

PERMOLITH
LITHOPONES

0007-SWP-000006573

N 4377

PERMOLITE LITHOPONES

Paper No 104
March 28 1965

PIGMENT, COLOR AND CHEMICAL DIVISION
THE SHERWIN-WILLIAMS COMPANY

0007-SWP-000006574

PERMOLITHS

REGULAR GRADES

PERMOLITH 20-L	Low Consistency
PERMOLITH 40-M	Medium Consistency
PERMOLITH 60-H	High Consistency

NON-REACTIVE GRADES

PERMOLITH 10-W	Low Consistency
PERMOLITH 60-W	High Consistency

HYDROPHOBIC GRADE

PERMOLITH 60-J	High Consistency
----------------	------------------

WATER WETTING GRADES

PERMOLITH W-320	High-Dry-Hiding	Medium Consistency
PERMOLITH W-660	Extra-High-Dry-Hiding	High Consistency

WATER DISPERSIBLE GRADES

PERMOLITH W-420	Medium Dispersibility	Medium Consistency
PERMOLITH W-421	High Dispersibility	Low Consistency
PERMOLITH W-461	High Dispersibility	Medium Consistency
PERMOLITH W-560	Medium Dispersibility	High Consistency
PERMOLITH W-661	High Dispersibility	High Consistency

0007-SWP-000006575

PERMOLITH is the brand name for a series of single strength lithopones containing 28% to 29% zinc sulfide and 70% to 71% barium sulfate. They are truly "co-precipitated" pigments because their method of manufacture involves the simultaneous precipitation of the zinc sulfide and barium sulfate in extremely intimate association. This inter-locking of components produces an extended zinc sulfide pigment possessing many unique and outstanding properties.

The PERMOLITHS are carefully controlled at every stage during manufacture, from raw material to finished pigment to assure uniformity and high quality. Barytes ore (crude barium sulfate) is converted in large rotary kilns to "black ash". The black ash is then leached with water and further treated to produce a pure solution of barium sulfide. Zinc ores (frequently zinc sulfide) are first roasted and then treated with acid to dissolve the zinc. This crude solution then undergoes additional processing to obtain a highly purified zinc sulfate.

The very pure solutions of zinc sulfate and of barium sulfide are brought together under precisely controlled conditions to precipitate the unit pigment. It is significant that the only product of the reaction is the pigment itself, and hence, it is formed in an environment free of possible contaminants and side products.



After precipitation, the crude lithopone is de-watered. The pulp is now calcined under a carefully regulated atmosphere to develop opacity and other pigment properties. From the calciner, the lithopone passes to the grinding circuits. It is wet-milled and classified for removal of coarse particles and development of the fine texture. Special treatments may be included at this stage. Finally, the pigment is filtered, dried, pulverized, and air classified before packaging. It is important to note that the process has been particularly designed to manufacture high quality lithopones of superior light resistance.

The PERMOLITHS are all fine-particle pigments, possessing excellent whiteness and good opacity. Each lot is tested for conformance to specification on such important characteristics as consistency, reactivity, color, opacity, and texture. A wide selection of grades is available to meet a variety of requirements. In addition to the regular grades of PERMOLITH which offer a range of body and reactivity characteristics, a number of special grades have been developed for specific purposes.

Although the FERMOLITE are used in many kinds of products, they find their widest application in paints of various types. With selection of the proper grade, they contribute many properties and improvements not otherwise possible.

A. IN LATEX PAINTS

Greater	<u>Emulsion Stability</u> - in the package - during application
Improved	<u>Brushability</u>
Better Control of	<u>Chalking</u> <u>Sinking</u> <u>Flooding</u> <u>Flaking</u>
Increased	<u>Scrub Resistance</u> and
Freedom from	<u>"Sainers"</u>
Better	<u>Washability</u>

B. IN RESIN-EMULSION (AND CASEIN) PAINTS

Provides	<u>High-Dry-Hiding</u>
And other improved characteristics as listed for Latex Paints	

C. IN ALKYD FLATS (AND OTHER OIL FLATS)

Enhances	<u>Brushing Properties</u>
Improves	<u>Scrub Resistance</u>
Increases	<u>Enamel Holdout</u>
Reduces	<u>Color Float</u>
Contributes	<u>High-Dry-Hiding</u>

D. IN ENAMELS

Superior
Better

Light Resistance
Color and
Gloss Retention

E. PORCH AND DECK PAINTS

Increased
Reduced

Easier
Better

Wear Resistance
Flooding and
Flaking
Brushing
Flow

F. IN TRAFFIC PAINTS

Longer

Greater
Increased

Wear, through increased abrasion
resistance
Color Retention
Visibility

REGULAR GRADES

FERMOLITH 2OL	Consistency Factor 15-19
FERMOLITH 4OM	Consistency Factor 20-25
FERMOLITH 6OH	Consistency Factor 26-32

The regular grades of FERMOLITH carry no additives or special treatments, and are low in soluble salts. They are compatible with a wide variety of materials. They are suitable for practically all types of paints, interior and exterior; oil, alkyd, casein, resin-emulsion and latex base paints. They find extensive application in rubber, plastics, printing inks, linoleum, oil cloth, leather, textiles, paper, polishes, and many other compositions. These grades differ principally in their consistency characteristics, and selection of the correct one is largely a matter of the body to be obtained.

FERMOLITH 2OL is frequently the first choice for exterior house paint, wall primers and sealers, and flat wall paints. As indicated by the consistency factor, it produces the lowest body of the three grades.

FERMOLITH 4OM is probably the most versatile of all the lithopones. It is the "general-purpose" lithopone of the FERMOLITH series. It also finds particular application in all types of enamels; high gloss, semi-gloss, porch and floor enamels, industrial enamels.

FERMOLITH 6OH is usually the preferred grade for traffic paints.

NON-REACTIVE GRADES

PERMOLITH 10W	Consistency Factor 13-16
PERMOLITH 60W	Consistency Factor 24-30

These are special "non-reactive" lithopones with an exceptionally low zinc oxide (0.10% max.) and soluble salt content. They are specifically designed for use where after-body must be kept to a minimum or where the vehicle is sensitive to alkaline pigments. Like the regular grades, the non-reactive grades are compatible with both aqueous and organic vehicle systems.

PERMOLITH 10W is recommended where both low consistency and low reactivity are desired. It is also useful for obtaining high pigment loading without undue build-up of consistency.

PERMOLITH 60W combines non-reactivity with medium high consistency.

HYDROPHOBIC GRADE

PERMOLITH 60-J	Consistency Factor 24-30
----------------	--------------------------

Rapid wetting in oil vehicles (and non-water-wetting) is the principal characteristic of this lithopone. In addition to ease of dispersion in oils, it promotes improved suspension in many formulas. It may be used to advantage in either enamel or flat paints.

WATER WETTING GRADES

PERMOLITH W-320	Consistency Factor 16-23 Water Absorption 18-21
PERMOLITH W-660	Consistency Factor 20-28 Water Absorption 28-33

These PERMOLITHS possess both high-dry-hiding and water-wetting properties. They are equally compatible with oil and water systems and show excellent performance in each. The many outstanding properties which are contributed by Lithopone to flat wall paints of all types are possessed to a very high degree by these grades.

The consistency imparted by these Lithopones in oil systems frequently is much higher than indicated by the consistency factors given above. Usually, this cannot be reliably predicted and should rather be determined by trial.

PERMOLITH W-320 has been the recognized standard in resin-emulsion paints for many years, and is finding increased acceptance in oil and alkyd flats. PERMOLITH W-320 is not only low in soluble salts, but is practically free of divalent and trivalent metals, especially calcium. It also has unusually good light resistance.

PERMOLITH W-660 possesses somewhat greater high dry-hiding than PERMOLITH W-320, and in general, produces distinctly higher consistencies.

WATER DISPERSIBLE GRADES

PERMOLITH W-420	Water Absorption 17-20
PERMOLITH W-421	Water Absorption 17-20
PERMOLITH W-560	Water Absorption 18-21
PERMOLITH W-661	Water Absorption 27-32

These lithopones are intended primarily for water-based systems and are markedly hydrophilic. The various grades differ with respect to their degree of dispersibility, consistency, and dry-hiding properties.

PERMOLITH W-420 is intermediate in dispersibility, dry-hiding, and consistency. In water, it produces soft pastes in high concentration and light, creamy suspension in lower concentrations.

PERMOLITH W-560 exhibits about the same degree of dispersibility as the W-420, but produces appreciably higher consistencies. Water pastes are somewhat buttery in character. PERMOLITHS W-560 and W-420 are generally preferred for Kalsomines, water-based paper coating compositions and similar preparations.

PERMOLITH W-421 is treated for maximum ease of dispersion in water systems. These highly dispersible lithopones in many instances possess certain advantages in emulsion and water-containing compositions. They are especially recommended where the lithopone is to be subjected to little or no grinding. PERMOLITH W-421 is quite similar to the W-320 grade, except for the dispersing treatment.

PERMOLITH W-661 is the highly water dispersible counterpart of PERMOLITH W-660. It exhibits the greatest high dry-hiding of any of the water dispersible lithopones; and in many formulations a higher body. It is recommended wherever a water dispersible lithopone must be used at the lowest cost in hiding power.

0007-SWP-000006583

CHEMICAL AND PHYSICAL PROPERTIES

% ZnS (min.)	28.0%
% ZnO (max.)	0.3%
% 325 mesh residue (max.)	0.15%
Specific Gravity	4.30
Bulk Density	2.77 gals./100 lbs.
Wt. Sol. 1 Gallon	35.8 lbs.

* Except PERMOLITH 10W and 60W; 0.10% max.

All grades of PERMOLITH meet ASTM Spec. D-477-45
and Federal Spec. TT-L-426

Grade	Color, Fisher 1	Water Absorp.	Tint Strength	Sp. Res. ² (min.)	pH
PERMOLITH 20L	15-19	-	104	-	8-9
PERMOLITH 40W	10-15	-	102	-	8-9
PERMOLITH 60W	10-12	-	100	-	8-9
PERMOLITH 10W	11-16	-	104	7,500	7-8
PERMOLITH 60W	21-30	-	100	7,500	7-8
PERMOLITH 60J	21-30	-	100	-	7-8
PERMOLITH W-320	15-23	13-12	102	3,500	7.3-8.6
PERMOLITH W-420	-	17-20	100	-	-
PERMOLITH W-421	-	17-20	100	-	-
PERMOLITH W-461	-	18-21	100	-	-
PERMOLITH W-560	-	18-21	100	-	-
PERMOLITH W-660	20-27	29-13	100	3,500	8.5-9.5
PERMOLITH W-661	-	18-22	100	-	-

¹Consistency Factor is a reliable indication of the relative consistencies imparted by the various PERMOLITMS under standard conditions. The determinations are made in a flat paint vehicle of about average reactivity, using a Stormer Viscometer with off-set blade paddle. The consistency factor values are directly proportional to the weight in grams (stress) required to produce a constant rate of rotation (shear). They are used in preference to oil absorption values, because the latter are subject to considerable variation between different operators and laboratories, and further, they are not a very reliable guide to consistency.

²Specific Resistance is a measure of the soluble salt content of the lithopone; with a low value meaning high solubles and vice versa. This is determined by extracting 20 grams of pigment with 180 grams of boiling distilled water. The pigment is separated by filtration or centrifuging, and the conductivity of the extract determined with a suitable conductivity bridge. Specific Resistance is the inverse of the conductance.

COUNTERMATCHES FOR PERMOLITHS

The following data sheet tabulates the PERMOLITH countermatches for the various competitive grades of lithopone.

In applying these recommendations, several factors must be kept in mind. In the first place, there are no exact matches between the respective competitive brands. Certain general characteristics of a given brand are to some extent determined by the design and process operations of that particular plant. The plant in which the PERMOLITHS are manufactured is the latest and most modern lithopone plant in the country.

Also, a single grade of competitive lithopone may require one grade of PERMOLITH for one application and another grade of PERMOLITH for a different application or type of vehicle system.

Finally, the PERMOLITH which provides the closest countermatch for the competitive grade being used by the customer may not necessarily be the most suitable for the particular application; a different lithopone might give improved performance.

In using the table, special attention should be paid to any notes entered in the extreme right hand column.

<u>N.J. Zinc</u>	<u>Glidden</u>		<u>Cherwin- Williams</u>	<u>Notes</u>
<u>Albalith</u>	<u>Plant B</u> Sunolith	<u>Plant C</u> Sunolith	<u>Pernolith</u>	
14A*				
14B*		Low Oil NR	10-N	*1 Non-Reactive
14*	96LO	Low Oil	20-L W-320*	*2
13			-	Low Sheen
11	HO		40-M	
10		High Oil #97*	60-H 60-H	Med. High *3
806 807			40-M 40-M	*4
			60-N	Non-Reactive
73			60-J	Hydrophobic
90			-	High Oil, Ultra Texture
	76C 76B	High Opacity*	W-320	*5 W.W.
			W-421	W.D. High Consistency
			W-461	W.D.
	JR		W-560	W.D. Med. Consistency
362			W-660	Extra-High-Dry-Hiding
332		#86	W-661*	*6 W.D.

Note 1. Albalith 14A - Extra high specific resistance.
Albalith 14B - Extra high sp. resistance and 0.1% ZnO, Max.

Note 2. In matching Albalith 14 in latex and emulsion systems or where high-dry-hiding is required, W-320 is usually recommended.

Note 3. For additional opacity and consistency in flats, use W-320.

Note 4. 40-M is our regular enamel grade; however, if a lower consistency is essential, use 20-L.

Note 5. For extra-dry-hiding, use W-660.

Note 6. Where calcium salts must be absent, use W-461.

USAGE INDEX

The list below covers only general recommended order of preference. However, selection of is often dictated by some specific requirement and can only be made after an understanding of his product.

Attention is also called to a brochure "Use of Lithopone in Latex Emulsion Paints", which application in considerable detail.

Exterior House Paints	20L	
Flat Wall Paints	20L	
Floor Enamels	40M	
High Gloss Enamels	40M	
Industrial Finishes	40M	
Semi-Gloss Enamels	40M	
Traffic Paints	60H	
Wall Primers and Sealers	20L	1C
Kalsomine	W560	W4
Water and Emulsion Paints	W320	
Latex Paints	W320	
Caulks and Putties	20L	
Chalks, Crayons	20L	
Floor Tile	20L	
Leather	40M	
Linoleum	20L	

Oilcloth	40M	10M	60M	
Paper Coating and Filling	W560	W421	W320	W660
Patching Plaster, Crack Filler	W320	40M		
Printing Inks	40M	10M	W320	
Rubber and Plastics	40M	20L	60M	
Shade Cloth	40M	20L	W320	
Wallpaper Coating	W560	W421	W320	W660

PACKAGING AND SHIPMENT

All grades of PERMOLITH are packed in 50 lb. multi-wall paper bags. Each bag is clearly marked to show both the grade and the lot number.

Carload shipments are available for fork truck unloading. Bags are "cross-stacked" on expendable pallets in unit loads. A bulletin giving details of the unit loading system may be obtained upon request.

USEFUL DATA

CONVERSION UNITS

<u>FROM</u>	<u>TO</u>	
Kilograms	Pounds	2.205
Ounces (avoir.)	Grams	28.35
Pounds	Grams	453.5
Cubic Feet	Gallons	7.48
Cubic Feet	Liters	28.32
Gallons	Liters	3.785
Ounces (fl.)	Cubic Centimeters	29.57
Quarts	Cubic Centimeters	946.4
Inches	Centimeters	2.54
Inches	Microns	2.54×10^4
Meters	Feet	3.28
Meters	Yards	1.09
Millimeters	Microns	10^3
Mils	Microns	25.4
Pounds Per Gallon	Specific Gravity	0.12

0007-SWP-000006590

BULKING VALUES OF PIGMENTS

	<u>Sp.Gr.</u>	<u>Gals. Per 100 Lbs.</u>	<u>Lbs. Per Solid Gal.</u>
Antimony Oxide	5.73	2.10	47.7
Barium Sulfate, barite	4.44	2.70	37.0
Barium Sulfate, blanc fixe	4.30	2.79	35.8
Basic Carbonate White Lead	6.70	1.79	55.9
Basic Sulfate White Lead	6.40	1.88	53.2
Calcium Carbonate, natural	2.72	4.41	22.7
Calcium Carbonate, precipitated	2.65	4.52	22.1
Calcium Silicate	2.90	4.14	24.2
Calcium Sulfate, anhydrous	2.93	4.10	24.4
Calcium Sulfate, gypsum	2.35	5.11	19.5
Clay, kaolin	2.60	4.62	21.7
Leaded Zinc Oxide, 12%	5.66	2.12	47.2
Leaded Zinc Oxide, 18%*	5.72	2.10	47.6
Leaded Zinc Oxide, 35%	5.83	2.06	48.6
Leaded Zinc Oxide, 50%	5.94	2.02	49.5
Mica, ave.	2.88	4.17	21.4
PERMOLITH	4.30	2.79	35.8
Silica, natural and amorphous	2.65	4.53	22.1
Silica, diatomaceous; ave.	2.15	5.58	17.9
Talc, fibrous	2.85	4.21	23.7
Titanium Dioxide, Anatase	3.88	3.09	32.4
Titanium Dioxide, Rutile	4.35	2.86	35.0
Titanium - Calcium, Anatase	3.13	3.84	26.1
Titanium - Calcium, Rutile	3.25	3.69	27.1
Zinc Oxide	5.61	2.14	46.7
Zinc Sulfide	4.00	3.00	33.3

* 18% Monobasic Lead Sulfate

0007-SWP-000006591

PROPERTIES OF COMMON SOLVENTS

<u>SOLVENTS</u>	<u>Sp.Gr.</u>	<u>Lbs. Per Gal.</u>	<u>Dist. Range C°</u>	<u>Flash Pt. C°</u>
Acetone	.794	6.62	55-57	-18 oo
Benzene, S	.880	7.33	79-81	-11 oo
n - Butyl Acetate	.867	7.23	115-135	25 oo
n - Butyl Alcohol	.809	6.74	115-118	34 oo
Butyl Lactate	.811	6.75	115-125	71 oo
Carbon Tetrachloride	1.60	13.3	77	-
Cellulose	.930	7.75	132-138	58 oo
Cellulose Acetate	.972	8.10	115-160	52 oo
Diacetone Alcohol	.940	7.83	190-230	78 oo
Dipentene	.853	7.10	168-188	41 oo
Ethyl Alcohol, 95%	.812	6.77	75-80	18 oo
Isopropyl Alcohol	.787	6.56	80-84	19 oo
Kerosene	.795	6.62	180-280	58 oo
Methyl Alcohol	.792	6.60	64-67	11 oo
Methyl Ethyl Ketone	.805	6.71	77-84	1 oo
Methyl Isobutyl Ketone	.802	6.68	110-120	16 oo
Methylene Chloride	1.34	11.1	40-61	-
Mineral Spirits	0.780	6.50	150-170	40 oo
Naphtha, High Flash	0.790	6.58	180-195	63 oo
Naphtha, VM and P	0.750	6.25	115-130	13 oo
Toluene	0.880	7.38	107-113	4 oo
Trichlorethylene	1.46	12.2	87	-
Turpentine	.864	7.20	150-180	29 oo
Xylene, 20°	.863	7.18	132-155	27 oo

0007-SWP-000006592

CONSISTENCY COMPARISON CHART

	SECONDS (EXCEPT AS INDICATED ¹)										
ASTM 0.15	5	10	19	29	38	48	58	67	76	86	95
ASTM 0.20		3	6	10	13	16	20	23	26	30	33
AULT AND WISONG B	5	11	22	33	44	54	65	76	87	97	108
FORD #3	42	84	166	250	313	416	500	583			
FORD #4	30	55	109	162	215	270	323	376	432	485	540
INTERCHEMICAL, 8°	10	20	40	60	80	100	120	140	160	180	200
PARLIN 15	5	10	20	29	38	47	56	65	74	84	93
PARLIN 20		3	6	10	14	17	21	24	27	30	33
PRATT AND LAMBERT B	10	20	41	62	82	103	123	144	164	185	205
PRATT AND LAMBERT F	5	10	20	30	41	51	61	71	82	92	102
SAYBOLT FUROL	48	96	192	286	382	476	570				
WESTINGHOUSE	30	59	117	176	235	294	353	411	470	529	588
ZANN G3		27	48	69	91	113	132	150	168	186	204
ZANN G4		19	32	45	58	71	89	106	124	142	160
STORMER-Cyl; 150 Gr.	27	49	91	135	178	223	265	289	353	396	440
STORMER, Krebs Units ²		38	61	71	79	85	90	94	98	102	105
GARDNER HOLT ² Units ²	D	E	F	U	V	W	X	-	-	Y	-
Sec.			5	8	11	14	17	20	24	27	30
VISCOSITY IN POISES	1	2	4	6	8	10	12	14	16	18	20

¹To Nearest Second

Taken from data of the Dallas Paint and Varnish Production Club.

See Official Digest, June 1952.

0007-SWP-000006593

PIGMENT, COLOR AND CHEMICAL DIVISION

THE SHERWIN-WILLIAMS COMPANY

ZONE OFFICES

300 West Lake Street, Chicago 6, Ill.
101 Prospect Avenue, Cleveland 1, Ohio
100 Park Avenue, New York 17, N. Y.
1450 Sherwin Avenue, Oakland 8, Calif.

LOCAL OFFICES

655 Beacon Street, Boston 15, Mass.
616 Main Street, Cincinnati 2, Ohio
2036 Woodward Avenue, Detroit 26, Mich.
1110 S. Main Street, Houston, Texas
363 S. Mission Road, Los Angeles 33, Calif.
325 N. Broad Street, Philadelphia 7, Pa.
515 Spruce Street, St. Louis 2, Mo.

EXPORT OFFICE -- 100 PARK AVE., NEW YORK 17, N. Y.

AGENTS IN

Argentina - Buenos Aires	Iran - Teheran
Austria - Vienna	Italy - Milan
Belgium - Brussels	Japan - Osaka, Tokyo
Bolivia - La Paz	Korea - Pusan
Brazil - Rio de Janeiro, Sao Paulo	Mexico - Mexico City
Canada - Montreal, Toronto	Netherlands - Amsterdam
Chile - Santiago	New Zealand - Auckland
Colombia - Medellin	Norway - Oslo
Cuba - Havana	Peru - Lima
Denmark - Copenhagen	Philippines - Manila
England - London	Portugal - Lisbon
France - Paris	South Africa - Johannesburg
Greece - Athens	Sweden - Stockholm
India - Bombay	Switzerland - Zurich
Uruguay - Montevideo	

0007-SWP-000006594