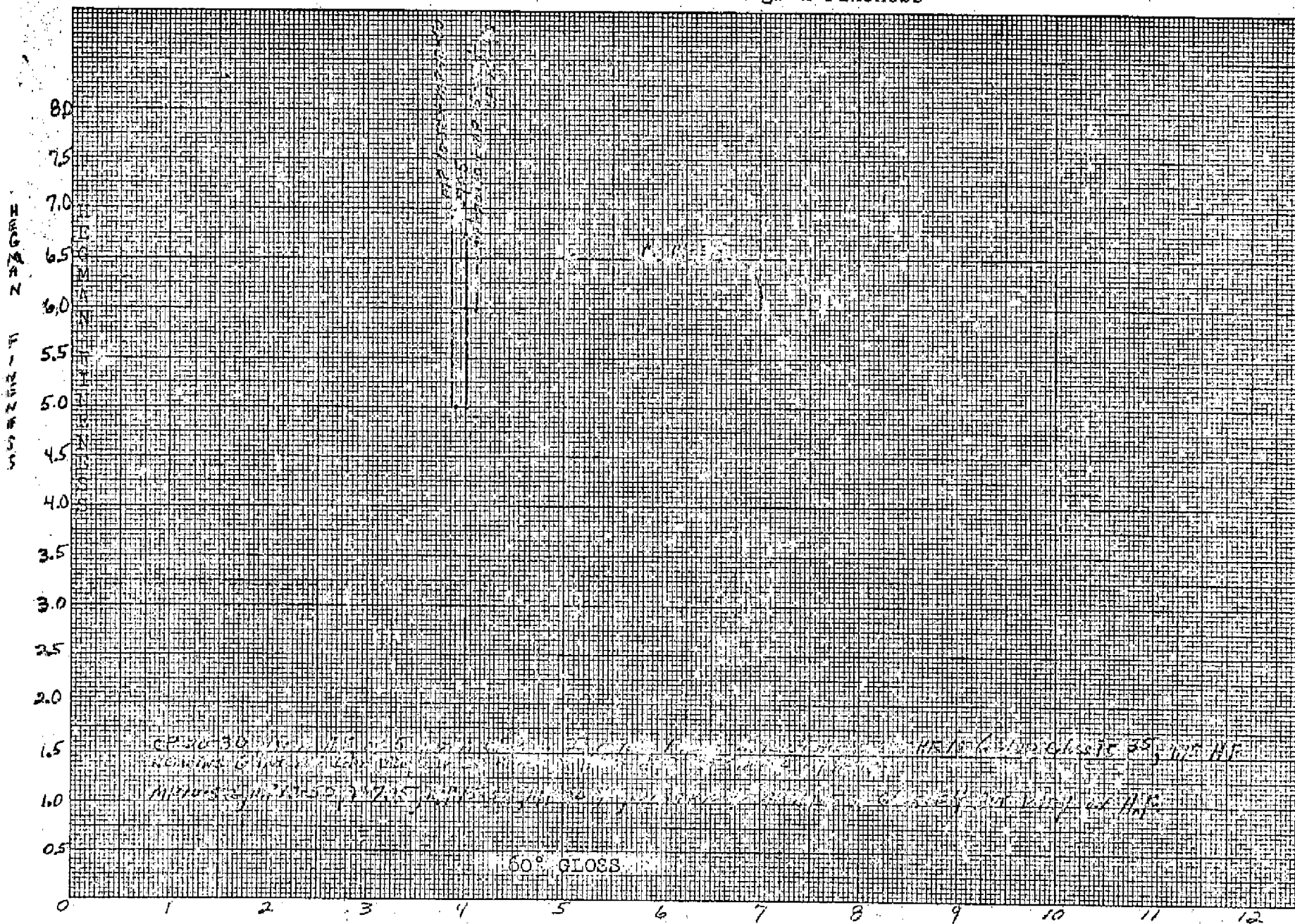


Graph #1A -- Flat Wall Alkyd -- Porcelain Ball Mill
Hegman Fineness of Celites versus Grinding Time

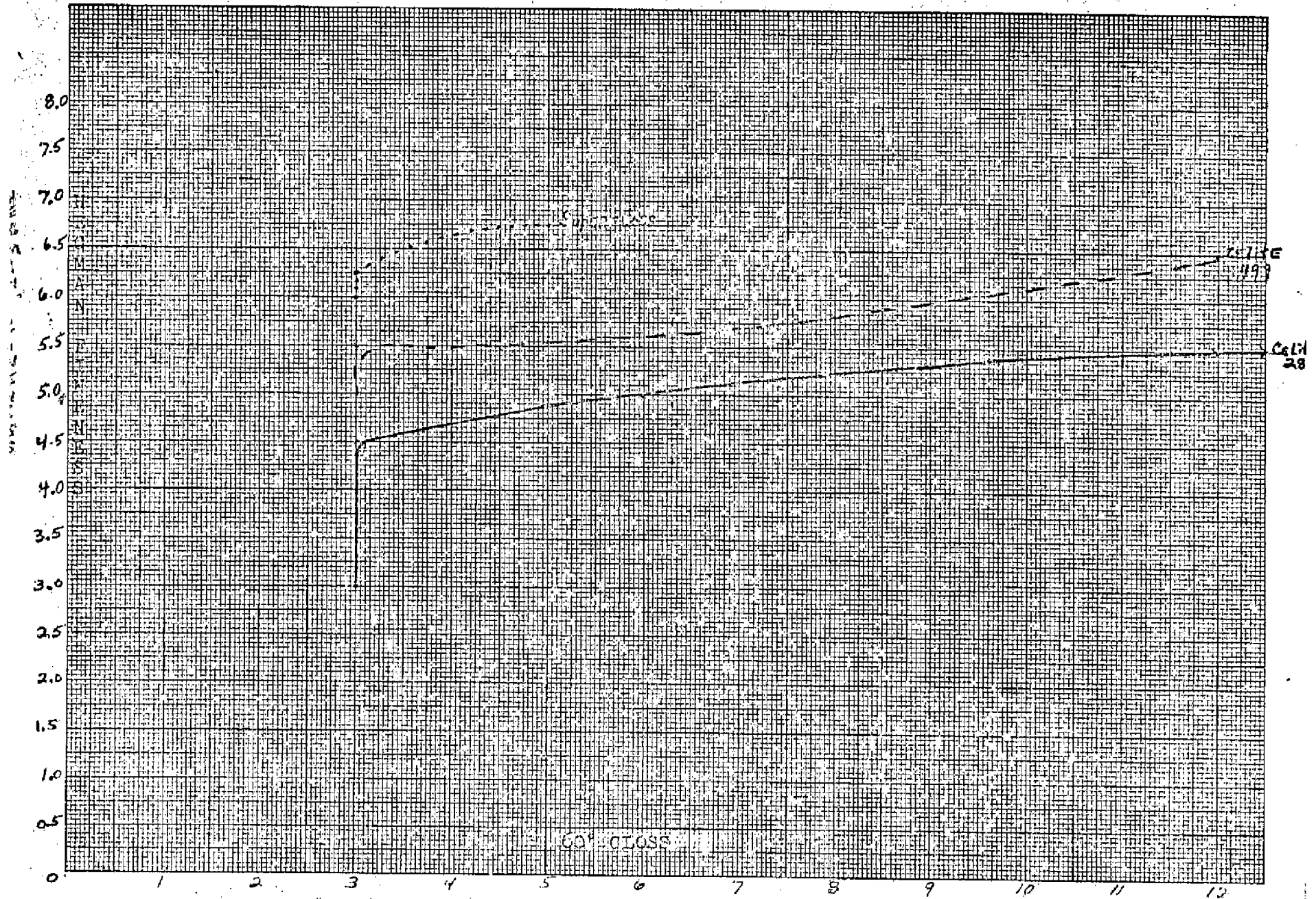


Graph #2 -- Flat Wall Alkyd -- Porcelain Ball Mill

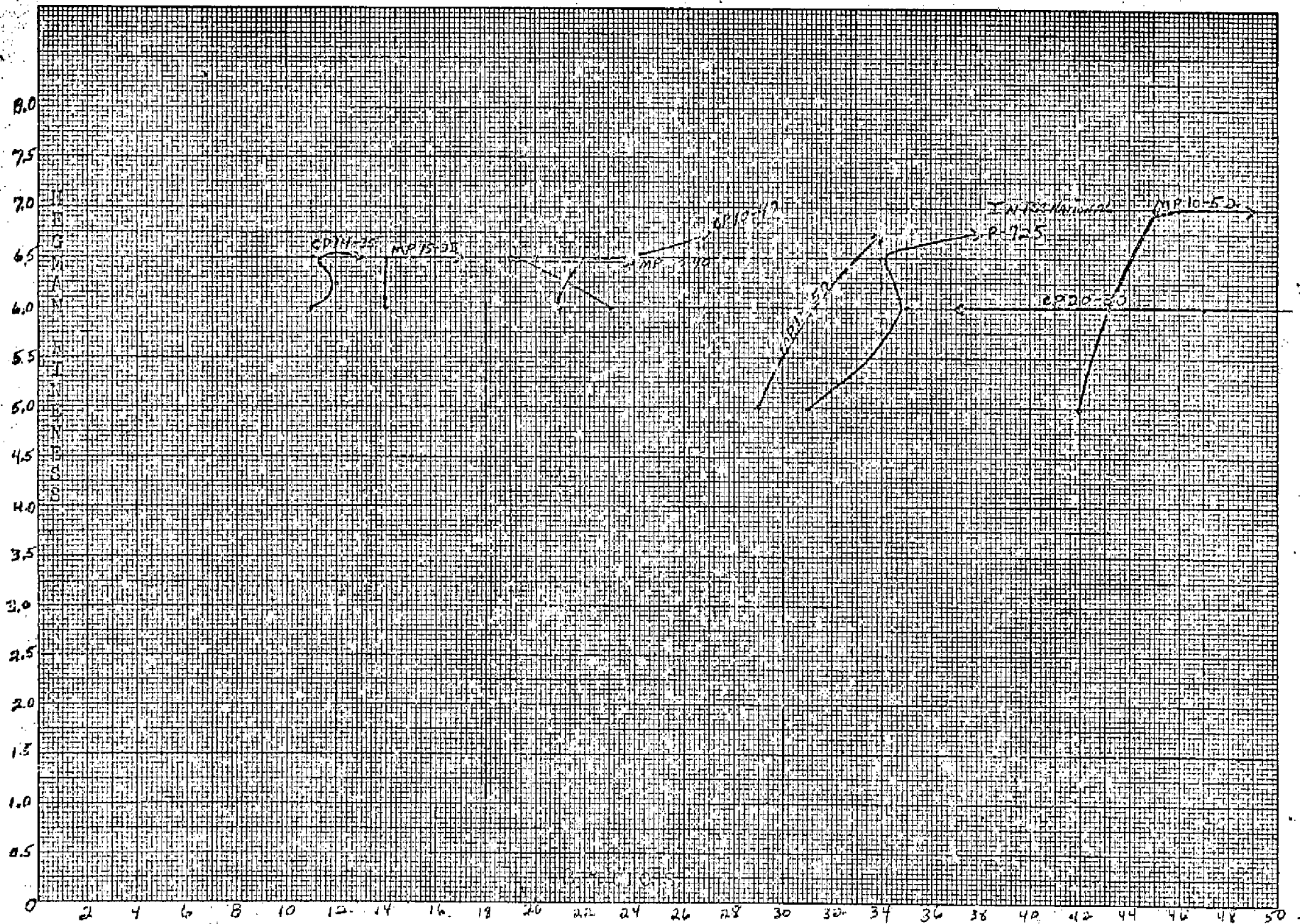
60° Gloss of Microtals versus Hegman Fineness



Graph #2A -- Flatwall Alkyd -- Porcelain Ball Mill
60° Gloss of Celites versus Hegman Fineness

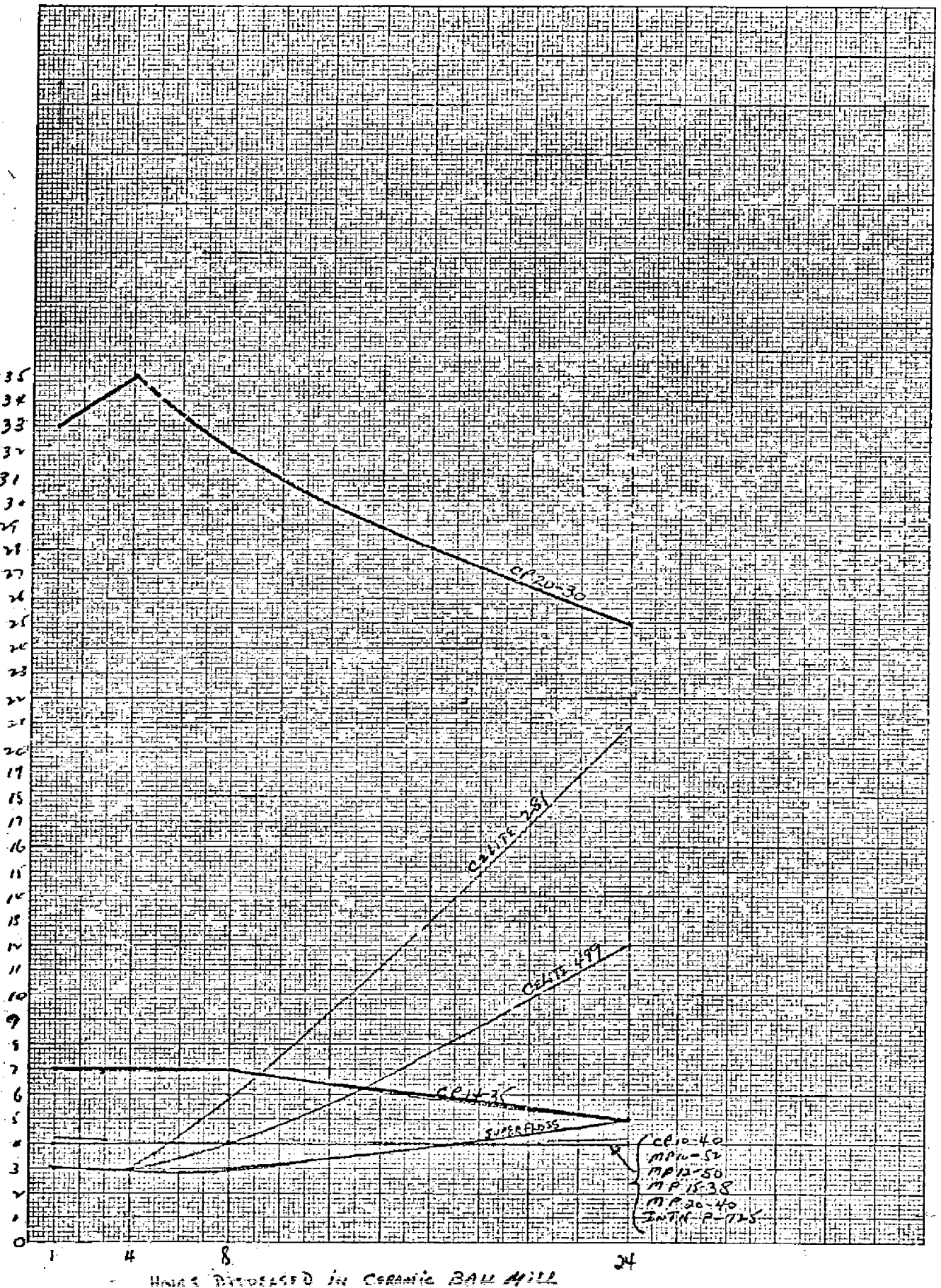


Graph #3 -- Flat Wall Alkyd -- Porcelain Ball Mill
85° Gloss of Microtales versus Hegman Fineness



Graph #4 -- Flat Wall Alkyd -- Porcelain Ball Mill
60° Gloss of Microtalcs & Celites vs. Grinding Time

KE 10 X 10 TO THE CENTIMETER 48 1510
MADE IN U.S.A.
NEUPPEL & ESSER CO.
60° GLOSS WHITE FLAT WALL ALKYD

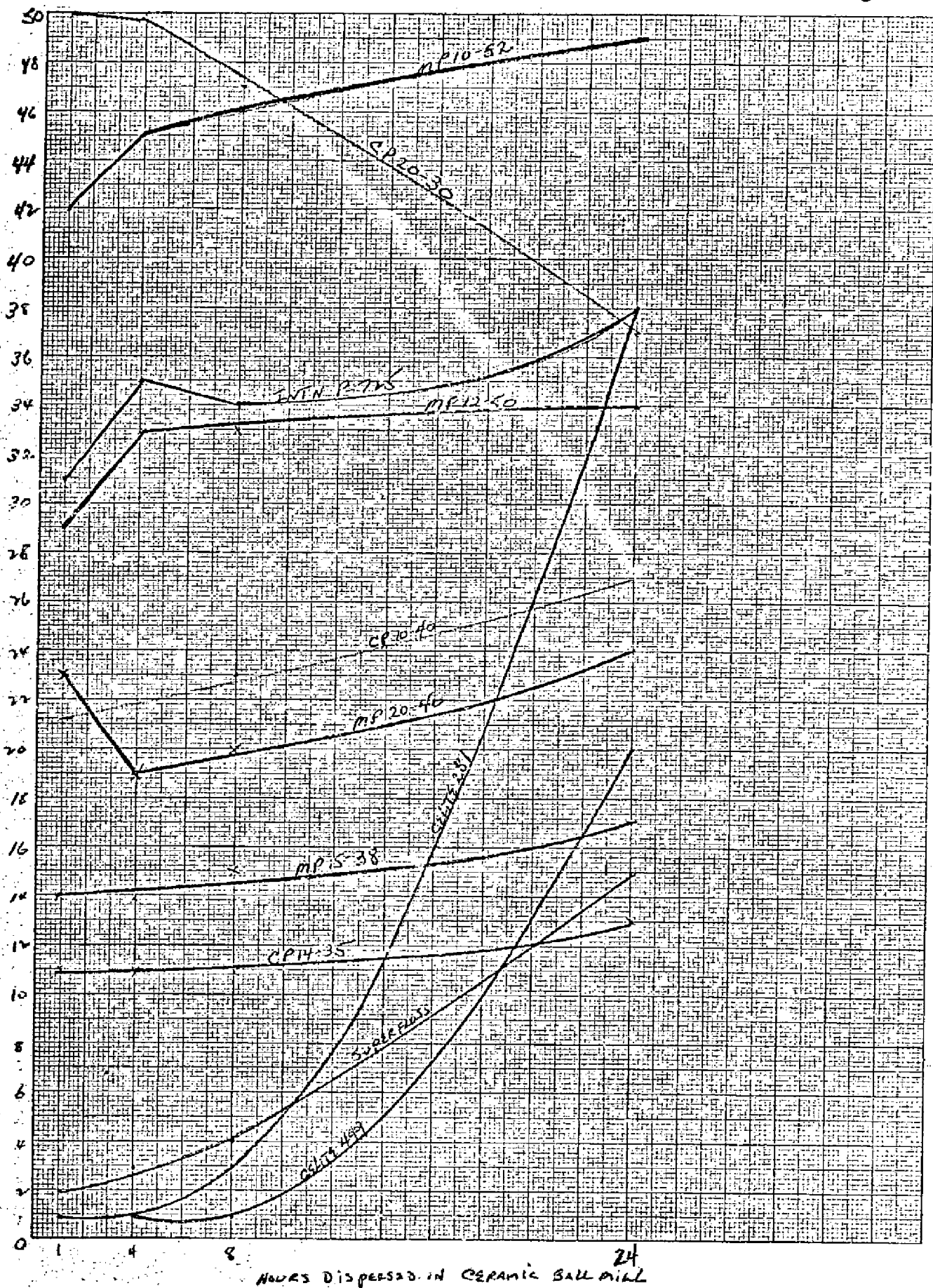


Hours Processed in Ceramic Ball Mill

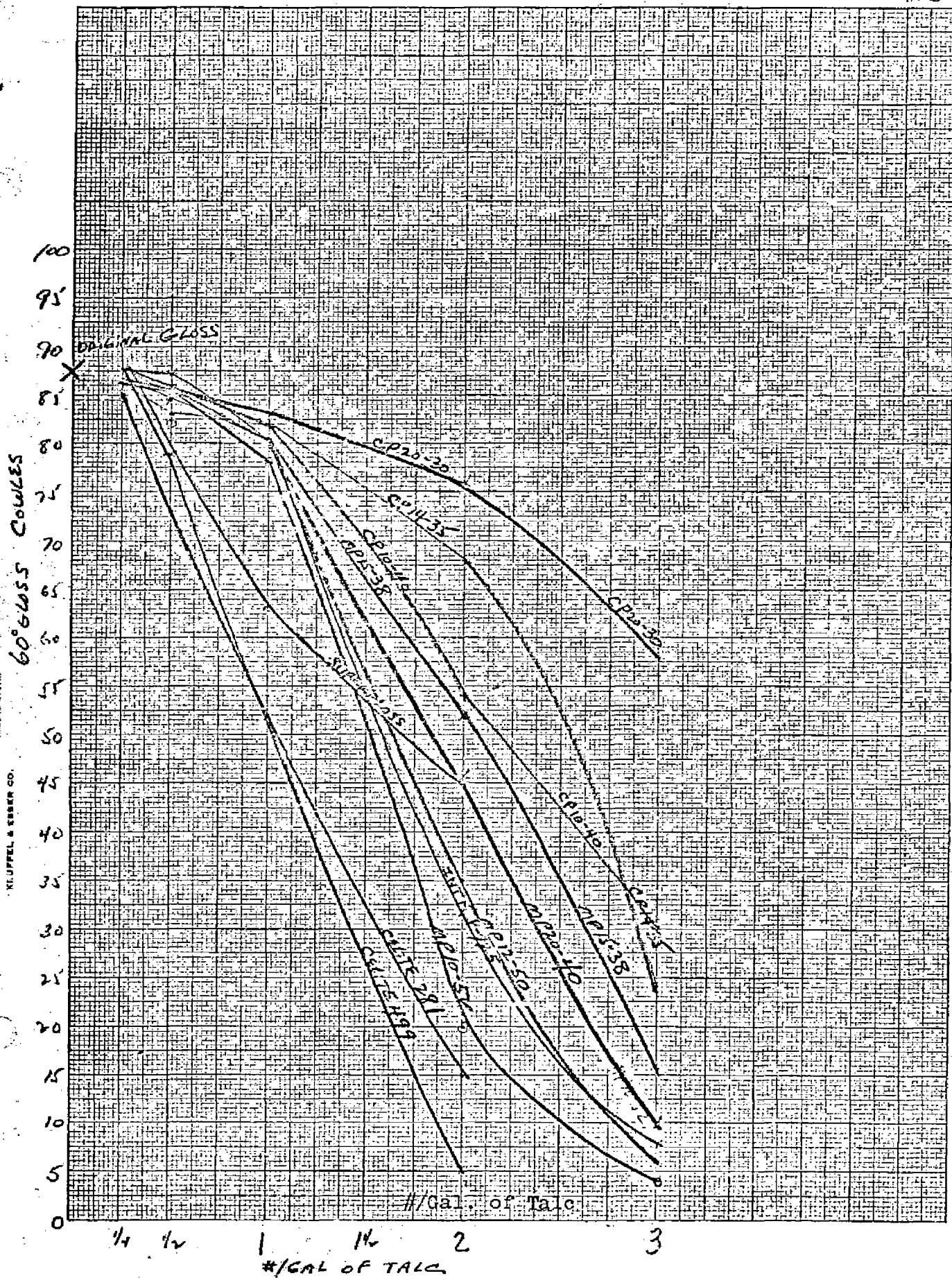
85° Gloss of Microtals & Celites versus Grinding Time

K-E 10 X 10 TO THE CENTIMETER 40 1510
MADE IN U.S.A.
NEUFFEL & ESSER CO.

85° SHEEN WHITE FLAT WALL MURK D



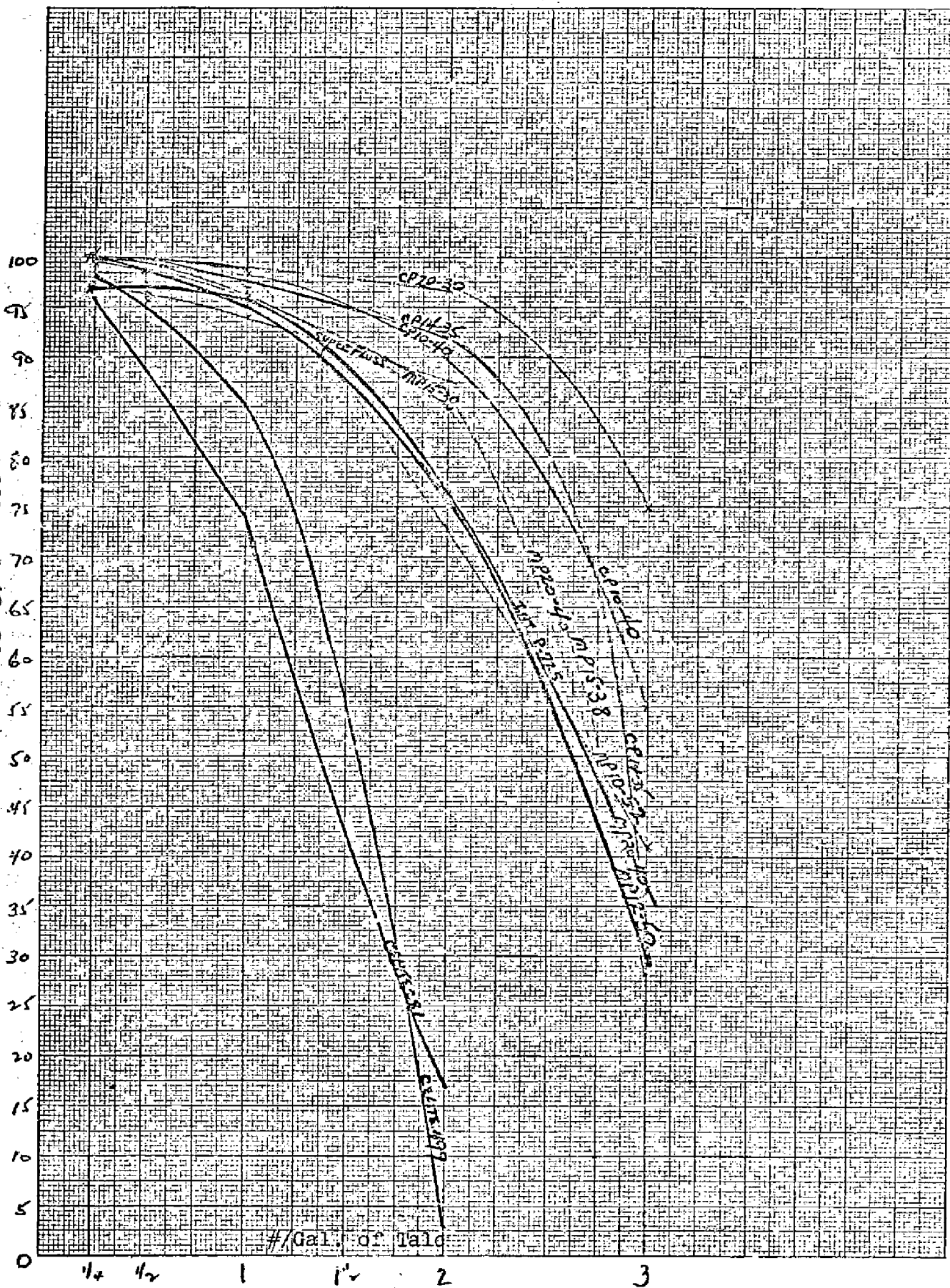
44224 11/



85° Gloss of Microtals & Celites vs. Use level in #/gal.

K&E
10 X 10 TO THE CENTIMETER 46 1510
MADE IN U.S.A.
KUPPEL & EBERH. CO.

85° Gloss Coefficients





MINERALS, PIGMENTS & METALS DIVISION

Pfizer Inc., 640 North 13th Street, Easton, Pennsylvania 18042

215 253-6261

February 3, 1972

Mr. George J. Dippold
Whittaker, Clark & Daniels
230 Park Avenue
New York, New York 10017

Dear George:

In reviewing some of our laboratory work here, it was indicated that you recently sent us a sample of Vansil 3371. We have examined this product and it is covered in the attached technical report.

If you have any questions, please do not hesitate to contact us.

Sincerely,


Geo. A. Wells
Product Manager
Mineral Products

GAW/dt

Attachment

TO: Mr. George Wells ✓
FROM: Mr. Arthur T. Gronet
DATE: January 27, 1972
SUBJECT: Vansil 3371 Talc
cc: K. R. Hancock
W. L. Hockersmith
W. M. Stephenson
A. K. Woernle

Subject product is marketed by R. T. Vanderbilt at \$58/Ton FOB Dunn Siding. I have been advised it has great merit as a filler for polypropylene because of its exceedingly white color in the polymer matrix. I requested that Research obtain a sample and that they conduct a cursory analysis. This request was filled under Research File Number 2605, Evaluation of Competitive Products. Particle size, oil absorption, chemical analysis and micrographs were developed. Enclosed please find the Physical and Chemical Testing Labs informal report of these test results.

In lieu of:

1. Comments of significant sales, especially in the East and Midwest of Vansil 3371.
2. Employment of E. Cooper (formerly of R. T. Vanderbilt) by Whittaker, Clark and Daniels to develop a market for WCD's Canadian Talc Number 4615 in competition to Vansil 3371.
3. The whiteness of polypropylene plaques I saw of Vansil Number 3371, WCD's Number 4615 versus MPM and other competitive talcs.

I suggest we meet to review these data if the market potential is sufficient to justify further time in the examination of Vansil 3371 and WCD 4615 to determine if we can economically develop and offer the trade a similar or superior product.

Your comments will be appreciated.

A. T. Gronet (KRN)

Arthur T. Gronet

ATG:bls

REQUEST FOR PHYSICAL - CHEMICAL TESTING  MINERALS, PIGMENTS & METALS DIVISION RESEARCH DEPARTMENT EASTON, PA. 18042	PRODUCT (COMPLETE DESCRIPTION) <i>Vansil 3371</i>				
	REQUEST FOR: ☒ MICROSCOPY ☒ OTHER PHYSICAL TEST ☒ CHEM. ANALYSIS ☐ X-RAY DIFFRACTION ☐ METHOD DEVEL.	INTENDED USE: ☐ RESEARCH ☒ MARKETING ☐ PRODUCTION ☐ Q. C. ☐ OTHER SPECIFY	FILE NUMBER <i>2605</i>	IF MICROGRAPH # COPIES <i>3</i>	DATE REQUESTED <i>1/19/72</i>
	BRIEF SAMPLE HISTORY - OUTLINE OF PROBLEM, TESTING REQUIRED, WHAT YOU HOPE TO LEARN. <i>This is a new competitive tale from Dunn, Calif. Request micrographs Oil Absorption Particle Size Chem Analysis.</i>		RESULTS AND COMMENTS $\% \text{MgO} = 24.7$ $\% \text{SiO}_2 = 60.7$ $\% \text{CaO} = 5.51$ $\% \text{Fe}_2\text{O}_3 = 0.48$ $\% \text{TiO}_2 = 0.03$ $\% \text{K}_2\text{O} = 1.00$ $\% \text{Al}_2\text{O}_3 = 0.47$ $\% \text{LOI} = 8.23$ $\text{Density} = 2.791 \text{ gm/cc}$ $\text{Surface Area} = 7.0 \text{ m}^2/\text{gm}$ $\text{Oil Absorption} = 47$ <i>Particle size and micrographs Enclosed</i>		
FILE TITLE: <i>Eval of Competitive Pigments</i>	ORIGINATOR'S SIGNATURE <i>Art Woemle</i>	EXT. NO. <i>248</i>	TESTS PERFORMED BY <i>HDS, RMF</i>		APPROVED BY <i>Orfanwood</i>
	COPY DISTRIBUTION <i>AKW/ATG</i>		HOURS CHARGED 		DATE COMPLETED <i>1/26/72</i>
	PRIORITY <i>Good - Better - Best</i>		SAMPLE DISPOSITION 		

PARTICLE SIZE DISTRIBUTION

SAMPLE IDENTIFICATION VANSIL 3371 144 1-11-72 50th BAGS

Density 2.791 g/cc LIQUID: Density 0.9957 g/cc Viscosity 0.8007 cps

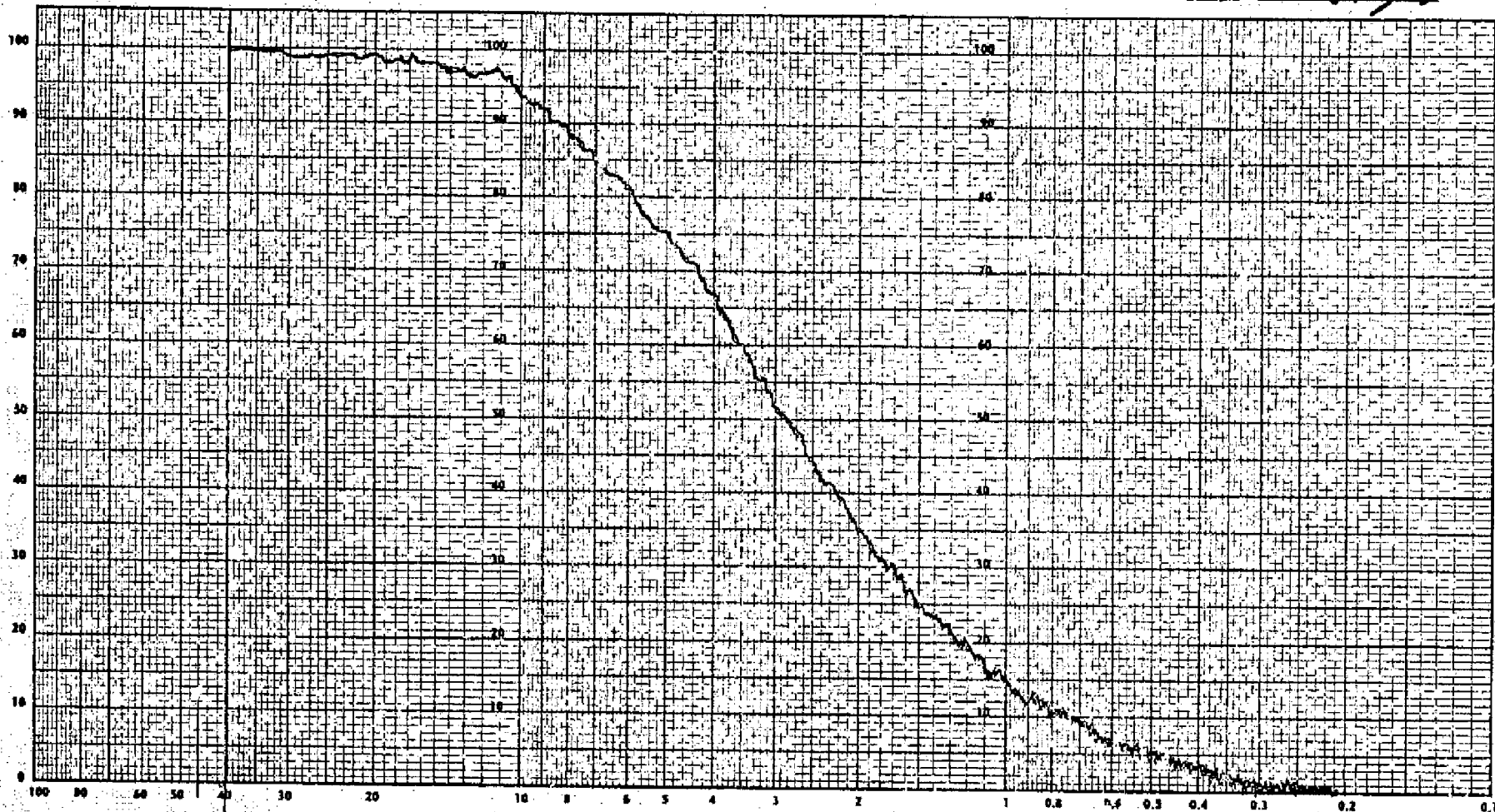
Preparation DISP. WITH SONIFIER

DATE 1-24-72

BY J.F.

TEMPERATURE 30 °C

RATE 78 (40 μ s)



EQUIVALENT SPHERICAL DIAMETER, MICRONS



800 DOWEN SPRINGS RD. • NORCROSS, GEORGIA 30071 U.S.A. • (404) 448-1281



TECHNICAL DATA SHEET

VANSTAY DEPARTMENT

SPECIFICATION

VANSIL 3371

Composition:

Typical analysis (not guaranteed)

Silica (SiO_2)	53.7%
Magnesium Oxide (MgO)	24.8%
Iron Oxide (Fe_2O_3)	0.3%
Calcium Oxide (CaO)	8.5%
Aluminum Oxide (Al_2O_3)	0.8%
Sodium Oxide (Na_2O)	1.3%
Potassium Oxide (K_2O)	0.7%
Ignition Loss	9.5%
	<u>99.6%</u>

Physical State:

Powder

Specific Gravity:

2.85 ± .03

Color:

Blue White

Fineness:

99% through 325 mesh (A.S.T.M.)

Standard Container:

50 lb. paper bag

Note:

Results of analysis of this mineral product for mercury is reported as 50 parts per billion.

R. T. VANDERBILT COMPANY, Inc., 230 PARK AVENUE, NEW YORK, N. Y. 10017

The recommendations for use of our materials are based upon tests believed to be reliable. However we do not guarantee the results to be obtained.



ONE MICRON

9000x

VANSIL 3371

COMPETITIVE TALC FROM DUNN, CALIF.



ONE MICRON

8,000x

VANSIL 3371

COMPETITIVE TALC FROM DUNN, CALIF.

Physical Properties of Talc Filled
Polypropylene 40% Filled

<u>General Properties</u>	<u>VANSIL 3371</u>	<u>WESTAL 202</u>	<u>WESTAL 303</u>	<u>WESTAL 404</u>
Melt Flow Rate @ 230°C, g/10 min.	4.8	7.0	5.8	5.4
Density, g/cc	1.245	1.252	1.242	1.245
Mold Shrinkage, in/in				
Water Absorption, %, 24 hrs @ 73°F				
<u>Mechanical Properties</u>				
Tensile Yield Strength, 2"/min, psi	4730	4720	4490	4770
Elongation @ Yield, %, 2"/min	4.7	5.1	4.7	4.7
Secant Flexural Modulus, .05"/min, psi	385000	341000	359000	362000
Izod Impact, Strength, ft#/in				
Notched, 72°F	.61	.59	.54	.56
Unnotched, 72°F	5.60	5.92	6.94	7.26
Unnotched, 0°F	3.17	3.17	3.36	3.55
<u>Thermal Properties</u>				
Deflection Temperature, °F				
66 psi	280	275	279	279
264 psi	203	198	187	187
Coef. Linear Thermal Expansion, in/in/°F				

4070 TALL 157

PP - S	7/80	15.00
<u>General Properties</u>	DESECTIC	VANSL
Melt Flow Rate @ 230°C, g/10 min.	57	3371
Density, g/cc	5.0	5.0
Mold Shrinkage, in/in		
Water Absorption, %, 24 hrs @ 73°F		
<u>Mechanical Properties</u>		
Tensile Yield Strength, 2"/min, psi	4400	4500
Elongation @ Yield, %, 2"/min	3.0	3.0
Secant Flexural Modulus, .05"/min, psi	50000	60000
Izod Impact, Strength, ft#in		
Notched, 72°F	.5	.5
Unnotched, 72°F		
Unnotched, 0°F		
<u>Thermal Properties</u>		
Deflection Temperature, °F		
66 psi	280	280
264 psi		
Coef. Linear Thermal Expansion, in/in/°F		
COLOR	LT BEIGE	LT BEIGE
STABILITY	> 100	> 100

RED Polypropylene

400	4400	4460	4720	4490	4730	4770
21.1		5.1	5.1	4.7	4.7	4.7
321,000	330,000	333,000	341,000	359,000	383,000	382,000
14	15	5.2	.59	.54	.61	.56
		1.78	5.92	6.94	5.60	7.26
		5.09	3.17	3.36	3.17	3.55
230	250	264	275	279	280	279
172		183	198	187	203	187
DARK	SEIGE	DARK	4720	4730	4730	4730
NT	?	210	2100	2100	2100	2100

VANSIL 3371

Typical Chemical Analysis

MgO	28%
SiO ₂	57
CaO	7
Al ₂ O ₃	1.1
Fe ₂ O ₃	0.4
Na ₂ O	0.1
K ₂ O	1.3
CO ₂	5
Ignition Loss	6

Typical Particle Size by Sedimentation

<u>Microns</u>	<u>Weight Percent Finer Than</u>
----------------	--------------------------------------

20	99+
15	99+
10	97
7	89
5	76
3	54
2	40
1	25
0.8	22

August 15, 1969



TECHNICAL DATA SHEET

VANSTAY DEPARTMENT

SPECIFICATION

VANSIL 3371

Composition:

Typical analysis (not guaranteed)

Silica (SiO_2)	53.7%
Magnesium Oxide (MgO)	24.8%
Iron Oxide (Fe_2O_3)	0.3%
Calcium Oxide (CaO)	8.5%
Aluminum Oxide (Al_2O_3)	0.8%
Sodium Oxide (Na_2O)	1.3%
Potassium Oxide (K_2O)	0.7%
Ignition Loss	9.5%
	<u>99.6%</u>

Physical State:

Powder

Specific Gravity:

2.85 $\pm$.03

Color:

Blue White

Fineness:

99% through 325 mesh (A.S.T.M.)

Standard Container:

50 lb. paper bag

Note:

Results of analysis of this mineral product for mercury is reported as 82 parts per billica.

R. T. VANDERBILT COMPANY, Inc., 230 PARK AVENUE, NEW YORK, N. Y. 10017

The recommendations for use of our materials are based upon tests believed to be reliable. However we do not guarantee the results to be obtained.

TYPICAL PHYSICAL PROPERTIES

	Fluffed Bulk lbs./cu. ft.	Compacted Bulk lbs./cu. ft.	Oil Absorption*	Consistency KU	Water Absorption	pH at 10% Solids	Hegman Fineness	
							Low Shear	High Shear
Nytal 99	—	—	—	—	—	—	—	—
Nytal 100	29	61	21	—	37	9.4	—	—
Nytal 200	27	60	24	71	37	9.5	0-1	0-1
Nytal 300	19	41	29	74	44	9.5	4	4.5
Nytal 400	12	26	36	88	50	9.5	5	5.5

TYPICAL PARTICLE SIZE by SEDIMENTATION—MICRONS

% Finer than	50	30	20	15	10	7	5	3	2	1
Nytal 99	67	44	30	25	18	16	14	—	—	—
Nytal 100	81	62	50	40	33	27	24	20	—	—
Nytal 200	—	67	73	62	49	40	33	25	21	15
Nytal 300	—	99	96	90	73	58	47	34	27	19
Nytal 400	—	—	—	98	90	79	67	50	40	27

*Rub-out Method

PRODUCT: **NYTAL®** — a tremolitic talc consisting of hydrous magnesium silicate with varying amounts of chemically combined calcium oxide.

Typical Chemical Analysis:	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MgO	CaO	Uncombined H ₂ O	L.O.I.
Percent	56.7	1.1	0.3	31.4	7.0	0.5 max.	3.5

PHYSICAL PROPERTIES

	DRY BRIGHTNESS	FIRE BRIGHTNESS	COLOR TRI GREEN	+100 MESH		+200 MESH		+325		CaO		USES
				MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
NYTAL 99	—	89	—	—	—	2.0	3.7	—	—	—	9.1	Ceramics
NYTAL 100-HR	—	90	—	—	—	1.7	3.0	—	—	8.0	10.0	Ceramics
NYTAL 100	—	90	—	—	—	2.1	2.8	—	—	7.1	8.3	Ceramics
NYTAL 200	90	88	55	—	0.5	—	—	.75	2.0	—	—	Paper, Paint, Rubber, Specialties
NYTAL 200 L	90	90	55	—	0.1	—	—	.75	2.0	—	9.0	Ceramics, Paint, Rubber, Specialties
NYTAL 300	90	88	55	—	—	—	—	—	0.08	—	8.0	Paper, Paint, Rubber
NYTAL 400	91	88	55	—	—	—	—	—	trace	—	9.0	Paper, Paint, Ceramics

TALC COMPANY, NEW YORK, N.Y.

TALC COMPANY

Date March 27, 1981
ATTN: Mr. G. Dippold
File

LAB REPORT NO. 287R
Product Vantalc 6H (Lot#S-336)
Remarks Physical tests

LABORATORY REPORT

A sample of Vantalc 6H was received from the R.T. Vanderbilt Company for testing.

The tests run along with the results are as follows:

<u>Properties</u>	<u>Vantalc 6H (Lot#S-336)</u>
Loose Bulk	7.6
Brightness	90.5
PH	8.8
Hegman	6.5
Oil Absorption	41.4

Particle Size Distribution

<u>Diameter in microns</u>	<u>% less than (weight)</u>
40	100
30	100
20	100
15	100
10	100
5	92
4	86
3	74
2	56
1	30

% through 325 Mesh- 100%

Nancy C. Schenkel



R. T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 Winfield Street, Norwalk, CT 06855 (203) 853-1400
West Coast: 6279 East Slauson Avenue, Los Angeles, CA 90040 (213) 723-5200

TECHNICAL DATA

VANTALC® 6H

Magnesium Silicate Pigment

Paint/Paper Department

October 1, 1980

Description: **VANTALC 6H** is a high purity, platy, hydrous magnesium silicate pigment. It is a superfine grade exhibiting high brightness and high oil absorption. **VANTALC 6H** is effective for gloss control of coatings, particularly where film smoothness and pigment suspension are important factors.

Typical Chemical Analysis

Magnesium Oxide (MgO)	31.9 %
Silicon Dioxide (SiO ₂)	60.8 %
Calcium Oxide (CaO)	1.44%
Aluminum Oxide (Al ₂ O ₃)	0.02%
Ferric Oxide (Fe ₂ O ₃)	1.66%
Moisture (H ₂ O)	0.25%
Loss on Ignition	5.0%

Typical Properties

Density (Mg/m ³)	2.75
Weight (lbs/solid gallon)	22.91
Fluffed Bulk (lbs/ft ³)	9.35
Compacted bulk (lbs/ft ³)	13.80
pH (ASTM D 1208)	9.5
Dry Brightness	90
Plus 325 Mesh, %	Nil
Oil Absorption (ASTM D 281)	52
Hegman Fineness (3 lbs/gallon)	6.0

VANTALC 6H meets the requirements of ASTM Specification D 605 for magnesium silicate pigment.

TYPICAL DATA SHEET

Cyprus Industrial Minerals Company

Talc Division
555 South Flower Street • Los Angeles, California 90071 • Telephone (213) 489-3700

MISTRON CYPRUSPERSE

MISTRON CYPRUSPERSE is a magnesium aluminosilicate of a platy nature. It is easily wet out in water and possesses low oil absorbancy. These characteristics make MISTRON CYPRUSPERSE an ideal choice for use with emulsion systems where minimal wetting agent addition is advantageous.

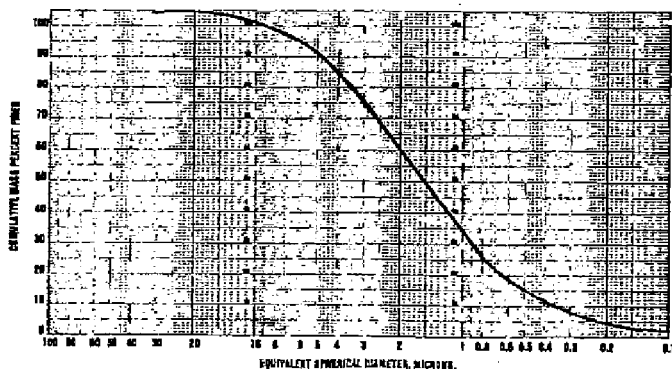
CHEMICAL ANALYSIS

	Percent
MgO	32
SiO ₂	32
CaO	Trace
Al ₂ O ₃	20
K ₂ O	—
Fe ₂ O ₃	3
TiO ₂	Trace
Loss on Ignition:	
H ₂ O Chemically Combined	12½

PHYSICAL PROPERTIES

Brightness, % (relative to MgO):		Oil absorption, g/100g chlorite	
General Electric	88+	Spatula rub-out ASTM D281	39
Luminous (green filter)	90+	Gardner-Coleman ASTM D1483	60
Apparent Density, lb/ft ³ :		Surface area, m ² /g (N ₂ BET)	12
Loose (Scott Volumeter)	11	Hegman fineness of grind	5½-6
Tapped (Numinco)	24	pH (1:5 dilution)	8.4
Specific gravity	2.8	Refractive index	1.57

PARTICLE SIZE DISTRIBUTION



% minus 200 mesh, 74 µm	100
% minus 325 mesh, 44 µm	100
% minus 20 µm	100
% minus 10 µm	99
% minus 5 µm	89
% minus 2 µm	55
% minus 1 µm	30
% minus 0.5 µm	12

Median particle size, µm 1.7

Data presented are representative of most recent testing and are offered in good faith as being typical of normal production.

CYPRUS

TYPICAL DATA SHEET

Cyprus Industrial Minerals Company

Talc Division
555 South Flower Street • Los Angeles, California 90071 • Telephone (213) 489-3700

MISTRON 139

MISTRON 139 is a medium oil absorption, high brightness, paint and general purpose California talc. It is designed to provide a fineness of grind between the "ultra-fine" (6+ Hegman) and the 325-mesh (3 Hegman) talcs. It is the coarsest grade in a series of three such products, including MISTRON F-128 and MISTRON T-076.

CHEMICAL ANALYSIS

	Percent		Parts Per Million
MgO	26	Pb	5
SiO ₂	56	Sb	not detected
CaO	7	As	not detected
Al ₂ O ₃	1	Cd	0.3
K ₂ O	1	Hg	0.05
Fe ₂ O ₃	> 1/2	Se	1
TiO ₂	—	Ba (water soluble)	not detected
Loss on Ignition:			
CO ₂ } Chemically	6		
H ₂ O } Combined	3		

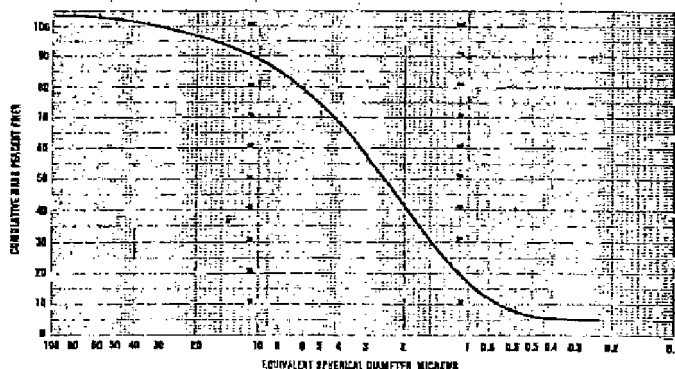
MINERAL ANALYSIS

Asbestos-like minerals not detected
by X-Ray Diffraction.

PHYSICAL PROPERTIES

Brightness, % (relative to MgO):		Oil Absorption, g/100g talc:	
General Electric	88+	ASTM D281 (rub-out)	33
Luminous (green filter)	89+	ASTM D1483 (Gardner-Coleman)	51
Apparent Density, lb/ft ³ :		Surface Area, m ² /g (N ₂ , BET)	8
Loose (Scott Volumeter)	13	Hegman Fineness of Grind	4 1/2
Tapped (Numinco)	37	Adsorbed Moisture, %	0.2
Specific Gravity	2.8	pH (1:5 dilution)	9
Acid solubles, % (as CaO)	9	Refractive index	1.6

PARTICLE SIZE DISTRIBUTION



% minus 200 mesh, 74 μm	100
% minus 325 mesh, 44 μm	100
% minus 20 μm	99
% minus 10 μm	88
% minus 5 μm	64
% minus 2 μm	30
% minus 1 μm	16
% minus 0.5 μm	8
Median particle size, μm	3

Data presented are representative of most recent testing and are offered in good faith as being typical of normal production.

CYPRUS

TYPICAL DATA SHEET

Cyprus Industrial Minerals Company

Talc Division
555 South Flower Street • Los Angeles, California 90071 • Telephone (213) 489-3700

MISTRON VAPOR

MISTRON VAPOR is a high purity, asbestos-free, natural magnesium silicate pigment. The surfaces of its ultra-fine, platy particles have a strong affinity for many types of organic molecules and, conversely, a strong hydrophobicity. However, in aqueous systems excellent wetting may be achieved by use of proper surface active agents.

Major uses of MISTRON VAPOR are as a white reinforcing filler and processing aid in elastomers and plastics, as a rheological control agent in liquid resins, plastisols, adhesives, and as a scavenger of unwanted organic matter from water slurries, for example the control of undesirable pitch build-up during paper production.

CHEMICAL ANALYSIS

Percent	Parts Per Million
MgO	31
SiO ₂	62
CaO	1
Al ₂ O ₃	trace
K ₂ O	—
Fe ₂ O ₃	1
TiO ₂	—
Loss on Ignition:	
CO ₂ } Chemically	5½
H ₂ O } Combined	
Pb	not detected
Sb	not detected
As	not detected
Cd	0.5
Hg	0.02
Sc	4
Ba (water soluble)	1.5

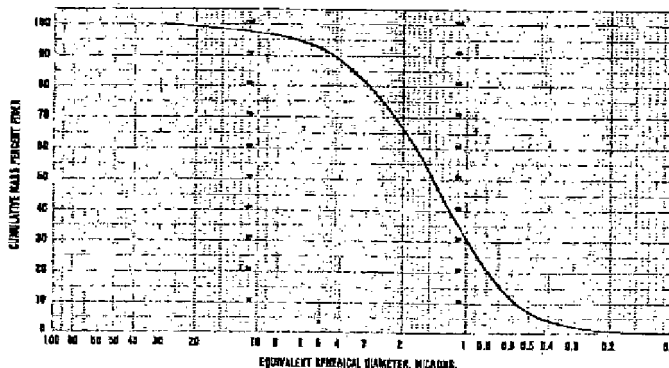
MINERAL ANALYSIS

	Percent
Talc (3MgO·4SiO ₂ ·H ₂ O)	98
Chlorite (5MgO·Al ₂ O ₃ ·3SiO ₂ ·4H ₂ O)	—
Dolomite ([CaMg] CO ₃)	2
Quartz	1
Asbestos-type minerals	not detected

PHYSICAL PROPERTIES

Brightness, % (relative to MgO):		Oil absorption, g/100g talc:	
General Electric	85+	Spatula rub-out ASTM D281	46
Luminous (green filter)	88+	Gardner-Coleman ASTM D1483	80
Apparent Density, lb/ft ³ :		Surface area, m ² /g (N ₂ BET)	17
Loose (Scott Volumeter)	6	Hegman fineness of grind	5½-6
Tapped (Numinco)	13	Absorbed moisture, %	0.2
COMPACTED	50	pH (1:5 dilution)	9
Specific gravity	2.8	Refractive index	1.6
Acid Solubles, % (as CaO)	1	Valley abrasion, mg max.	20

PARTICLE SIZE DISTRIBUTION



% minus 200 mesh, 74 μm	100
% minus 325 mesh, 44 μm	100
% minus 20 μm	100
% minus 10 μm	97
% minus 5 μm	92
% minus 2 μm	65
% minus 1 μm	30
% minus 0.5 μm	7
Median particle size, μm	1½

Data presented are representative of most recent testing and are offered in good faith as being typical of normal production.

CYPRUS

TYPICAL DATA SHEET

Cyprus Industrial Minerals Company

Talc Division
555 South Flower Street • Los Angeles, California 90071 • Telephone (213) 489-3700

MISTRON RCS

MISTRON RCS is a high purity, platy talc pigment, free of asbestos-type impurities. MISTRON RCS is specially processed to provide a fineness of grind similar to "ultra-fine stir-in" talcs, but with significantly lower "binder demand". If your application requires the smoothness and freedom from coarse particles only an ultra-fine talc can offer, but you desire more "loadability", MISTRON RCS is for you — at a surprisingly moderate price.

CHEMICAL ANALYSIS

Percent	Parts Per Million
MgO 32	Pb not detected
SiO ₂ 61	Sb not detected
CaO ½	As not detected
Al ₂ O ₃ 1	Cd 0.3
K ₂ O —	Hg 0.03
Fe ₂ O ₃ ½	Se 1
TiO ₂ —	Ba (water soluble) 1
Loss on Ignition:	
CO ₂ } Chemically < ½	
H ₂ O } Combined 5	

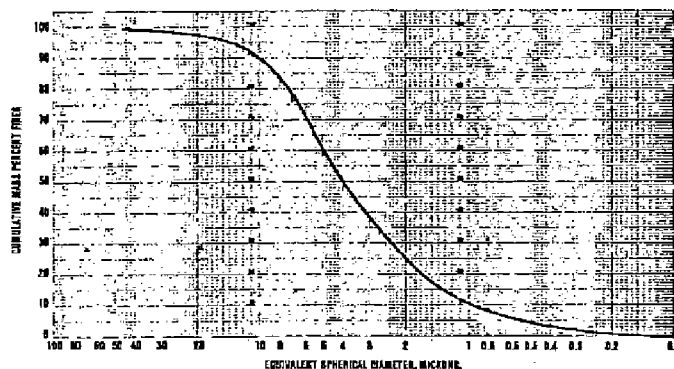
MINERAL ANALYSIS

Percent
Talc (3MgO·4SiO ₂ ·H ₂ O) 95
Chlorite (5MgO·Al ₂ O ₃ ·3SiO ₂ ·4H ₂ O) 4
Dolomite ([CaMg] CO ₃) 1
Quartz trace
Asbestos-type minerals not detected

PHYSICAL PROPERTIES

Brightness, % (relative to MgO):		Oil absorption, g/100g talc:	
General Electric 88+		Spatula rub-out ASTM D281 35	
Luminous (green filter) 89+		Gardner-Coleman ASTM D1483 52	
Apparent Density, lb/ft ³ :		Surface area, m ² /g (N ₂ BET) 10	
Loose (Scott Volumeter) 15		Hegman fineness of grind 6	
Tapped (Numinco) 39		Absorbed moisture, % 0.2	
COMPACTED —		pH (1:5 dilution) 9	
Specific gravity 2.8		Refractive index 1.6	
Acid Solubles, % (as CaO) 0.4		Valley abrasion, mg max. —	

PARTICLE SIZE DISTRIBUTION



% minus 200 mesh, 74 μm	100
% minus 325 mesh, 44 μm	100
% minus 15 μm	98
% minus 10 μm	90
% minus 5 μm	60
% minus 2 μm	25
% minus 1 μm	11
% minus 0.5 μm	5
Median particle size, μm	4

Data presented are representative of most recent testing and are offered in good faith as being typical of normal production.

CYPRUS

TYPICAL DATA SHEET

Cyprus Industrial Minerals Company

Talc Division
555 South Flower Street • Los Angeles, California 90071 • Telephone (213) 489-3700

MISTRON MONOMIX

MISTRON MONOMIX is an ultra-fine, high purity, platy talc pigment, free of asbestos-type impurities. It is used by the plastics industry in liquid resin systems for resistance to settling and sagging, and for viscosity control; by the paint industry for maximum fineness of grind, flattening, film smoothness, ease of sanding, and for resistance to hard settling. In any application requiring the finest particle size talc with high whiteness and purity, MISTRON MONOMIX is the product of choice.

CHEMICAL ANALYSIS

Percent		Parts Per Million	
MgO	32	Pb	not detected
SiO ₂	61	Sb	not detected
CaO	1/2	As	not detected
Al ₂ O ₃	1	Cd	0.3
K ₂ O	—	Hg	0.03
Fe ₂ O ₃	1/2	Se	1
TiO ₂	—	Ba (water-soluble)	1
Loss on Ignition:			
CO ₂ } Chemically	< 1/2		
H ₂ O } Combined	5		

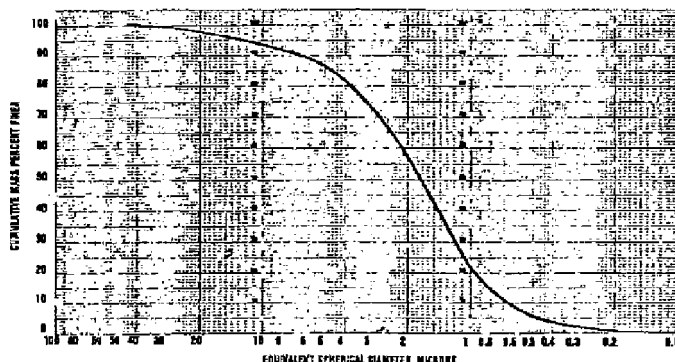
MINERAL ANALYSIS

	Percent
Talc (3MgO-4SiO ₂ -H ₂ O)	95
Chlorite (5MgO-Al ₂ O ₃ -3SiO ₂ -4H ₂ O)	4
Dolomite ([CaMg] CO ₃)	1
Quartz	trace
Asbestos-type minerals	not detected

PHYSICAL PROPERTIES

Brightness, % (relative to MgO):		Oil absorption, g/100g talc:	
General Electric	89+	Spatula rub-out ASTM D281	43
Luminous (green filter)	90+	Gardner-Coleman ASTM D1483	76
Apparent Density, lb/ft ³ :		Surface area, m ² /g (N ₂ BET)	14
Loose (Scott Volumeter)	7	Hegman fineness of grind	6-7
Tapped (Numinco)	19	Adsorbed moisture, %	0.2
COMPACTED	—	pH (1:5 dilution)	9
Specific gravity	2.8	Refractive index	1.6
Acid Solubles, % (as CaO)	0.4	Valley abrasion, mg max.	—

PARTICLE SIZE DISTRIBUTION



% minus 200 mesh, 74 μm	100
% minus 325 mesh, 44 μm	100
% minus 20 μm	100
% minus 10 μm	94
% minus 5 μm	87
% minus 2 μm	59
% minus 1 μm	23
% minus 0.5 μm	6
Median particle size, μm	2

Data presented are representative of most recent testing and are offered in good faith as being typical of normal production.

CYPRUS

TYPICAL DATA SHEET

Cyprus Industrial Minerals Company

Talc Division

555 South Flower Street • Los Angeles, California 90071 • Telephone (213) 489-3700

BEAVERWHITE 325

BEAVERWHITE 325 is a high purity, platy talc pigment, free of asbestos-type impurities. It is among the low cost, 325 mesh, "workhorse" fillers and extenders which exhibit versatility in a wide variety of applications within the plastics, paint, rubber, building products and related industries.

CHEMICAL ANALYSIS

Percent		Parts Per Million	
MgO	32	Pb	not detected
SiO ₂	61	Sb	not detected
CaO	1/2	As	not detected
Al ₂ O ₃	1	Cd	0.3
K ₂ O	—	Hg	0.03
Fe ₂ O ₃	1/2	Se	1
TiO ₂	—	Ba (water soluble)	1
Loss on Ignition:			
CO ₂	Chemically < 1/2		
H ₂ O			
	Combined		5

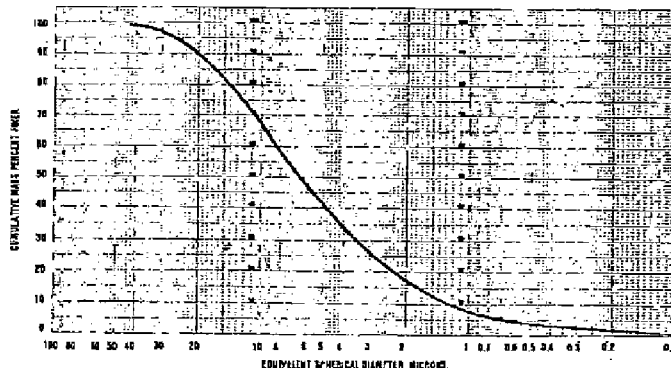
MINERAL ANALYSIS

	Percent
Talc (3MgO·4SiO ₂ ·H ₂ O)	95
Chlorite (5MgO·Al ₂ O ₃ ·3SiO ₂ ·4H ₂ O)	4
Dolomite ([CaMg] CO ₃)	1
Quartz	trace
Asbestos-type minerals	not detected

PHYSICAL PROPERTIES

Brightness, % (relative to MgO):		Oil absorption, g/100g talc:	
General Electric	87+	Spatula rub-out ASTM D281	30
Luminous (green filter)	88+	Gardner-Coleman ASTM D1483	42
Apparent Density, lb/ft ³ :		Surface area, m ² /g (N ₂ BET)	8
Loose (Scott Volumeter)	21	Hegman fineness of grind	3 1/2-4
Tapped (Numinco)	49	Adsorbed moisture, %	0.2
COMPACTED	—	pH (1:5 dilution)	9
Specific gravity	2.8	Refractive index	1.6
Acid Solubles, % (as CaO)	0.4	Valley abrasion, mg max.	—

PARTICLE SIZE DISTRIBUTION



% minus 200 mesh, 74 μm	99.6-99.8
% minus 325 mesh, 44 μm	98
% minus 20 μm	91
% minus 10 μm	68
% minus 5 μm	41
% minus 2 μm	18
% minus 1 μm	8
% minus 0.5 μm	3
Median particle size, μm	6 1/2

Data presented are representative of most recent testing and are offered in good faith as being typical of normal production.

CIM16551177

CYPRUS



INDUSTRIAL MINERALS

Produced by

Subsidiaries of

and

Marketed by

B. T. VANDERBILT
COMPANY, INC.

AND

VANDERBILT EXPORT
CORPORATION

General Offices

230 Park Avenue
New York, New York 10017

INTRODUCTION

This pamphlet has been prepared to familiarize interested existing and prospective customers with all of the various industrial materials produced by our mining subsidiaries and marketed by R. T. Vanderbilt Company and Vanderbilt Export Corporation. In the past many of our mineral products were, to all intents and purposes, developed for individual industries and in many instances, marketed by a single department. For this reason, a number of potential customers are unfamiliar with our overall mineral products. We hope this booklet will give them a better understanding of the mineral products that we produce and sell.

The following sections are devoted to a very brief description of each of our Mining Operations together with a generalized description of the minerals they produce. Additional and more specific information giving properties and uses of any of these products is available from our Sales and Mining Departments. Our Customer Service Research Laboratory is always available to give our customers confidential assistance in the use of our mineral products.

The following are registered U.S. Trade marks:

DIXIE®, PAR®, CONTINENTAL®, McNAMEE®,
PYRAX®, SNOWGOOSE®, WESTAL®, PEERLESS®,
NYTAL®, VANSIL®.

*•MARCA REGISTRADA

KAOLIN

DIXIE CLAY COMPANY BATH, SOUTH CAROLINA

Dixie Clay Company, a wholly owned subsidiary of R. T. Vanderbilt Company, Inc., produces a large variety of kaolin products. The mines and the plant are located on a railroad some seven miles northeast of Augusta, Georgia. Mining is by open pit methods using modern heavy equipment. Milling consists of crushing, drying, grinding and classifying, or "air floating" the kaolin into various products. Mining at the Dixie Clay Company property has been continuous since 1852.

Quality control is paramount in the operation and all personnel at the plant are continually made aware of its importance. Sampling is carried on through every step of the operation from mining to final product shipment. A production quality control laboratory, located in the mill building, is operated on a 24 hour basis whenever processing is in progress.

The mines of the Dixie Clay Co. produce essentially two basic types of kaolins, e.g., "hard" and "soft". These designations, neither accurate nor descriptive, are based on industry nomenclature in use for many years.

Hard Clays:

The so-called "hard" clay, as it occurs in the mines, consists of an extremely fine particle size kaolin mixed with minor amounts of mica, quartz, and some iron, titanium and magnesium minerals. The bulk of these impurities is removed during processing in the mill and the various end products contain grit varying from 0.05% on 325 mesh to as high as 1% on 200 mesh, depending on the amount of grinding and classification involved.

The actual pure kaolin (without grit) consists of very fine hexagonal platelets ranging from 0.08 to 0.4 microns in width and down to 0.01 microns in thickness. Surface area of the kaolin is about 25 square meters per gram.

Mechanically delaminated clay of the Georgia type consists of quite broad platelets of the order of 2 microns that are about 0.2 to 0.4 microns thick. Dixie Clay Company can supply the following general types of "hard" clay:

Name	% Moisture	G.E. Brightness
	Max.	Min. or Range
DIXIE®	1.0	70
PAR®	1.0	66-70
CONTINENTAL®	1.0	66-70
BILT-PLATES 145	2.0	66-70

Name	Residue on 325 mesh	pH
DIXIE®	0.1-0.2	4.5-5.5
PAR®	0.4-0.5	4.5-5.5
CONTINENTAL®	0.6-0.8	4.5-5.0
BILT-PLATES 145	0.05 max.	4.5-5.5

At this writing, we are in the process of developing a slurried clay which will be virtually grit free and have a G.E. brightness of 73 to 75. The slurry will consist of about 65% solids. We are also planning to produce a dry, high brightness, kaolin from this slurry. Such a product with its extremely fine particle size will be of interest to a number of industries.

Soft Clays:

Basically, the "soft" clays consist of kaolinite with varying amounts of grit. However, the "soft" clay kaolinite occurs as stacks of platelets, the size of which is considerably larger than the "hard" clay platelets. Aside from the difference in occurrence and size of platelets as compared with "hard" clay, the "soft" clays vary in brightness from 67 to over 75.

These clays are ground and classified in a size range of from 0.25% on 325 mesh to as much as 3% on 200 mesh.

Dixie Clay Company can supply this type of kaolin in the following general types:

Name	% Moisture Max.	G.E. Brightness Min. or Range
No. 1 McNAMEE®	1.0	75
No. 1 PEERLESS®	2.0	75
No. 2 PEERLESS®	2.0	70-72
No. 3 McNAMEE®	2.0	67-70
No. 3 PEERLESS®	2.0	67-70

Name	Residue
No. 1 McNAMEE®	.25-.35 on 325 mesh
No. 1 PEERLESS®	.30-.40 on 200 mesh
No. 2 PEERLESS®	.30-.50 or .60-.80 on 200 mesh
No. 3 McNAMEE®	.30-.40 on 200 mesh
No. 3 PEERLESS®	.60-.80 on 200 mesh

General

Any grade of either "hard" or "soft" clay is available in bulk as unground wet shaved or dryer dried shaved. All Dixie Clay Company ground products can be supplied either in bags or in bulk at the customer's option.

Given a sufficient potential market, the Mining Department's research laboratory will work on the development of any product which would meet requirements of any industry where the rather remarkable basic characteristics of our clays can be of interest.

Recoverable kaolin at our Dixie mine facilities has been estimated to be well in excess of anticipated production demands for the next several decades.

TALC

GOUVERNEUR
TALC
COMPANY

ST. LAWRENCE COUNTY
NEW YORK

WESTERN TALC
COMPANY

Mines — TECOPA
Plant — DUNN SIDING
CALIFORNIA

These two widely separated talc producers are both wholly owned subsidiaries of the R. T. Vanderbilt Company, Inc. Both produce a wide variety of talc products. But basically the talc minerals are somewhat different in character. Therefore, we are in a much better position than other talc producers to supply talc consumers with a broad spectrum of products.

As with all R. T. Vanderbilt Company plants, quality control is paramount at both these operations. Checks and counter-checks are continually made in the milling circuit and before shipment to assure compliance with specifications.

GOUVERNEUR TALC COMPANY

Gouverneur Talc Company is the largest talc producer in the world. The underground mine and the treatment plant are located on a railroad close to the town of Gouverneur, New York, some 40 miles east of Watertown, New York. Ore reserves at the mine are more than adequate for many years.

The series of industrial talcs produced by Gouverneur Talc Co. consists of mixtures of various talc minerals of which talc (a magnesium silicate) and tremolite (a calcium magnesium silicate) are the major constituents. The modern plant facilities consist of crushing, drying, grinding by both pebble mills and fluid energy mills, and blending utilizing a unique patented method. Five basic types of the

talc are produced and sold under the NYTAL® trade name and have the following characteristics:

Product	Residue - maximum or range	
	+200 mesh	+325 mesh
NYTAL 99®	2.0 - 3.7	
NYTAL 100®	1.7 - 3.0	
NYTAL 200®		0.75 - 2.5
NYTAL 300®		0.06
NYTAL 400®		0.02

Product	Typical G.E. Brightness		CaO max. or range
	dry	fired	
NYTAL 99®		89	9.1
NYTAL 100®		90	8.0 - 10.0
NYTAL 200®	90		9.0
NYTAL 300®	90		9.0
NYTAL 400®	90		3.0

There are, of course, other characteristics and specifications applicable to specific industries.

WESTERN TALC COMPANY

The Western Talc Company mine is located near the town of Tecopa in Bernardino County, California. Ore is mined there by the open pit method and is processed in a modern treatment plant located on the Union Pacific Railroad at Dunn Siding. The Las Vegas-Los Angeles Freeway passes in front of the plant which lies halfway between the towns of Baker and Barstow. Large ore reserves at the mine assure continuity of supply for many years. The plant is similar to the Gouverneur Talc Company plant but uses Raymond mills for first stage grinding and does considerable custom grinding of clay and other materials in a contiguous but separate facility.

The talc minerals produced at Western are considerably different from those found at Gouverneur. The Western talcs in general may be divided into two classes - hard and soft. The hard ores contain

more tremolitic talc than the soft ores. The latter ores consist mostly of platy particles rather than rods or nodules which occur in the hard type.

Western Talc produces 14 different talc products, of which the following essentially cover the range:

Product	Residue - maximum or range %	
	+200 mesh	+325 mesh
SNOWGOOSE 95®	4.5 - 5.5	
WESTAL 101®	4.5 - 5.5	
WESTAL 202®		0.30
WESTAL 301®		0.06
WESTAL 401®		
VANSIL MG®		0.01

Product	Typical G.E. Brightness		CaO max. or range %
	dry	fired	
SNOWGOOSE 95®		84	10.5 - 13.0
WESTAL 101®		88	8.9 - 9.5
WESTAL 202®	90		10.0
WESTAL 301®	93		10.0
WESTAL 401®	93		10.0
VANSIL MG®	93		10.0

VANSIL MG® is a relatively new product and is unusual in that it consists almost entirely of platelets, and has very low abrasion characteristics.

PYROPHYLLITE

STANDARD MINERAL COMPANY

ROBBINS, N. C.

Standard Mineral Company's mines and plant are located on a railroad near the town of Robbins, North Carolina. The Company is a partially owned subsidiary of R. T. Vanderbilt Company, Inc. Mining is by open pit using heavy equipment. Milling consists of a number of crushing and screening stages followed by grinding and classification.

Pyrophyllite is a light crystalline aluminum mineral resembling talc. It is inert

and is used in the ceramic, rubber, paint, insecticide, and refractory industries. It is felt that its properties may very well make it suitable for other industries requiring an inert material.

At Standard Mineral there are essentially two grades of pyrophyllite, e.g., a high sericite, high alkali, silicious ore, and a refractory grade material containing low alkali (Na,K O). Very large reserves of both types of ore are available.

Our PYRAX® products are ground to number of size specifications. Color also varies with the particular needs of the customers. Some typical grades of PYRAX® follow:

Product	Residue % on:		
	1/2"	4 mesh	20 mesh
PYRAX ABB®	—	—	—
PYRAX HS®	—	—	—
PYRAX B®	—	—	—
PYRAX RG 1/4®	0	1-10	45-70
PYRAX RG 140®	—	—	1-8

Product	Residue % on:		
	65 mesh	100 mesh	200 mesh
PYRAX ABB®	—	0.5 max.	3.0 max.
PYRAX HS®	—	0.25 max.	3.0 max.
PYRAX B®	—	—	1.0 max.
PYRAX RG 1/4®	70-85	—	75-90
PYRAX RG 140®	35-50	—	65-80

More detailed information, complete data sheets, specifications and technical brochures may be obtained by simply filling out the perforated reply card on the back flap of this pamphlet.

ASBESTINE

TRADE MARK REGISTERED

*a Fibrous
Magnesium
Silicate Talc*

TECHNICAL
DATA FOR
PAINT
MAKERS



INTERNATIONAL TALC CO., INC.

90 WEST STREET

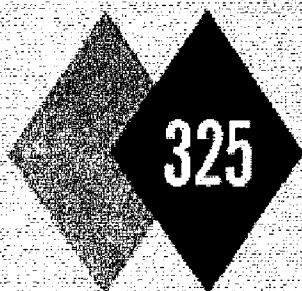
NEW YORK 6, N.Y.

an introduction to **ASBESTINE**

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- 13** Suspending (anti-settling) Characteristics of ASBESTINE 325 in House Paints.
- 14** Fineness of Grind Data.
- 15** Dispersion Advantages of ASBESTINE 325.
- 16** Blister Resistant Paints; Development and Use.
- 17** Stain and Blister Resistant House Paint Formulations.



ASBESTINE is the name of an inert extender pigment which needs no introduction to the protective coatings industries.

As early as 1849, a fibrous, white, talc-like ore was discovered on the land of a farmer living near Gouverneur, New York. Before long this ore became recognized as the source of a useful pigment. To this day these fine white ores are considered to be the best for their purpose in the world.

In 1869 the first mill was grinding this ore into a pigment. This pigment increasingly became recognized as useful in paint. Until the year 1893 this ore was moved from the mines, to mills, along the Oswegatchie River, by horse and wagon.

In 1893 the railroad came to this locality. In 1893 was formed that which was later to become the International Talc Company, Inc.

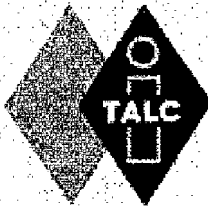
This white fibrous magnesium silicate was found to be non-reactive with paint oils and thus became recognized as being inert. If not the most, it is one of the most inert extender pigments.

The International Talc Company, Inc. gave the name ASBESTINE to this pigment and has maintained its manufacture and reputation for more than 60 years.

You will find described in the brochure and technical data which follows, a description of our new ASBESTINE 325.

ASBESTINE 325 is the result of years of development in our mills and research department. May we tell you more about ASBESTINE 325 and prove how it should be useful to you?

INTERNATIONAL TALC CO., INC.



ASBESTINE 325 IS



When a man goes to a tailor and comes away with a suit which rides high and loose about his neck and drags about his heels, he may well conclude he has been the victim of poor tailoring.

For many years the paint industry endured a form of poor tailoring.

To prevent the presence of oversize particles, such as would protrude through the paint film made with their product, the paint maker had to reduce the oversize particles by crushing, grinding and milling and had to do so on his own paint mills at his own expense.

Many pigment manufacturers recognized this as an imposition upon their customers and have long sought means of removing the oversize from their products. A common method of minimizing occurrence of these oversize particles, was prolonged milling or grinding in the mills of the pigment maker. When they did so, overgrinding was common. Overgrinding produced a large proportion of excessively fine particles in a pigment. Excessively fine particles have large surfaces. This surface must be wet by oil when making the paint.

Harley Nelson, some 16 years ago, pointed out this fact. He said, "... a normal pigment averaging about 0.2 micron in diameter has from 15,000 to 20,000 square feet of surface per pound of pigment or approximately $\frac{1}{2}$ acre."¹ Sufficient oil must be available to wet this pigment surface before oil is available to wet the substrate and also be available to help shed water from the weather surface.²

Dr. W. H. Madson and others have proved titanium oxide particles, judiciously proportioned to the extender pigment used in a paint, may be made to reduce the total oil demand of the composite of pigments necessary in a paint.

¹ Nelson, H. A. — Practical Paint Course (N.E. Production Club) p. 19 (1940)

² Lukens, A. R. — Practical Paint Course (N.E. Production Club) p. 55 (1954)

INTERNATIONAL TALC CO., INC.

TAILORED PIGMENT

Today the teachings of Asbeck and Van Loo give us a better understanding of the value of the Critical Pigment Volume Concentration test.³ With such a test as a guide, we learn how to choose and proportion our extender and our tinctorial pigments.

We have learned that an excessive amount of very fine particles, in an extender pigment, prevent most economic proportioning of the very fine particles characteristic of tinctorial pigments.

If the extender pigment is wisely designed, particularly in its distribution of particle sizes, the relatively small sized tinctorial particles, such as titanium oxide, will fill into the voids between the larger extender pigment particles. This develops that which is known as a well designed particle aggregate. A well designed aggregate has a low demand for oil.

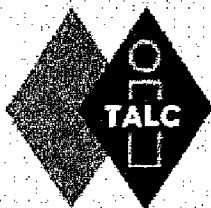
If, however, the extender pigment contains a high proportion of small particles, and such fill the voids between the larger particles, then the addition of necessary tinctorial pigments further increases, rather than decreases, oil demand. This may be made apparent with the Critical Pigment Volume Concentration test.

The International Talc Company, Inc. research has devised means of so tailoring the new ASBESTINE 325, as to remove oversize particles. We know how to concurrently proportion the very small particles. Thereby, we produce an extender pigment which will permit fashioning of economic aggregates with the tinctorial pigments. This makes it easy for the paint maker to obtain required fineness of grind test results, yet not be forced to use excessive oil. This he can do with our new ASBESTINE 325.

International Talc Company, Inc. offers to you ASBESTINE 325 as a "well tailored" pigment. ASBESTINE 325 has been tailored to top-size removal of large particles; it has been tailored to permit economies in proportioning of oil and pigments.

³ Asbeck, W. K. and Van Loo, M. — Ind. Eng. Chem., 41, 1470 (1949)
Asbeck, Laiderman and Van Loo — Official Digest No. 326, March 1952

INTERNATIONAL TALC CO., INC.



ASBESTINE 325

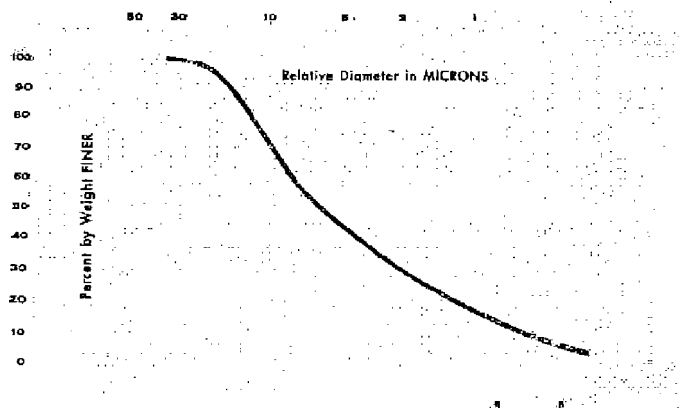
(The well tailored fibrous magnesium silicate pigment)

PHYSICAL ANALYSIS

Specific Gravity @ 20°C.	2.78
Bulking value.	4.2 gallons/100 lbs.
Weight per solid gallon	23.5 lbs.
Moisture content	less than 1/2 of 1% @ 212°F.
Structure	semi-fibrous
Reactivity with linseed oil	inert
Spectrophotometric color (Hunter)	90-92 (Green filter)

PARTICLE SIZE DISTRIBUTION ANALYSIS

HEGEMAN FINENESS 4-4.5



K.U. (note test procedure 11)

No mill discoloration when making whites. ASBESTINE 325 is a "stir-in" pigment.

CHEMICAL ANALYSIS

SiO ₂	58.61%
MgO	28.88%
CaO	4.97%
Fe ₂ O ₃	.30%
Al ₂ O ₃	.85%
CO ₂	1.95%
Ignition loss	4.41%
pH	9.3-9.6 (in distilled water)

INTERNATIONAL TALC CO., INC.

FEDERAL SPECIFICATION TT-P-102 CLASS "A" WHITE HOUSE PAINT

Lbs.	Gals.	
365	7.51	35 % Lead Zinc Oxide
172	3.23	Basic Sulfate White Lead
146	4.51	Free Chalking Anatase Titanium Dioxide
266	11.22	Asbestos "325"
44	5.60	"Q" Bodied Linseed Oil
398	51.80	White Refined Linseed Oil
100	15.44	Mineral Spirits
9.2	0.95	24 % Pb Napthenate
1.5	0.19	6 % Mn Napthenate
1501.7	99.45	

ANALYTICAL DATA

Wt./Gal.	15.1	Vehicle	89.0%
% Pigment (by Wt. Paint)	63.0%	Non Volatile	
		P.V.C.	32.0%

SPECTROPHOTOMETRIC DATA

(Color Value) (2.5 Mil Dry Film)

COLOR:

84	Green Filter
85	Amber Filter
80	Blue Filter

CONTRAST RATIO

60° GLOSS:

72

98

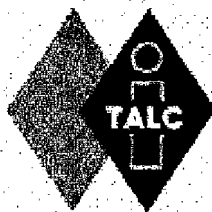
70

80

90

100

INTERNATIONAL TALC CO., INC.



OIL DEMAND of an EXTENDER

Increasingly, the so-called Pigment Packing Factor test is winning recognition as a useful means of evaluating the relative economies of various pigments.

The Pigment Packing Factor (PPF) is a volume relationship. This test indicates the demand of a pigment for just sufficient vehicle to wet the particle surfaces and to fill the voids created by that pigment in normal packing. The particles are not forced together as in the rub out test. Different individuals are able to reproduce and check results with each other.

The PPF is expressed as a percentage of volume. Shown is the volume of vehicle used to wet and fill the voids.

If for example, in 100 cc of packed particles and vehicle we arrived at a balance of 43 cc of pigment and 57 cc of linseed oil (this could be gallons or any other volume unit), then such would indicate 43% PPF for that pigment.

Taking into consideration the specific gravities of the vehicle and the pigment, one may readily convert to a weight relationship. Thus one obtains the calculated oil demand to wet and fill 100 pounds of pigment.

It is recommended one then apply the relative costs per pound of oil and pigment and thus determine the relative usage value of the pigment under consideration.

If one pigment demands more oil than a competitively similar pigment even though bought at the same price per ton, it is indeed likely to prove more costly in your formulation.

This test has helped us to tailor ASBESTINE 325 to that which we believe to be the lowest in vehicle (oil) demand of any pigment of its type.

It might be advisable for you to make the PPF test upon the extender pigment you now use and consider whether or not ASBESTINE 325 may develop significant economies for you.

INTERNATIONAL TALC CO., INC.

PIGMENT AS WE SEE IT

OIL DEMAND ASBESTINE "325"

VOLUME BASIS

OIL %
57%

PIGMENT %
43%

PIGMENT PACKING
FACTOR 43

OIL
44 lbs.

PIGMENT
100 lbs.

Lbs. Oil Per 100 lbs. Pigment

WEIGHT BASIS

COST BASIS

OIL
\$6.20

PIGMENT
\$2.45

\$ Oil Per \$ Pigment

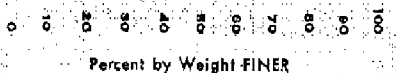
*DELIVERED PRICES

INTERNATIONAL TALC CO., INC.

ASBESTINE 325



ASBESTINE 325 is tailored to remove oversize. Will give good aggregate balance with bituminous pigments.

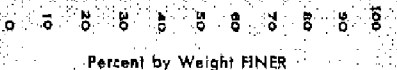


WILL GIVE A
HEGEMAN OF 4.0

TALC "B"



Talc "B" is tailored to remove oversize. Insufficient thermite and fine particles to form a good aggregate.



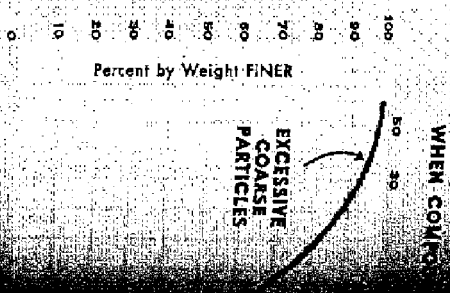
WILL GIVE A
HEGEMAN OF 4.0

TALC "A"

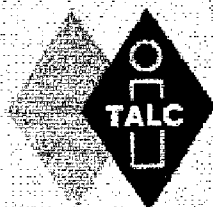


Talc "A" contains excessively large particles and an ever-supply of fines.

A S B E S COMPARED WITH

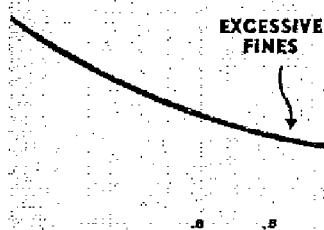


NE 325 "COLOR RED TALCS"

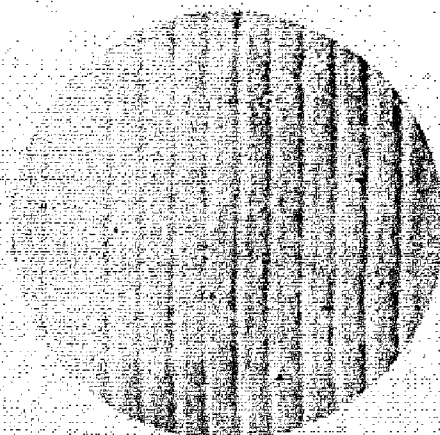


WITH A TINCTORIAL INTO A PAINT

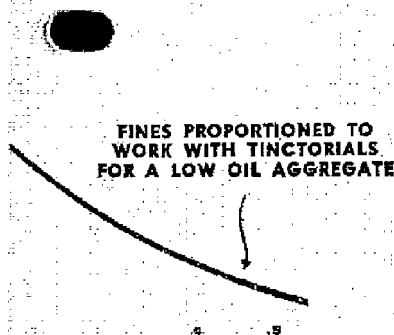
Diameter in MICRONS



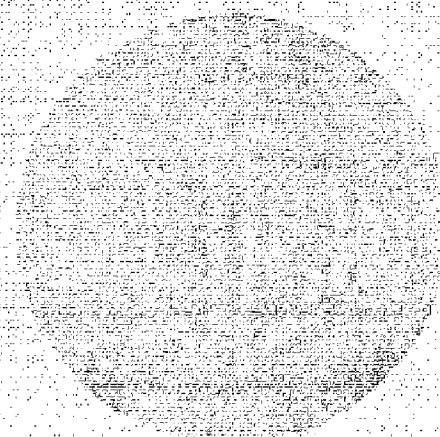
Expect poor leveling
Expect high oil demand
Expect little or no sag



Diameter in MICRONS



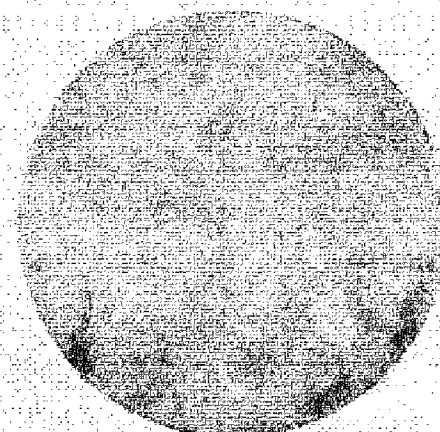
Expect well balanced leveling
Expect low oil demand
Expect little or no sag

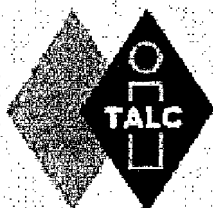


Diameter in MICRONS



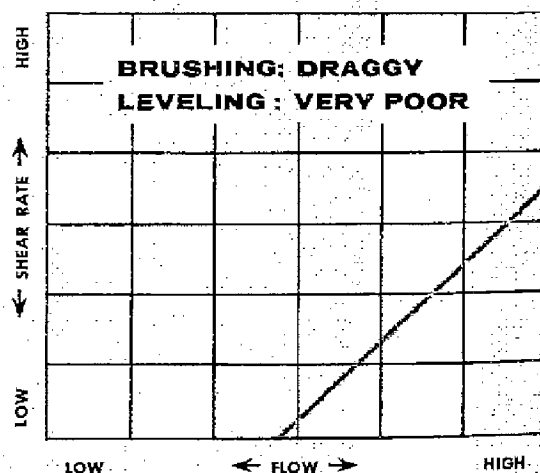
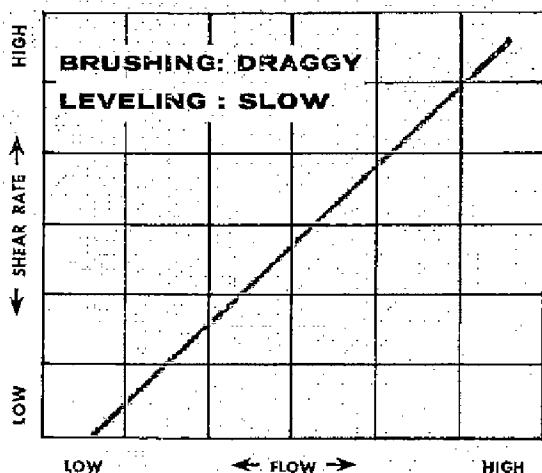
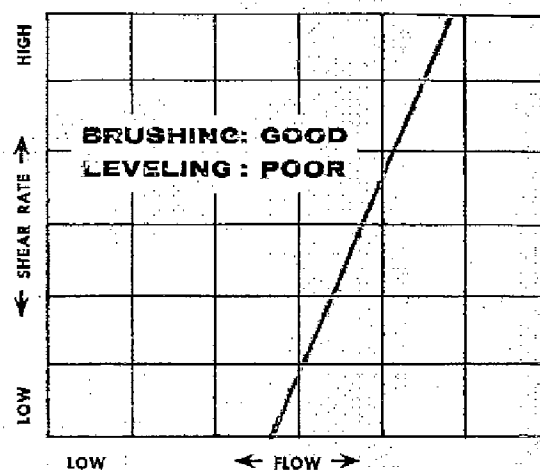
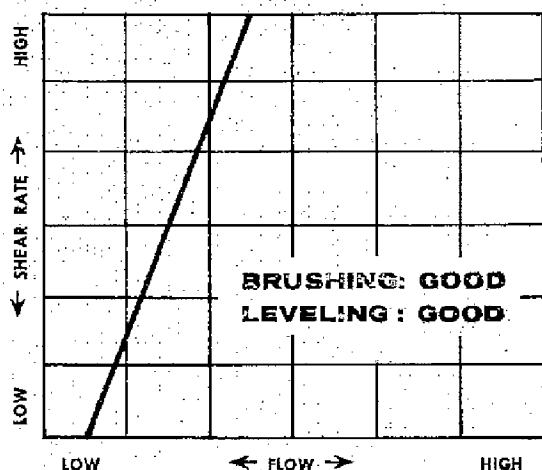
Expect ready leveling
Expect high oil demand
Expect tendency to sag

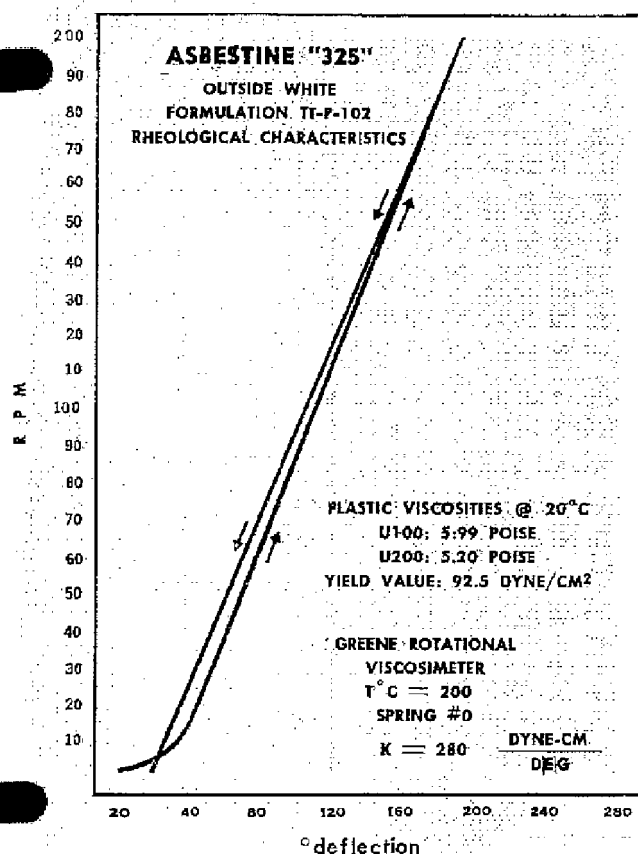




HOW TO PREDICT BRUSHING AND LEVELING CHARACTERISTICS OF A PAINT BY THE USE OF A ROTATIONAL VISCOMETER

Resistance to sag, ability to level well (thus minimizing brush marks), easy brushability, all of these are important requirements of a well designed paint. Rotational Viscometers, particularly those such as the Interchemical, the Brookfield, etc. may be used to give data which will signify the ability of your paint to meet these requirements.





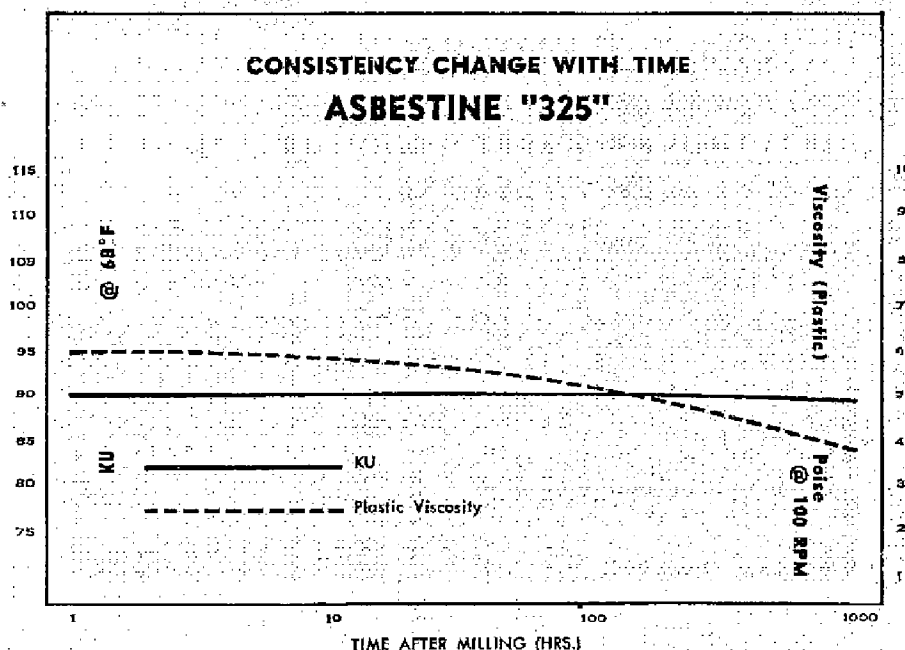
We present herewith characteristic graphs. These demonstrate wherein ASBESTINE 325 will make a TT-P-102 paint (and others) having excellent rheological properties.

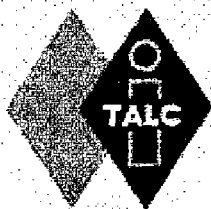
CONSISTENCY CHANGE VS. TIME

Various extender (and tinctorial) pigments have varying disposition to thicken (gelate) paint oils.

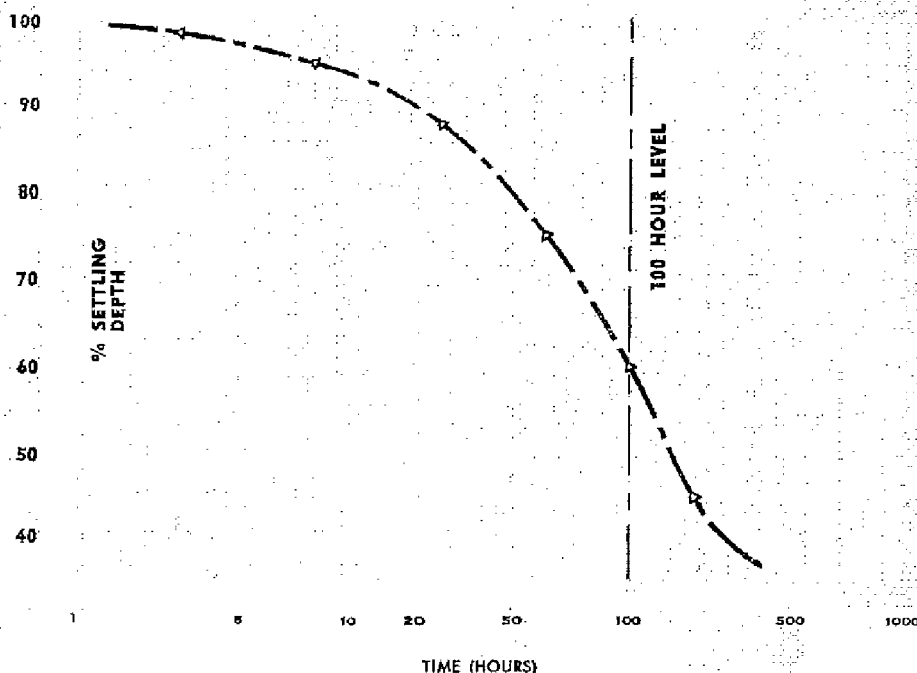
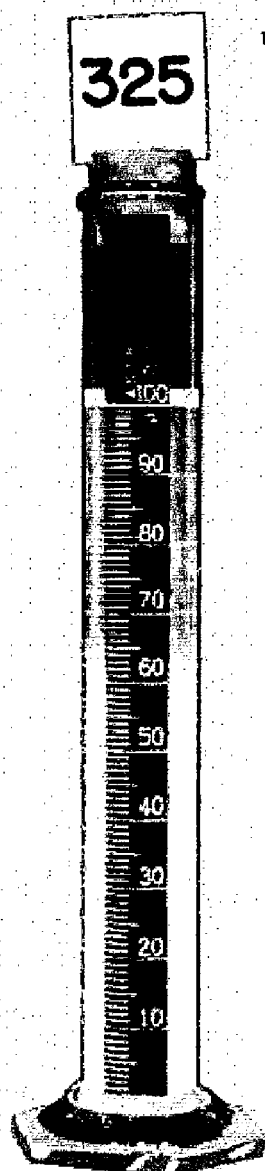
ASBESTINE, being a truly inert pigment, maintains consistency. To prove this we show the consistency change of a TT-P-102 formula containing ASBESTINE 325 for 3,000 hours.

At the end of 1 hour, 10 hours, 24, 72, 100, 1200 and 3600 hours, the paint was removed from the container and stirred so as to incorporate the thinner. This remixed paint was tested to show both KU and Interchemical Viscosity viscosities. All tests and aging at 70°F.





ACCELERATED SETTLING TEST



ASBESTINE has long been considered an excellent means of minimizing settling in paints. Normal tests in the can require long periods of time, and to be exactly comparative, would require temperature controls. An accelerated test yielding useful information and indicative of the relative ability of extender pigments has been devised.

In this test we made a TT-P-102 paint (using the proportion of ASBESTINE shown elsewhere in this brochure). We mixed equal parts of this paint and the same thinner indicated in that specification.

100 cubic centimeters of this diluted paint were poured into a graduate calibrated from 0 to 100. Temperature was maintained at 70°F. $\pm$ 10°F.

The rate of settling was observed by the level reached in the various times shown above. The photograph shows the level at 100 hours.

INTERNATIONAL TALC CO., INC.

FINENESS OF GRIND Hegeman

To prove the precision of tailoring top sizes of an extender (or-tinctorial) pigment a simple and informative test has been devised.

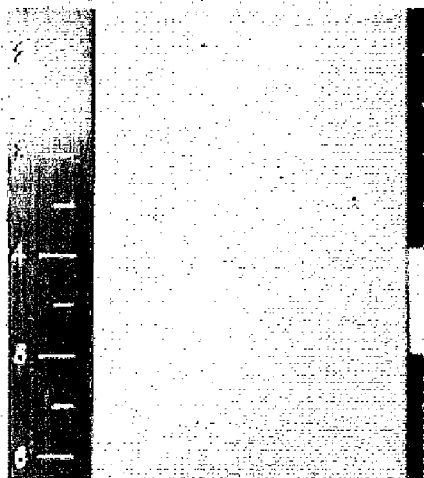
A charge of 1 quart of a pigment or pigments with a mixture of Q Bodied and White Refined Linseed Oil plus just enough Mineral Spirits to give good mill grinding consistency, is recommended.

If one then removes samples from the mill and makes a Hegeman test every 15 minutes, there will be obtained data indicating the relative grindability of pigments.

It is recognized that certain tinctorials are composed largely of flacculates of very small particles. Grinding or milling of such breaks down these flocs and replaces the air and water which cements them into sizes objectionable to glossy finishes.

Many extender pigments have not only these flocs, but also large gritty particles. All of these must be reduced to a certain size to obtain a required Hegeman test.

It will be noted that ASBESTINE 325 serves two purposes. If the mill base of tinctorials is preground to a given Hegeman, the ASBESTINE may be stirred in or rapidly dispersed by any high speed mill.



ASBESTINE 325 HEGEMAN 4-4.5

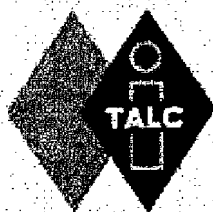
If the ASBESTINE 325 is introduced with the tinctorials (in the formula shown) a Hegeman of 4.5 is obtained in 1 and ½ hours.

To obtain this same Hegeman without ASBESTINE 325 requires more than 4 hours of milling.

By itself, with the two oils shown, ASBESTINE 325 came to a Hegeman of 4½ in less than 15 minutes.

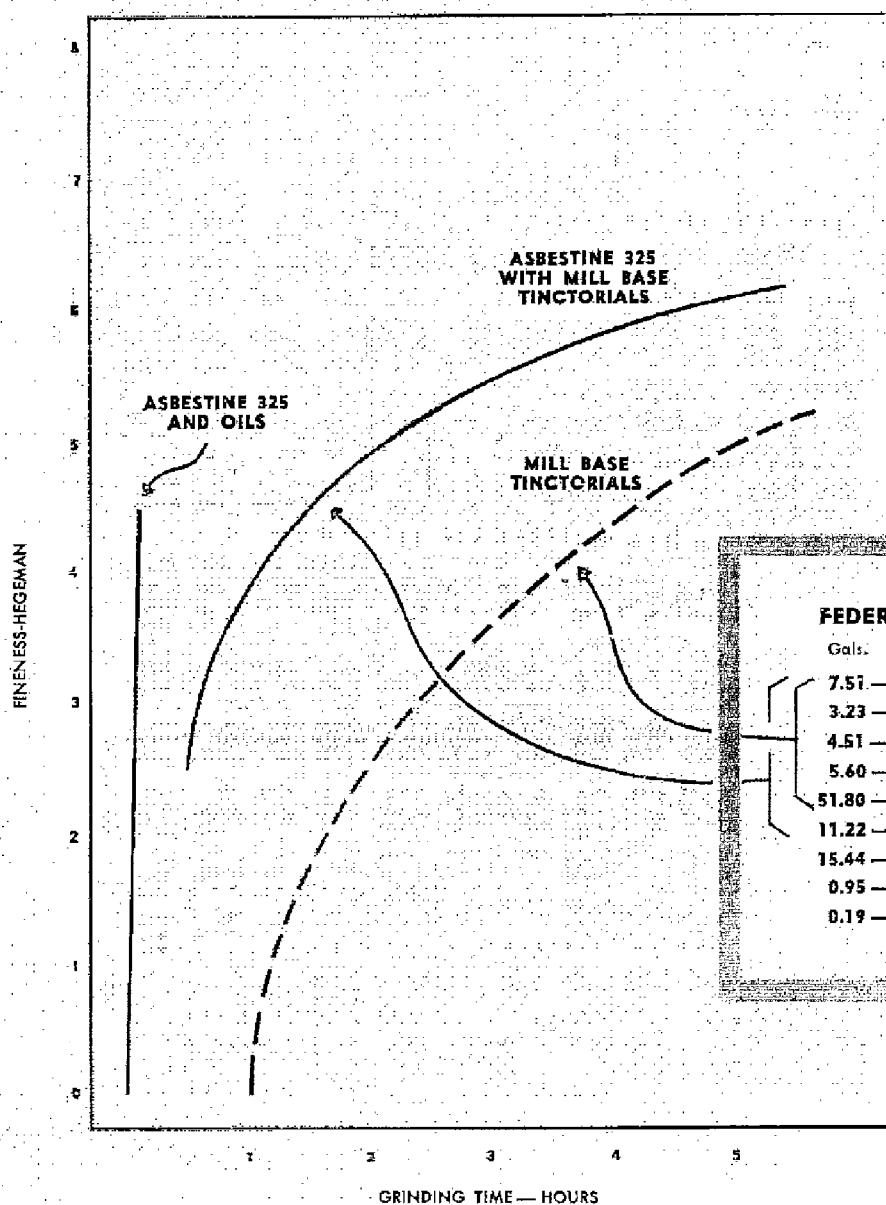
Used in this test: 1 gallon porcelain mill 7" x 7" charged with 35 — 1½", 11 — 1" and 82 — ¾" porcelain pebbles. Rotating speed 65 rpm. Room temperature 70°F.

INTERNATIONAL TALC CO., INC.



DISPERSION STUDY

Porcelain ball — porcelain mill
dispersion in standard outside
white house paint



FEDERAL SPEC. TYP-102-A

Gals. By Volume

- 7.51 — 35% Leaded Zinc Oxide
- 3.23 — Basic Sulfate White Lead
- 4.51 — Free Chalking Anatase TiO_2
- 5.60 — "Q" Bodied Linseed Oil
- 51.80 — White Refined Linseed Oil
- 11.22 — ASBESTINE 325
- 15.44 — Mineral Spirits
- 0.95 — 24% Lead Napthenate
- 0.19 — 6% Mineral Napthenate

NOTE: Names of suppliers
furnished on written request.

INTERNATIONAL TALC CO., INC.

BLISTER RESISTANT PAINTS

Lately much interest has been displayed by consumers and paint manufacturers alike in blister resistant paints.

Excessive moisture conditions can be controlled by:

1. Sidewall vents.
2. Attic louvers.
3. Correct maintenance of gutters, valleys and house foundations.
4. Venting of such equipment as clothes dryers.
5. Intelligent use of insulation and barrier material.

Observing the above precautions will usually eliminate need for special paints. The many excellent conventional house paint formulations will give good performance in such cases, on new wood as well as on repaint work.

The second way is to formulate a paint with a specially designed vehicle which will not be affected by excessive moisture; e.g. will not absorb water and swell or lose adhesion to the substrate.

Pigmentation is important in these paints. Reactive pigments are omitted, necessitating the use of fungicides.

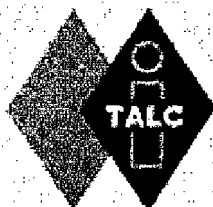
Paints formulated in this manner give excellent performance under adverse conditions that would cause normal paint films to blister severely.

It should be noted that this performance can be expected only when the blister resistant paint is applied over new wood.

In the case of repaint work experience has indicated that the old paint should be completely removed, preferably by burning followed by washing, if good blister resistance is to be expected.

We present herewith, two formulations demonstrating the use of ASBESTINE 325 in blister resistant paints. Due to lower oil demand and excellent anti-settling characteristics of ASBESTINE 325, higher pigment volume concentrations are possible effecting a lower production cost without affecting performance or storage characteristics.

INTERNATIONAL TALC CO., INC.



STAIN AND BLISTER RESISTANT HOUSE PAINTS

FORMULA # 61018A

Lbs.	Gals.	
56	1.73	Titanox A-168-LO
56	1.60	Titanox RA
404	17.50	ASBESTINE 325
359	46.56	Cykelin 70
32.9	5.00	Mineral Spirits
164.5	25.00	Mineral Spirits
8.23	.78	Butanoleate 30
0.63	.08	6% Co Naphtholate
0.63	.03	6% Mn Naphtholate
6.30	.67	24% Pb Naphtholate
0.83	.10	Antioxidant B
1089.02	99.04	
Lbs. per gallon		11.0
P.V.C.		40.4%
V.N.V.		45.4%
Consistency		84 KU
Total Solids		71.2%
Hegeman		4.0
R.M.C.		\$1.27/gal. (FOB — plant prices)

NOTE: Names of suppliers furnished on written request.

FORMULA # 61016A

Lbs.	Gals.	
50	1.54	Titanox A-168-LO
50	1.43	Titanox RA
360	15.61	ASBESTINE 325
386	50.00	Cykelin 70
164.5	25.00	Mineral Spirits
8.5	.80	Butanoleate 30
0.67	.08	6% Co Naphtholate
0.67	.08	6% Mn Naphtholate
6.75	.71	24% Pb Naphtholate
0.91	.11	Antioxidant B
1028.00	95.36	
Lbs. per gallon		10.8
P.V.C.		36.1%
V.N.V.		49.2%
Consistency		86 KU
Total Solids		71.9%
Hegeman		4.0 to 4.5
R.M.C.		\$1.27/gal. (FOB — plant prices)

NOTE: Names of suppliers furnished on written request.

INTERNATIONAL TALC CO., INC.

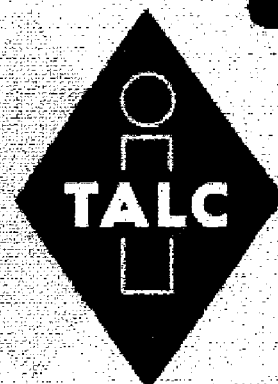
**YOUR INQUIRIES FOR SAMPLES
AND TECHNICAL SERVICE
ARE INVITED**

For your convenience, a business reply card
is enclosed for ordering a sample of our
new ASBESTINE 325.

The International Talc Co., Inc. maintains
a fully equipped paint laboratory for your
service.

**I N T E R N A T I O N A L
T A L C C O M P A N Y , I N C .
9 0 W E S T S T R E E T
N E W Y O R K 6 , N E W Y O R K**

The information herein is based on tests
believed to be reliable. We do not guarantee
the results to be obtained with this information.



INTERNATIONAL
TALC CO., INC.
90 WEST STREET
NEW YORK 6, N.Y.

File

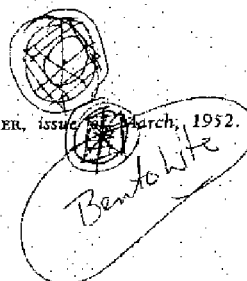
EXTENDERS

Covering talc, clay, calcium
and magnesium carbonates,
and blanc fixe in printing inks.

By A. J. Gitter

Whittaker, Clark & Daniels, Inc., New York

Reprinted from AMERICAN INK MAKER, issue for March, 1952.



EXTENDERS

Covering talc, clay, calcium and magnesium carbonates, and blanc fixe in printing ink.

CONSIDERABLE work has been done by private companies and research laboratories on extenders for use in printing inks. For many years, aluminum hydrate, magnesium carbonate and blanc fixe were the commonly accepted and used ink extenders. Lately, however, the popularity of these three standbys has been challenged by the use of natural extenders such as talc (magnesium silicate), calcium carbonate and clay as well as by new forms of precipitated extenders. This article deals with the production and availability of white extenders. It is designed to give the ink maker a better conception of how white extenders are produced commercially. Another article presenting more specific detailed information on grades and applications in printing ink is being prepared and will be published at a later date.

Talc

TALC, an abundant mineral mined in many parts of the world, chemically is a hydrous magnesium silicate with the basic formula of $3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$. It is also sometimes known as soapstone, but for simplification purposes, the word "talc" will be used here throughout.

The impurities present in this mineral influence the physical characteristics of the powdered form. In general, when the calcium content is high and present in the form of a calcium silicate, the powdered material is harsh, abrasive and has a dry feel when rubbed between the fingers. Because of these abrasive

characteristics, the varieties of talc containing calcium silicate generally are avoided by the printing ink industry. If the calcium is present in the form of crystalline calcium carbonate, the talc still has a harsh, dry texture, but is considerably less abrasive. Because of the correlation between abrasive characteristics and the presence of calcium, there is a tendency to select talcs with a low calcium content.

A second common impurity found in this mineral is iron oxide which may be present either as ferric oxide or as a complex magnesium ferric silicate. The presence of the iron tends to make the talc grayish in appearance. In many applications, this gray color is not objectionable. It does, however, limit the use of iron bearing talcs in printing ink formulations. In general, talc containing iron as an impurity is soft and extremely non-abrasive to plates.

Interestingly, the same grades of talc that are popular for cosmetics are likewise the most desirable for printing ink extenders. These are the grades low in impurities, hence, with the whitest color and the softest basic particles. In the United States talcs of this quality occur in North Carolina, Montana and California. By careful selection, these grades are being mined in Ontario, Canada, but up to the present only in limited quantities. Large quantities are produced in France and Italy. India also produces high quality talc.

Calcium bearing talcs occur in New York State and certain areas of

EXTENDERS

Covering talc, clay, calcium and magnesium carbonates, and blanc fixe in printing ink.

CONSIDERABLE work has been done by private companies and research laboratories on extenders for use in printing inks. For many years, aluminum hydrate, magnesium carbonate and blanc fixe were the commonly accepted and used ink extenders. Lately, however, the popularity of these three standbys has been challenged by the use of natural extenders such as talc (magnesium silicate), calcium carbonate and clay as well as by new forms of precipitated extenders. This article deals with the production and availability of white extenders. It is designed to give the ink maker a better conception of how white extenders are produced commercially. Another article presenting more specific detailed information on grades and applications in printing ink is being prepared and will be published at a later date.

Talc

TALC, an abundant mineral mined in many parts of the world, chemically is a hydrous magnesium silicate with the basic formula of $3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$. It is also sometimes known as soapstone, but for simplification purposes, the word "talc" will be used here throughout.

The impurities present in this mineral influence the physical characteristics of the powdered form. In general, when the calcium content is high and present in the form of a calcium silicate, the powdered material is harsh, abrasive and has a dry feel when rubbed between the fingers. Because of these abrasive

characteristics, the varieties of talc containing calcium silicate generally are avoided by the printing ink industry. If the calcium is present in the form of crystalline calcium carbonate, the talc still has a harsh, dry texture, but is considerably less abrasive. Because of the correlation between abrasive characteristics and the presence of calcium, there is a tendency to select talcs with a low calcium content.

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By A. J. Gitter

Whittaker Clark & Daniels, New York

California. Iron bearing grades are generally products of Vermont, Georgia, Maryland and Virginia. Table I shows typical analyses of each type.

Talc is mined by both underground and strip operations. The underground mines can vary from 100 feet to over 1,000 feet in depth. Often, the mines producing the best grades for printing ink extenders must be timbered. Strip mining is less common in the United States than in foreign countries but is utilized whenever the talc veins are near enough to the surface to permit this type of operation.

Because the printing ink industry has such high standards, it is common to hand pick printing ink grades. The ore is put through a jaw crusher and then ground in a roller or pebble mill. This produces talc of a particle size of 200-325 mesh or finer. Because of the need in printing ink formulations for materials of fine particle size, the talc may be ground further

in a jet attrition mill, a high speed Williams mill or pebble mill to the low micron sizes. It might be noted that since the talc generally is a dense, massive type of ore, it does not tend to break down by itself and requires extensive grinding. The grinding generally is accomplished by a dry process.

It is possible to select a talc for use as an extender having considerable variations in properties to fit the particular type of ink desired. For example, the oil absorption varies considerably with the basic type of talc as well as with variations in the fineness of grind. The viscosity of the ink also can be affected by the inherent wettability characteristics of the talc particle; some talcs are more easily wetted than others. Along this same line, the variation in the inherent slipperiness of the talc also will affect its viscosity and tendency toward thixotropic behavior.

It might be mentioned at this point that a material similar to talc some-

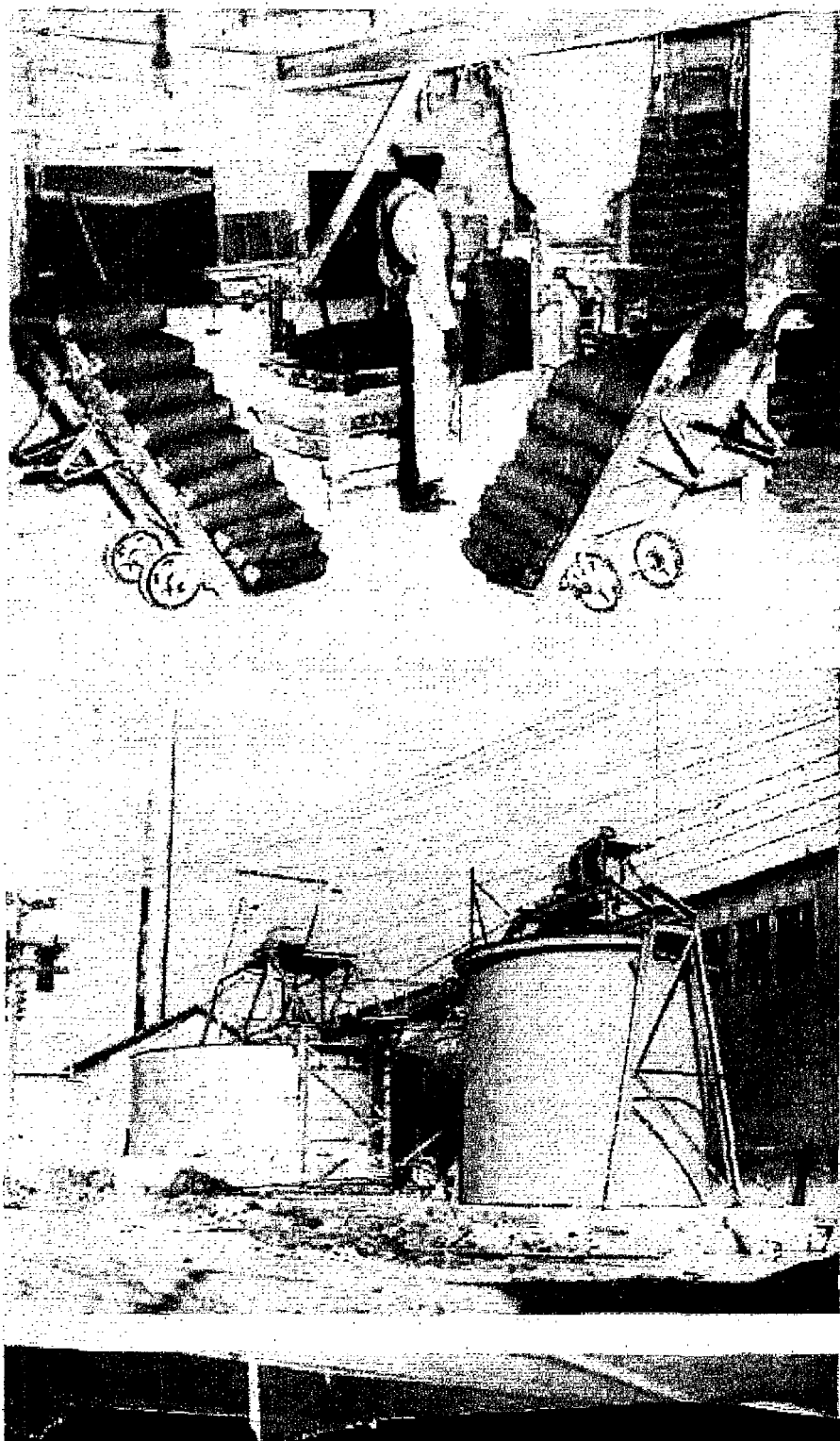
times is used as an extender by other industries which is known as pyrophyllite. Pyrophyllite is a hydrous aluminum silicate and is often described by mineralogists as having the same basic physical characteristics as talc. Unfortunately, most known pyrophyllite deposits contain some impurities which destroy the softness and so give an abrasive type of material.

Talc is available in unlimited quantities as an extender. It represents a material that can be adopted with complete assurance of ready availability. Users of talc as ink extenders should investigate the various grades of talc, for the larger manufacturer probably will find it advantageous to use several distinct types in his formulations to take best advantage of the various physical characteristics.

Clay

A SECOND popular white extender for printing ink is clay, a natural hydrous aluminum silicate. There are many kinds and classifications of clay as this is one of the most common minerals found in nature. The type of interest to printing ink makers is that designated as china clay or kaolin. These types are white in color possessing a fair amount of tackiness when wet. Clay of this nature is mined domestically in Georgia and South Carolina. Considerable tonnage of white clay also is produced in other locations but these grades generally are utilized by the ceramic industry exclusively. The English china clay is likewise popular as an ink extender.

China clay is strip mined, and to produce suitable grades for ink ex-



tenders, it is normally washed in water. The clay as it occurs in the mine contains varying amounts of water, oftentimes up to 20-25%. The clay is agitated in a large blunger into a thin slip or slurry. Because of the tonnage processed, it generally is cleaned by water separation. The clay slurry is maintained at such a consistency that the heavy foreign impurities, such as free quartz, will drop to the bottom of the flotation tanks. Mica and other materials having a lighter specific gravity are removed with the top water. The clean slurry is then either pumped into a filter press or treated on drum filters to remove the major portion of the water. Next, the clay is dried and pulverized to what is classified as "air floated" fineness. Air classification is more accurate than screening and permits more controlled segregation of the finer particles. The air floated materials generally can be considered to be 200 or 325 mesh depending upon the air stream adjustments.

Clay materials in this condition frequently are used as extenders. At the same time, however, it is becoming an increasingly common practice to grind the clay further in a jet attrition, high speed Williams, or pebble mill. Likewise, for certain types of work, the clay may be surface coated with a stearate or other material. The purpose of the coating is to give selected characteristics to ink formulations in so far as wetting and physical behavior is concerned.

Whereas the impurities cause marked differences in the characteristics of talc, in the case of clay, the impurities, while they do cause a difference are of such geological nature as to be

clays used as extenders are known as "secondary" formations. The original clay forming material laid down in a pre-historic geological period later was carried to a new location either by wind or water. Typical kaolin analyses are shown in Table II.

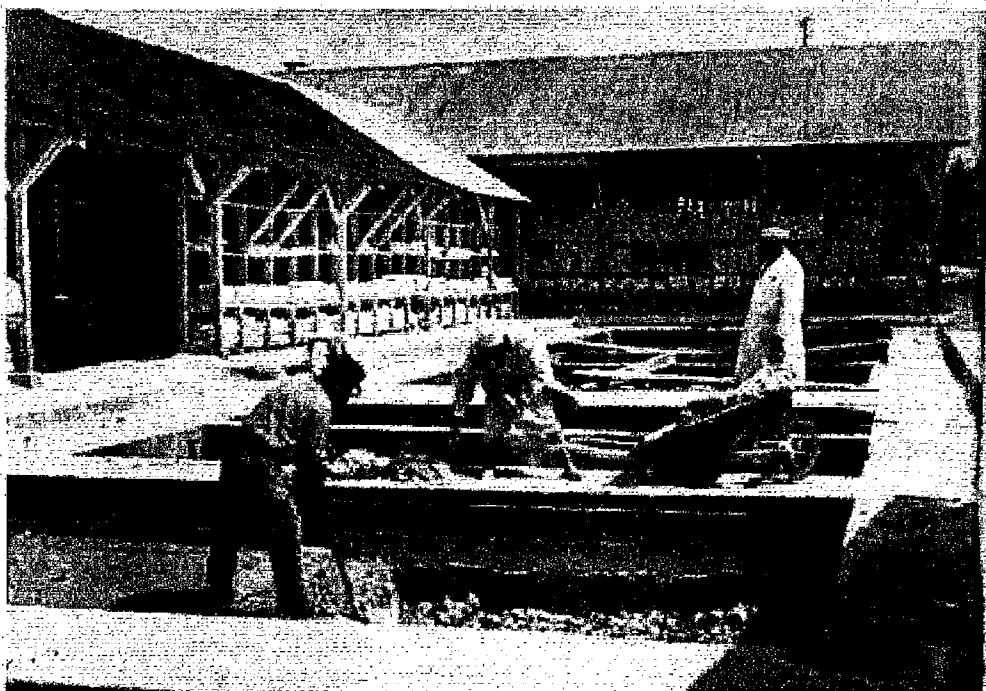
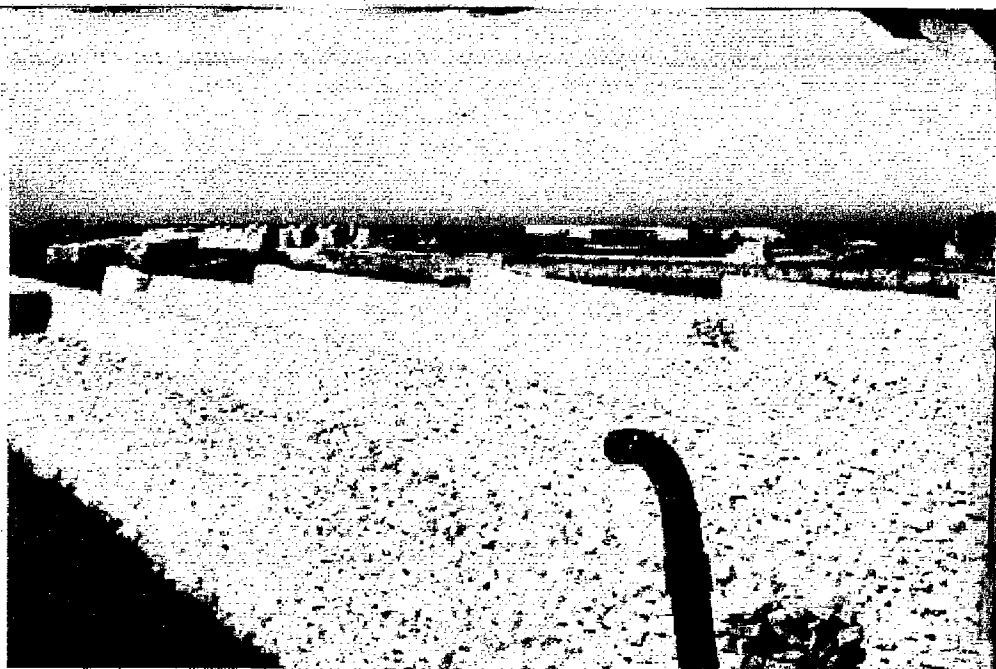
On the subject of clay for printing ink, mention should be made of bentonite. Mineralogically, bentonite belongs to the clay family as it is also a hydrous aluminum silicate. It is generally considered to be of what geologists call a montmorillonite formation.

Bentonite generally is not used as an extender but can be added to mixes to give suspension and consistency. The Wyoming type of bentonite has a high water absorbency plus a peculiar tendency to swell when wetted. The color of the Wyoming-South Dakota material tends to be on the gray-buff side. However, when bentonite is used, the percentage is small, seldom exceeding 3%, so that the color is not too much of a limiting factor.

The high and low gel imported bentonites, on the other hand, are what are known as sub-bentonites. These do not have the swelling characteristics or the high water retention of the other bentonites. They act more like a highly plastic clay. Here again, the mineral is used essentially to give increased consistency or suspension.

Calcium Carbonate

THE term calcium carbonate covers a number of distinct types of materials but because of conflicting nomenclature in the trade, the term is being more widely used to cover any material that is essentially calcium carbonate. By this is meant



Top: Amorphous chalk storage depot in England. English product is obtained from the famous "White Cliffs of Dover." Center: Drying pans near the extensive Omya chalk deposits in France. Bottom: Loading Omya chalk for shipment to the crushers.

either a precipitated calcium carbonate or a natural calcium carbonate. Both the precipitated and the natural types are used as extenders for a wide range of printing inks. The precipitated form can be prepared by either of two processes. The first is by the reaction of lime water and carbon dioxide and the second is the reaction between sodium carbonate and lime. In both cases, a pure calcium carbonate with amorphous particles is produced. In general, the precipitated calcium carbonate is cleaner and brighter than the natural calcium carbonate. While the precipitated type has higher chemical purity, it also has greater alkaline reactivity. If the precipitated calcium carbonate is not washed carefully, it is also subject to greater variations in pH which, in turn, affect the viscosity of the ink.

Natural calcium carbonate is produced from materials identified mineralogically as chalk, marble, sugar calcite limestone and other varieties. The natural material may be amorphous, crystalline or cryptocrystalline in structure. In each case, there is a difference in the application of the type of final product, even though the mineral is ground to the same fineness and shows the same chemical analysis.

Within the United States, the sugar calcite type is perhaps of the greatest interest to the ink industry as in its ground form it has exceptionally good color and brightness. Deposits occur in widely separated localities, the most important of which are Georgia, Pennsylvania, Missouri, southern Ill. and Vermont. It normally is strip mined, crushed, and then either ground wet or dry in tube mills. Sugar calcite is a hard, dense material, but one which grinds readily.

The grades of most interest to ink makers are those which are water ground and in which the particle size is controlled. The advantages of controlled particle size are becoming increasingly evident as an outgrowth of the studies in low micron extenders.

The English and French calcium carbonates generally are produced

from mining amorphous chalk such as the "White Cliffs of Dover" in England or from the famous Omya chalk deposits in France. Here again, the material is strip mined but due to the amorphous characteristics of the chalk, the processing is somewhat easier. It might be noted in passing that these deposits contain quantities of a hard material which is salvaged for use as grinding pebbles in ball and pebble mills.

English chalk is processed by both wet and dry grinding. In the case of the wet grinding, the selection of

grades here again is made by water classification and sedimentation. All of the French chalk is dry ground. Due to the inherently good characteristics it is possible to produce by dry grinding, a French material comparable to wet ground English products.

The advantage of calcium carbonates as extenders is due essentially to their good color, which is of importance in obtaining clear colors in printing ink, and to their excellent working properties. The presence of impurities in unprocessed calcium carbonate is of concern but

TABLE II

	English China Clay	Georgia Kaolin	Bentonite Wyoming	Italian
Silica	47.40%	43.66%	64.00%	67.42%
Aluminum Oxide	38.01	41.26	—	15.83
Ferric Oxide	0.59	Trace	—	0.88
Calcium Oxide	Trace	0.86	—	2.65
Magnesium Oxide	0.41	0.12	—	1.29
Titanium Dioxide	—	—	—	—
Aluminum	—	—	21.00	—
Iron	—	—	3.50	—
Magnesia	—	—	2.30	—
Lime	—	—	.50	—
Soda	0.29	—	2.60	—
Potash	1.26	—	.40	—
Sulfate as SO ₃	—	—	—	Trace
Alkali in K ₂ O	—	—	—	1.09
Chemical Water	—	—	5.20	—
Moisture	—	—	—	—
Loss on Ignition	11.99	13.99	—	10.83

TABLE III

Typical Analysis:	Calcium Carbonates			
	Precipitated	Domestic Calcite Type	English	French
Calcium Carbonate	98.75%	98.20%	97.52%	99.20%
Magnesium Carbonate	0.38	1.20	0.66	0.12
Alum. & Ferric Oxide	0.32	—	0.44	—
Silica & Acid Insolubles	0.38	—	—	—
Aluminum Oxide	—	0.12	—	—
Aluminum	—	—	—	0.014
Ferric Oxide	—	0.06	—	—
Iron	—	—	—	0.014
Silica	—	0.45	1.11	0.30
Manganese	—	—	0.02	0.0095
Water Soluble Salts	—	0.07	—	—
Moisture	—	0.20	0.25	—
Water	—	—	—	0.14
Organic Substances	—	—	—	0.035

not primarily because of the basic mineralogical constitution of the calcium carbonate. Typical analyses of calcium carbonates appear in Table III.

Other Extenders

MMAGNESIUM carbonate was long a popular extender for printing ink when natural vehicles were being used extensively. While this product occurs as a mineral, it is rarely used in this form by the printing ink industry. The natural magnesite tends to be too high in impurities so that major demands are for precipitated grades. The extender grades of magnesium carbonate are being increasingly precipitated from sea water. By carefully controlling all phases of the process, it is possible to produce an extremely fine grained, closely controlled pure magnesium carbonate of high brightness. Research efforts are investigating the possibilities of manufacturing a product with a reduced pH for ink use. This lower pH would overcome many current objections to the use of magnes-

product used either in a powder or paste form. For many years, it was used in the higher quality inks because of its remarkable transparency. This material, likewise, has water repellent characteristics desirable in the finished ink. The use of alumina hydrate is traditional and of great importance as an ink extender.

Blanc fixe is a precipitated barium sulfate considerably more opaque when used as an extender than either alumina hydroxide or magnesium carbonate. It likewise is used both in powder and paste forms. It is used with lithographic as well as with printing inks. The popular usage of the precipitated extender is due largely to the low micron particle size of the product.

Barium sulfate also occurs in the natural form in which it is known as barytes. This form is seldom used by ink formulators as the color is apt to be off and it cannot be ground to as fine a particle size as the precipitated blanc fixe.

Work has been done on micro-sized

mica thus increasing its adhering properties.

White materials such as the aluminum stearates frequently are used in printing inks. These cannot be classified properly as extenders since their selection is made more upon the other characteristics which the stearates give to the ink. These materials are precipitated metallic soaps. By controlling the manufacturing process the aluminum stearates can be formed either as mono-, di-, or tri- stearates.

The printing ink industry in its normal investigation of the many white extenders available makes use of the combination of several different materials in order to obtain the specific type of ink desired. The use of the natural white minerals as extenders is expanding and as the ink industry expresses interest in these materials, producers are making continued improvements in processing. It might be noted that the supply of all of the natural extenders mentioned in this article is plentiful and their

COMPETITIVE DATA - INTERNATIONAL TALC CO.

G/L & T/L Price FOB Plant	ASBEST- TINE Grade	% 325 Mesh	Hegman* Fine- ness	KU Range Paint Test Formula	Oil Ab- sorption G-C	Water Ab- sorption cc's per 100 grams	Particle Shape	Remarks
\$ 28.00	X	98.5	1	70-76	29-32	75-95	semi- fibrous	low oil demand; high PVC possible; low Ku range; for exterior paints.
28.00	3X	98.5	1	76-81	37-41	120-140	fibrous	general purpose pigment for oil, alco-resinous, water emulsion interior and exterior paints.
31.00	Fine Texture	99.5	1½ - 2	76-83	37-42	110-130	fibrous	slightly higher consistency than 3X improved Hegman; for interior and exterior paints.
33.00	5X	97.5	1	87-100	47-53	145-165	fibrous	high oil absorption; most fibrous Asbestine; higher consistency range for exterior oil and water paints.
38.00	325	99.98	4 - 4½	75-81	37-41	90-120	semi- fibrous	"tailored"**- talc; medium oil absorption and consistency; for oil and water paints.
60.00	425	99.99	5 - 5½	77-85	45-52	110-140	semi- fibrous	"tailored"**- talc; medium/high oil demand; for industrial paints.
85.00	625	99.99	5½ - 6	125-140	65-72	190-240	platey	"tailored"**- platey talc; highest oil absorption and consistency; im- parts flattening; reduces gloss; for low sheen paints.

*Hegman obtained by hand mixing in linseed oil.

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