Health & Safety Network

Pigment Toxicity Information (2017)

This chart is published as part of the **Pigment Health and Safety Quick Guide** (*AIC News*, November 2017) and is intended to assist conservators in assessing the risks associated with common dry pigments. It should be used in conjunction with other resources, including the Safety Data Sheet (SDS) for each material. References consulted for this chart and indicated at the end of each entry have been published separately. See Table 2: Hazards of Metals and Metal Compounds for health hazards related specifically to the metal and metal compounds found in pigments.

BLACKS

Pigment Identification				Toxicity Information		
Pigment	**Color Index**	**Alternate Naming**	**Compound Description**	**Routes of Entry**	**Carcinogenicity**	**General Toxicity Information**
Black Spinels	PBk26, PBk27, PBk28, PBk29	Manganese Ferrite Black (PBk26), Iron Cobalt Chromite Black (PBk27), Chromium Iron Nickel Black, Copper Chromite Black (PBk28), Iron Cobalt Black (PBk29)	Complex natural or synthetic oxides	Skin contact, Inhalation; Ingestion	Yes/Probable - compounds with chromium, cobalt, or nickel could have characteristics of those metals	Nickel and hexavalent chromium compounds have been classified as carcinogens by IARC: Hazards associated with chromium, nickel, cobalt, and manganese (refer to Table 2); Read manufacturer information in detail to understand components and risks[3,4,5,8,10,19a,24a]
Bone Black	PBk09	Animal Black, Ivory Black, Frankfurt Black	Charred animal bone (main elements Ca, P)	Inhalation		No significant hazard known[5,8,10]
Carbon Black	PBk06, PBk07	Lamp Black, Channel Black	Nearly pure amorphous carbon	Skin contact; Inhalation	Possible	May be harmful if inhaled or absorbed through the skin; May cause irritation; Carcinogenicity related to manufacturing process and small particle size[4, 8, 10. 17a, 25c]
Charcoal Black	PBk08	Birch Black, Mineral Black, Vegetable Black, Vine Black, Willow Black	Mainly carbon and silicates or iron oxides or other minerals	Inhalation		No significant hazard known; larger particle size[5,8,10]
Mars Black	PBk11	Iron Oxide Black, Black Iron Oxide, Magnetic Oxide	Iron oxide (Fe_3O_4) may contain Mn and other impurities	Inhalation	Not listed	Repeated or prolonged inhalation of dust may cause chronic irritation of respiratory tract; Hazards associated with iron (refer to Table 2)[5,8,10,19g,19h]
Slate Grey	PBk19		Magnesium and aluminum silicates as a natural mixture	Inhalation	Not listed	Repeated or prolonged inhalation of mineral powders may cause respiratory problems; Hazards associated with aluminum and magnesium (refer to Table 2)[19j,19k]

BROWNS

Burnt Sienna	PB6, PR101	Mars Orange, Mars Violet	Iron Oxide	Inhalation	Not classifiable	Repeated or prolonged inhalation of mineral powders may cause respiratory problems; Hazards associated with iron (refer to Table 2)[4,5,10,20a]
Burnt Umber	PBr07	Mars Brown, Raw Brown	Iron Oxides, possibly manganese silicates or dioxide	Skin contact; Ingestion; Inhalation	Not classifiable (Iron oxide)	Hazards associated with iron and manganese (refer to Table 2)[4,5,8,10]
Van Dyke Brown	PBr09	Cassel Brown	Treated Cassel earth with 80-90% organic materials and iron, alumina, and silica	Inhalation	Not classifiable (Iron oxide)	Repeated or prolonged inhalation of mineral powders may cause respiratory problems; Hazards associated with iron and aluminum (refer to Table 2)[4,5,8,10]

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BLUES

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Pigment	**Color Index**	**Alternate Naming**	**Compound Description**	**Routes of Entry**	**Carcinogenicity**	**General Toxicity Information**
Azurite	PB30	Mountain Blue, Blue Verditer	Natural copper containing mineral	Skin contact; Ingestion; Inhalation		Harmful if swallowed; Causes skin irritation and serious eye irritation; Hazards associated with copper (refer to Table 2)[5,8,10,18a,20b]
Cerulean Blue	PB35	Cobaltous Stannate	Cobaltous stannate; oxides of cobalt and tin	Skin contact; Ingestion; Inhalation	Possible/Yes	Hazards associated with cobalt and tin; May cause irritation[2,4,5,8,10]
Cobalt Blue	PB28	Thenard's Blue	Oxides of cobalt and aluminum or cobalt aluminate	Skin contact; Ingestion; Inhalation	Possible/Yes	Hazards associated with cobalt and aluminum (refer to Table 2); Repeated overexposure may cause eye, skin and respiratory tract irritation[2,3,5,8,10,16a]
Cobalt Turquoise	PB36	Cerulean Blue Chromate, Cobalt Chromite Blue, Cobalt Chromite Green	Oxides of cobalt and aluminum or cobalt chromite	Skin contact; Ingestion; Inhalation	Possible/Yes	Hazards associated with cobalt, chromium, and aluminum(refer to Table 2); Repeated overexposure may cause eye, skin and respiratory tract irritation[2,4,8,10]
Egyptian Blue	PB31	Alexandrian Blue	Copper-calcium-silicate	Skin contact; Ingestion; Inhalation		Harmful if swallowed; Hazards associated with copper (refer to Table 2)[5,8,10,19f]
Indigo	NB1		Indigofera tinctoria	Skin contact; Ingestion; Inhalation	Not listed	Mostly unknown; synthetic version may cause damage to organs through repeated/prolonged exposure[6,25d]
Manganese Blue	PB33		Barium manganate often with barium sulfate	Skin contact; Ingestion; Inhalation		Hazards associated with manganese and barium (refer to Table 2), which may affect central nervous system and lungs with overexposure[5,8,10,14a]
Ultramarine Blue	PB29	Lapis Lazuli	Natural or artificial minerals of sodium, aluminum, and silica. Sometimes contain sulfur	Inhalation		No significant hazards known[5,8,10,19l,19m]
Phthalocyanine Blue	PB15	Primary Blue, Phthalo Blue, Cyan Blue, Monstral Blue, Thalo Blue, Winsor Blue	Copper phthalocyanine	Skin contact; Ingestion; Inhalation	Possible (Rossol indicates pigment may be contaminated with PCBs and dioxins)	Limited data; May be harmful if inhaled, ingested or absorbed through the skin; May cause irritation; Hazards associated with copper (refer to Table 2)[5,23b,25j]
Prussian Blue	PB27	Milori Blue, Berlin Blue, Chinese Blue, Iron Blue, Paris Blue, Steel Blue	Ferric-ammonium ferrocyanide	Ingestion;		Only slightly toxic, but can emit highly toxic hydrogen cyanide gas when exposed to acid, high heat, or strong ultraviolet light [5,8,10,25e]
Smalt	PB32		Potassium cobaltous silicates of variable composition	Skin contact; Ingestion; Inhalation	Possible	Hazards associated with cobalt (refer to Table 2)[4,5,8,10]

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GREENS

Pigment Identification				Toxicity Information		
Pigment	**Color Index**	**Alternate Naming**	**Compound Description**	**Routes of Entry**	**Carcinogenicity**	**General Toxicity Information**
Chrome Green	PG15	Milori Green, Prussian Green	Lead Chromate, Ferric ferro cyanide	Skin contact; Ingestion; Inhalation	Yes	Known carcinogen, teratogen. Hazards associated with lead, chromium, and iron (refer to Table 2)[4,8,10,15b]
Chromium Oxide Green	PG17	Chrome Oxide Green, Olive Green, Permanent Green	Chromic (III) oxide	Skin contact; Ingestion; Inhalation	Possible	Hazards associated with chromium (III) (refer to Table 2); May cause allergic reaction or irritation; Hazardous in case of skin or eye contact (irritant), of ingestion, or of inhalation[4,8,10,23a]
Cobalt Green	PG19, PG50, PG26 (Blue-green)	Rinman's Green	Calcined Cobalt, Zinc and aluminum oxides, cobalt chromite	Skin contact; Ingestion; Inhalation	Possible/Yes	Hazards associated with cobalt, chromium, zinc and aluminum (refer to Table 2)[4,5,8,10]
Emerald Green	PG21, PG 22	Paris Green, Veronese Green, Scheele's Green (PG22)	Copper acetoarsenite; Cupric acetoarsenite (originally copper arsenite)	Skin contact; Ingestion; Inhalation	Yes	Highly toxic; Hazards associated with arsenic and copper (refer to Table 2)[4,5,8,10]
Green Earth	PG23		Hydrated iron, magnesium, aluminum and potassium silicates	Inhalation		Repeated or prolonged inhalation of mineral powders may cause respiratory problems; Hazards associated with iron, magnesium and aluminum (refer to Table 2)[5,10]
Phthalocyanine Green	PG07	Copper Phthalocyanine Green, Cyan Green, Monstral Green, Thalo Green	Polychlorinated copper phthalocyanine	Skin contact; Ingestion; Inhalation	Possible (Rossol indicates pigment may be contaminated with PCBs)	Limited data. May be harmful if inhaled, ingested or absorbed through the skin; May cause irritation; Hazards associated with copper (refer to Table 2)[8,10,25k]
Verdigris	PG20		Copper dibasic Acetate	Skin contact; Ingestion; Inhalation		Harmful; irritating; Hazards associated with copper (refer to Table 2)[5,10]
Viridian	PG18	Emerald Oxide of Chromium, Emeraude Green	Hydrated chromic oxide	Skin contact; Ingestion; Inhalation	Probable/Possible; Some versions may contain hexavalent chromium which is more easily absorbed into the body and a probable carcinogen	Hazardous in case of contact, ingestion, or inhalation; Hazards associated with chromium (III) (refer to Table 2); May cause allergic reaction or irritation[4,8,10,14a]

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REDS

Pigment Identification				Toxicity Information		
Pigment	**Color Index**	**Alternate Naming**	**Compound Description**	**Routes of Entry**	**Carcinogenicity**	**General Toxicity Information**
Alizarin Crimson	PR83	Madder, Alizarin, Crimson Madder, Rose Madder, Madder Lake	Lakes of 1,2-dihydroxyanthraquinone or insoluble anthraquinone pigment	Skin contact		Low acute toxicity; Chemically related to cancer-causing anthraquinone[5,8,10]
Aniline Red	PR04	Permanent Red	Chlorinated para-nitroaniline pigment	No data available on routes of exposure	Rossol indicates this may be weakly carcinogenic	Low acute toxicity[5,8,10,22a]
Cadmium Red; Cadmium Barium Red	PR108	Cadmium Scarlet, Cadmium Lithopone Red	Cadmium sulfide, cadmium selenide	Skin contact; Ingestion; Inhalation	Yes	Toxic material causing other toxic effects; Hazards associated with cadmium and selenium (refer to Table 2)[4,8,10,11a,25b]
Cadmium Vermillion Red	PR113	Cadmium mercury red	Cadmium sulfide, mercuric sulfide	Skin contact; Ingestion; Inhalation	Yes	Toxic material causing other toxic effects; Mutagen, teratogen, chronic toxicity; Hazards associated with cadmium and mercury (refer to Table 2)[4,10,25b,25i]
Cochineal Lakes	NR04	Cochineal Carmine, Carmine Naacarat	Natural dye obtained from insect Dactylopius coccus Costa; alum lake of caminic acid	Skin contact; Ingestion; Inhalation		No data; Quantitative data on toxicity is not available[8,10,12a]
Quinacridone Red	PR122	Quinacridone Maroon (PR106); Quinacridone Maroon B (PV42); Quinacridone Magenta (PR202); Quinacridone Red (PR122, PV19)	Organic pigments	Skin contact		May cause dermatitis; No data for long-term exposure[5,8,10]
Red Lead	PR105		Lead Tetroxide	Skin contact; Ingestion; Inhalation	Yes	Toxic material causing other toxic effects; Hazards associated with lead (refer to Table 2)[5,8,10,23c]
Venetian Red	PR102	Persian Gulf Oxide, Red Chalk, Spanish Oxide	Iron Oxide, silica, alumina, lime, and magnesia	Inhalation	Not classifiable (Iron oxide)	Repeated or prolonged inhalation of mineral powders may cause respiratory problems; Hazards associated with iron, aluminum and magnesium (refer to Table 2)[5,8,10]
Vermillion	PR106	Chinese Vermilion, Cinnabar, English Vermilion	Mercuric Sulfide	Skin contact; Ingestion; Inhalation	Not classifiable	Toxic Material Causing Other Toxic Effects, Skin sensitizer; Hazards associated with mercury (refer to Table 2)[4,5,8,10,25i]

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ORANGES

Pigment Identification				Toxicity Information		
Pigment	**Color Index**	**Alternate Naming**	**Compound Description**	**Routes of Entry**	**Carcinogenicity**	**General Toxicity Information**
Cadmium Orange, Cadmium Barium Orange	PO20; PO20:1	Cadmium Lithopone Orange	Cadmium sulfide, cadmium selenide, barium sulfate	Skin contact; Ingestion; Inhalation	Yes	Toxic material causing other toxic effects; Carcinogen; Hazards associated with cadmium, selenium, and barium (refer to Table 2)[4,8,10,11a,25b]
Chrome Orange	PO21		Basic lead chromate	Skin contact; Ingestion; Inhalation	Yes	Carcinogen; may damage fertility or the unborn child; Hazards associated with lead and chromium (refer to Table 2)[8,10,25f]
Mercadmium Colours	PO23		Cadmium sulfide, mercuric sulfide complexes	Skin contact; Ingestion; Inhalation	Yes	Toxic material causing other toxic effects; Mutagen, teratogen, chronic toxicity; Hazards associated with cadmium and mercury (refer to Table 2)[4,10,25b,25i]

VIOLETS

Cobalt Violet	PV14	Violet Phosphates	Cobalt arsenite (historic), Cobalt phosphate	Skin contact; Ingestion; Inhalation	Yes	Fatal if swallowed; fatal in contact with skin; toxic if inhaled; Hazards associated with cobalt and arsenic (refer to Table 2)[4,5,8,10,15c]
Dioxazine Violet	PV23	Carbazole Violet; Dioxazine Purple; Permanent Violet	Dioxazine Violet [8,18-Dichloro-5,15-diethyl-5,15-dihydrodiindolo(3,2-b:3',2'-m)triphenodioxazine]	Skin contact, Ingestion	Possible (Rossol indicates pigment may be contaminated with dioxins)	Described as non-irritating, but little data available. Additives to some versions may cause allergic reactions[7,8,10,19d,19e]
Manganese Violet	PV16	Fast Violet, Nurnberg Violet, Permanent Mauve, Permanent Violet	Manganese Ammonium Pyrophosphate	Skin Contact; Inhalation	Not listed	Overexposure to manganese may affect central nervous system and lungs; Hazards associated with manganese (refer to Table 2)[5,8,10,16b,21a]

WHITES

Barium White	PW21, PW22	Barytes, Blanc Fixe	Barium Sulfate	Inhalation; Ingestion	Not listed	No significant hazard known[5,8,10]
Chalk	PW18	Whiting	Calcium carbonate	Inhalation	Not listed	No significant hazard known[5,8,10]
Lead White	PW01	Cremnitz White, Flake White, Foundation White, Silver White	Basic lead carbonate, sometimes with small amounts of extenders	Skin contact; Ingestion; Inhalation	Probable	Toxic material causing other toxic effects; Hazards associated with lead (refer to Table 2)[4,5,8,10,25g]
Lead White	PW02	Basic Lead Sulfate White	Basic lead sulfate, sometimes with a small amount of zinc oxide	Skin contact; Ingestion; Inhalation	Probable	Toxic material causing other toxic effects; Hazards associated with lead (refer to Table 2)[4,5,8,10,25h]
Titanium White	PW06	Titanium Oxide	Titanium dioxide	Skin contact; Ingestion; Inhalation	Yes	Carcinogen (inhalation); Hazards associated with titanium (refer to Table 2)[2,4,5,8,10,15e]
Zinc White	PW04	Chinese White, Permanent White	Zinc oxide	Skin contact, Ingestion; Inhalation	Not listed	No significant hazard known when pure, but may contain small amounts of lead[5,8,10,15f]

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Pigment Toxicity Information (2017)

YELLOWS

Pigment Identification				Toxicity Information		
Pigment	**Color Index**	**Alternate Naming**	**Compound Description**	**Routes of Entry**	**Carcinogenicity**	**General Toxicity Information**
Barium Yellow	PY31	Lemon Yellow	Barium chromate	Skin contact; Ingestion; Inhalation	Yes	Toxic material causing immediate and serious toxic effects; Hazards associated with chromium and barium (refer to Table 2)[8,10,25a]
Cadmium Yellow, Cadmium Barium Yellow	PY35, PY37	Aurora, Cadmium Primrose , Cadmium Lithopone Yellow	Cadmium sulfide, cadmium selenide, barium sulfate, zinc sulfide	Skin contact; Ingestion; Inhalation	Yes	Toxic material causing other toxic effects; Hazards associated with cadmium, selenium, barium and zinc (refer to Table 2)[4,5,8,10,11a,25b]
Chrome Yellow	PY34	Chrome Lemon, Lemon Chrome Yellow, Primrose, Primrose Yellow, Yellow Chrome Orange	Lead chromate, sometimes with lead sulfate	Skin contact; Ingestion; Inhalation	Yes	Toxic material causing other toxic effects; Hazards associated with lead and chromium (refer to Table 2)[4,5,8,10,25f]
Hansa Yellow	PY74 (there are a number of related pigments)	Studio Yellow, Brilliant Yellow, Dalamar Yellow	Insoluble azo pigments	Inhalation		Low toxicity; No data on chronic hazards; Related pigments may have different toxicological properties[1,5,8,10,19b,26]
Lead Tin Yellow	None	Massicot	Lead tin oxide or lead stannate	Skin contact; Ingestion; Inhalation	Yes	May damage fertility and the unborn child; may cause damage to organs through prolonged or repeated exposure[4,8,19i]
Yellow Ochre	PY42, PY43	Ochre, Raw Sienna, Sienna, Yellow Ochre, Yellow Iron Oxide, Mars Yellow	Iron oxides, Natural yellow earth	Inhalation	Not classifiable	Repeated or prolonged inhalation of mineral powders may cause respiratory problems; Hazards associated with iron (refer to Table 2)[4,5,8,10,19c]
Naples Yellow	PY41	Lead Antimonate, Antimony Yellow	Lead antimonate, sometimes with zinc and bismuth oxides	Skin contact; Ingestion; Inhalation	Yes	May damage fertility and the unborn child; may cause damage to organs through prolonged or repeated exposure; Hazards associated with lead and antimony (refer to Table 2)[4,5,8,10,13a]
Orpiment	PY39	King's Yellow, Realgar	Arsenic trisulphide (historic), sometimes lead chromate	Skin contact; Ingestion; Inhalation	Yes	Chronic health hazard; Hazards associated with arsenic, lead and chromium (refer to Table 2)[4,5,8,10,15a]
Strontium Yellow	PY32	Strontium Chromate Yellow, Lemon Yellow	Strontium chromate	Skin contact; Ingestion; Inhalation	Yes	Toxic material causing immediate and serious toxic effects; Hazards associated with chromium (refer to Table 2)[4,5,8,9,10,15d]
Zinc Yellow	PY36		Zinc chromate	Skin contact; Ingestion; Inhalation	Yes	Hazards associated with chromium, zinc, and barium (refer to Table 2); Harmful if swallowed, may cause an allergic skin reaction[4,5,8,10,11b]