

DR. H. J. KIEFER
PRODUCT DEVELOPMENT REPORT
COATINGS AND RESINS GROUP LABORATORIES
JANUARY 1965

THE KIEFER COMPANY

GLD006862

RAW MATERIALS
PROPERTIES OF COLORED PIGMENTS

<u>Pigment</u>	<u>Advantages</u>	<u>Disadvantages</u>
<u>ORANGES</u>		
Benzidine Orange	High tinting strength. Free of toxic metals. Good chemical resistance. Soft texture.	High cost. Poor light fastness. Poor bleed resistance. Low hiding power.
Dinitraniline Orange	High tinting strength. Free of toxic metals. Good chemical resistance. Good masstone light fastness. Soft texture.	High cost. Poor tinting light fastness. Poor bleed resistance. Low hiding.
Orange RK (Vat Dye)	Excellent light fastness, even in pastels and metallics. Free of toxic metals. Excellent chemical resistance. High transparency for metallized polychromatic finishes. Excellent bake resistance.	High cost. Moderate color intensity. Fair bleed resistance.
Molybdate Orange	Low cost. High hiding. Non-bleeding. Good light fastness. Excellent outdoor durability. Good bake resistance. Easy grinding. Blends well with reds.	Contains lead. Discolors in presence of sulfides. Darkens in masstone on exposure. Poor alkali and soap fastness in pastels.
Chrome Orange	Low cost. Non-bleeding. Good bake resistance. Good light fastness.	Contains lead. Discolors in presence of sulfides. Darkens in masstone on exposure. Poor alkali and soap resistance in pastels. Sensitive to over-grinding. Poor gloss retention.

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<u>Pigment</u>	<u>Advantages</u>	<u>Disadvantages</u>
<u>YELLOWS</u>		
Yellow Iron Oxide	Low cost. High hiding, non-bleeding. Excellent light fastness. Good chemical resistance. Free of toxic metals.	Low in chroma. Low in tinting strength. Poor gloss retention. Fair suspension characteristics. Fair bake resistance.
Lead Chromate Yellow	Low cost. High hiding, non-bleeding. Good light fastness in pastels. Excellent outdoor durability. Good bake resistance. Soft texture.	Contains toxic metal. Discolors in presence of sulfides. Darkens in masstone on exposure. Poor alkali and soap fastness. Tends to be reactive in highly acid vehicles.
Zinc Yellow	Low cost. Metal protective.	Low tinting strength. Poor light fastness as a yellow. Poor alkali resistance.
Basic Zinc Chromate	Specific use in metal protective wash primer.	No color value.
Cadmium Yellow	High hiding. Non-bleeding. Excellent light fastness in deep shades. Excellent bake resistance.	Low tinting strength. Low color intensity. Poor gloss retention. Fair weathering characteristics. Poor tint light fastness. Sensitive to discoloration due to metal sulfides. Relatively high cost.
Hansa Yellow	High tinting strength. Free of toxic metals. Excellent light fastness in deep shades. Good light fastness in pastels. Soft texture. Good chemical resistance.	High cost. High oil absorption. Poor bleed resistance. Low hiding power.

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<u>Pigment</u>	<u>Advantages</u>	<u>Disadvantages</u>
<u>YELLOWS - cont'd.</u>		
Benzidine Yellow	High tinting strength. Free of toxic metals. Good mastone light fastness. Soft texture. Good chemical resistance. Excellent bake resistance. Good bleed resistance.	High cost. Low hiding power. High oil absorption.
Green Gold	Excellent light fastness in mastone and tint. High color intensity in tints and green blends. High transparency in metallics. Good bleed resistance. Good bake resistance.	High cost. Has very slight bleed in some systems.
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<u>GREENS</u>		
C.P. Chrome Green	Low cost. High hiding. Easy grinding. Non-bleeding. Good bake resistance.	Poor alkali resistance. Moderate light fastness. Tend to flood and float.
C.P. Chromium Oxide	Excellent light fastness. Excellent chemical resistance. Excellent bake resistance. Non-bleeding. High hiding power.	Low tinting strength. Low chroma. Somewhat abrasive. Poor gloss retention on exterior exposure.
Hydrated Chromium Oxide	High chroma. High transparency for metallics. Excellent chemical resistance. Excellent bleed resistance. Excellent light fastness.	Relatively difficult to disperse. Low tinting strength. Low hiding. Poor blister resistance.
Phthalocyanine Green	High chroma. High transparency for metallics. Excellent chemical resistance. Excellent bake resistance. Excellent light fastness. High tinting strength. Excellent bleed resistance.	High cost except in tints. Dark shades bronze on exposure.
PTA - PMA (Phosphotungstic-phosphomolybdic)	Very high tinting strength. Very high chroma.	High cost except in tints. Poor outdoor durability. Poor bleed resistance.

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PigmentBLUES

Iron Blues

Low cost. High tinting strength. Good durability and light fastness in masstone and dark tints. Excellent bleed resistance.

Disadvantages

Fair light fastness in light tints. Poor can storage stability in light tints in presence of oxidizable vehicles. Poor alkali resistance.

Phthalocyanine Blue

Very high tinting strength. High degree of color intensity. Excellent light fastness even in light tints. Excellent chemical resistance. Excellent baking resistance. Excellent bleed resistance.

High cost except in light tints. Tendency to bronze in dark shades. Special forms required for flocculation resistance.

Ultramarine Blue

Low cost. Good alkali resistance, except lime. Excellent heat resistance.

Very poor acid resistance. Low hiding power. Low tinting strength. Poor outdoor durability in all shades. Poor wetting in organic vehicles.

Indanthrone Blue

Good outdoor durability in all depths of shade. Good chemical resistance. Good bake resistance. Good bleed resistance.

High cost except in light tints. Moderate color intensity in tints.

P.T.A. Blue

High tinting strength. High color intensity.

High cost except in light tints. Poor outdoor durability, especially in tints. Poor bleed resistance.

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<u>Pigment</u>	<u>Advantages</u>	<u>Disadvantages</u>
<u>VIOLETS</u>		
Dibenzanthrone Violet (Vat Dye)	High tinting strength. Good light fastness at high dilution. Excellent acid and alkali resistance. Excellent bake resistance except in whites.	High cost. Fair bleed resistance. Poor high bake resistance in white finishes.
Quinacridone Violet	Have exceptional color brightness. Outstanding light fastness in tints. Excellent resistance to chemicals, acids, alkali, and soap. Excellent resistance to bleed. Excellent resistance to heat.	High cost.
Thioindigoid Maroon	Excellent chemical resistance. Excellent light fastness in dark shades. Good bake resistance. Good light fastness at high dilution.	High cost. Masstone bronze. Some varieties bleed in lacquer and aromatic solvents.
Mineral Violet	Excellent light fastness. Excellent bake resistance. Excellent acid resistance. Excellent bleed resistance. Low cost.	Very low tinting strength. Poor alkali resistance. Hard grinding.

REDS

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<u>Pigment</u>	<u>Advantages</u>	<u>Disadvantages</u>
<u>REDS</u>		
Red Iron Oxide	Low cost. High hiding. Non-bleeding. Excellent light fastness. Good chemical resistance. Excellent bake resistance.	Low in chroma. Poor gloss retention. Fair suspension characteristics.
Cadmium Red	High hiding. Non-bleeding. Excellent bake resistance. Excellent light fastness in deep shades.	Low tinting strength. Fairly low in chroma. Poor gloss retention on outdoor exposure - poor polish back. Sensitive to discoloration due to metal sulfides. Poor light fastness in pastels - outdoor exposure.
Toluidine Red	Relatively low cost. High color intensity. Excellent deep tone light fastness and outdoor durability. Easy grinding. Excellent acid and alkali resistance.	Poor bleed resistance. Danger of bloom in urea and melamine modified baking enamels. Moderate hiding power. Fair tint light fastness.
Para Red	Low cost. Good hiding power. Good acid and alkali resistance. Good deep tone light fastness.	Moderate color intensity. Poor bake resistance. Poor bleed resistance. Poor tint light fastness.
Chlorinated Para	Good deep tone light fastness. Moderate cost. Excellent acid resistance. Good alkali resistance. Easy grinding.	Poor bleed resistance. Poor tint light fastness.
Naphthol Red	Excellent acid and alkali resistance. High chroma. Easy grinding.	Low hiding power. Fair bleed resistance. Poor outdoor durability. Relatively expensive.

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<u>Pigment</u>	<u>Advantages</u>	<u>Disadvantages</u>
<u>REDS</u> - Cont'd.		
Lithol Red	Low cost. Good bleed resistance. Easy grinding. High chroma.	Poor light fastness. Poor soap fastness. Fair bake resistance.
Lithol Rubine	High chroma. Blends well with Molybdate Orange for low cost reds. Good bleed resistance. Good bake resistance. Easy grinding.	Low hiding power. Poor light fastness. Poor alkali and soap resistance.
B.O.N. Red	Very good masstone light fastness. Excellent bleed resistance.	Poor alkali and soap resistance. Fairly hard grinding.
Pyrazolone Red	Good bleed resistance. Excellent acid and alkali resistance. Easy grinding. Good bake resistance. Good masstone light fastness.	Low hiding. Poor light fastness in tints. Relatively expensive.
Quinacridone Red	Excellent light fastness. Excellent bleed, heat, and chemical resistance.	High cost except in tints.
Thioindigo Red	Excellent light fastness. Excellent acid and alkali resistance.	High cost.
PTA - PMA Reds	Good acid resistance. High chroma. Easy grinding.	Poor alcohol bleed. High cost. Poor tint light fastness. Fair bake resistance.
Mercadmiums	Brighter in masstone, stronger and cleaner in tints than cadmiums. Cheaper than cadmium and easier to disperse. Non-bleeding.	Outdoor durability not as good as cadmium. Low tinting strength.

PigmentMAROONS

Alizarine Maroon
(Dyestuff)

Very good light fastness. Good acid and alkali resistance. Excellent bleed resistance.

Low hiding. Relatively low chroma. Fair bake resistance. Poor durability.

Helio Bordeaux Maroons
(Calcium Toners)

Very good light fastness at masstone depth and is considered to have good permanency in relatively strong tints. Non-bleeding in enamel. Good hiding power.

Suitable for interior exposure only.

Cadmium Maroon

High hiding. Non-bleeding. Excellent light fastness in deep shades. Excellent bake resistance.

Low tinting strength. Fairly low in chroma. Poor gloss retention on outdoor exposure. Poor light fastness in pastels - outdoor exposure.

B.O.N. Maroon

Very good masstone light fastness. Excellent bleed resistance.

Poor alkali and soap resistance. Fairly hard grinding.

Toluidine Maroon

Relatively low cost. Excellent deeptone light fastness and outdoor durability. Easy grinding. Excellent acid and alkali resistance.

Poor bleed resistance. Danger of bloom in baking finishes. Moderate hiding power. Fair tint light fastness.

Mercadmium

Brighter in masstone, stronger and cleaner in tints than cadmiums. Cheaper than cadmium and easier to disperse. Non-bleeding.

Outdoor durability not as good as cadmium. Low tinting strength.

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M. W. MALAGA