Additives Used in the Platinum Process

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The following tables list many of the additives described in the photographic literature for use by photographers and manufacturers of platinum and palladium papers to manipulate the appearance of the image and, in some cases, the tone of the paper. Typically, additives were used to impart desired aesthetic qualities, for example, to change the image hue or adjust the contrast of an image. In some cases, practitioners were warned of possible deleterious effects of an additive on image permanence, such as when salts of mercury were incorporated. These tables have been organized according to when the chemicals were added to the photographic paper: as part of the sensitizer; as an ingredient in the developer; or to the finished print as a postprocessing treatment. While the references are not exhaustive, the frequency with which particular additives were cited can suggest important trends about their use by photographers or manufacturers. Scientific analysis to determine the composition of a photograph and knowledge of photographic manufacture and working practices are essential in any effort to determine how the presence of additives might have influenced the appearance and condition of a print.

Francis Watts Lee, [*portraits of an unidentified woman*], c. 1900–1910. Platinum prints in various dimensions, 19 × 12 cm–21 × 17 cm. Library of Congress, Prints and Photographs Division, Gift of William Watts Lee and Family, PR 13 CN 2015:052. These platinum prints demonstrate how photographer Francis Watts Lee (1867–1945) achieved a wide variety of image tones by modifying the standard sensitizer and developer solutions and by locally applying glycerine-diluted developer with a brush.

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Table 1 | Additives to Sensitizer for Platinum Prints

Additive	Visual Effects	Processing Temperature	Remarks	References
Copper chloride	Warm tone	Hot/cold	—	H. C. Jones 1904, 47–48.
Dichromate (as ammonium or potassium)	Controls contrast	Cold	Reduces the sensitivity and therefore speed of the paper	[Tennant] 1899, 331; Ward 1909, 144; Gottlieb 1995, 21–22.
Gold chloride	Better contrast from thin negative	Cold	Discussion of whether gold chloride in the sensitizer makes cold development paper possible	Hutchings 1893, 56; Stebbins 1893.
Iron (as chlorate or citrate)	N/A	Hot	Improvement from Willis's Patent 1117 (1880)	Willis 1880; Hoppé 1911, 216; Gottlieb 1995, 12.
Lead (as nitrate, oxalate, or chloride)	Warmer black to sepia tone	—	—	Willis 1873; Willis 1876; Willis 1878; Willis 1880; Willis 1887a; Willis 1887b; Warren 1897, 472; Engelmann 1904, 27–28; Jarman 1907, 97; Hoppé 1911, 216; Neblette 1942, 694–95; Nadeau 1994, 30; Gottlieb 1995, 12.
Mercury (usually as chloride, but one reference each as oxide, citrate, and dichromate)	Sepia tone, warm black, brown	Hot/cold	Coating of sensitizer containing mercury used by platinum paper manufacturers to produce sepia papers	Willis 1878; Willis 1887a; Willis 1887b; Stieglitz 1892, 494; Abney and Clark 1895, 89–90; Ardaseer 1895, 92; "Printing-Out Platinotype Process" 1897, 520; Warren 1897, 472; Chandler and Scandlin 1899a, 183; [Tennant] 1899, 326, 331; "Editorial Notes" 1902; Engelmann 1904, 27–28; H. C. Jones 1904, 44; Ward 1909, 144–45; Nadeau 1994, 30, 63.
Palladium (as unspecified salt)	N/A	—	Used to achieve sepia tone but found not satisfactory	"Printing-Out Platinotype Process" 1897, 520.
Platinum bromide	N/A	Hot	—	Willis 1876.
Potassium chlorate	Controls contrast	Hot	—	Hoppé 1911, 216–17; Gottlieb 1995, 21.
Silver nitrate	N/A	Hot	—	Willis 1876.

N/A = not applicable; — = no relevant information found.

93 Alice Carver-Kubik, Saori Kawasumi Lewis, Andrew Robb, and Erin L. Murphy, "Additives Used in the Platinum Process," in *Platinum and Palladium Photographs: Technical History, Connoisseurship, and Preservation*, ed. Constance McCabe (Washington, D.C.: American Institute for Conservation of Historic and Artistic Works, 2017), 92–97.

Table 2 | Additives to Potassium Oxalate Developer for Platinum Prints

Additive	Visual Effects	Processing Temperature	Remarks	References
Bromide (as potassium bromide)	True sepia, also warmer or colder tones possible, for damp paper	—	—	Warren 1897, 474; [Tennant] 1899, 344; "Artura Double Re-Development" 1908.
Copper (as chloride or sulfate)	Sepia tone, warm black to red chalk tones	Hot (170°F–200°F) (chloride) /cold	Tone dependent on developer temperature (chloride) Cold development for sepia tones; used with potassium oxalate and ammonium monophosphate	"Developer for Sepia Brown" 1885; Burbank 1889, 64; [Ward] 1899a, 278; Jerome 1907; Ward 1909, 147; Hoppé 1911, 219.
Dichromate (as ammonium or potassium)	Better contrast from thin negative	—	Ammonium dichromate preferable to potassium dichromate	"Improving Platinotype Prints" 1905; "Platinotype Printing" 1905; Schriver and Cummings 1908, 177; Anderson 1917, 149; Anderson 1939, 194, 206; Gottlieb 1995, 22.
Iridium chloride	N/A	—	Possible to use iridium in place of platinum	Willis 1878.
Iron (as potassium ferricyanide)	True sepia, also warmer or colder tones possible	—	—	"Artura Double Re-Development" 1908.
Lead (as oxalate, acetate, or unspecified salt)	Warm black to red chalk tones	—	Lead said to contribute to a better reduction action	Willis 1887b; [Ward] 1899a, 278; Engelmann 1904, 27–28; Hoppé 1911, 221.
Mercury (as chloride or unspecified salt)	Sepia, warm black, brown, brick red tones	Cold/hot	Dilute clearing solution (i.e., 1:300) often recommended to avoid the loss of sepia tone; clearing solution 1:50 recommended to produce more stable prints Used with potassium phosphate and processed hot for cold brown tones; citric acid added for cold sepia; excess mercury added and hot processing for brick red	Willis 1878; Willis 1880; Willis 1887a; Willis 1887b; Stieglitz 1892, 496; Stieglitz 1893; Abney and Clark 1895, 91–92; Ardaseer 1895, 92–93; Cox 1895, 88; Warren 1897, 472; [Tennant] 1899, 339, 341, 342; [Ward] 1899a, 278; Adamson 1900, 204–5, 208; "Tones on Platinum Paper" 1901, 128; Cadby 1904, 20, 22; Cummings and Lambert 1904, 60; Engelmann 1904, 27–28; H. C. Jones 1904, 44; Walton 1904, 36; Schriver and Cummings 1908, 191–92; Ward 1909, 144–47; Hoppé 1911, 221; Anderson 1917, 150; "Degrees of Permanence" 1918, 76; Wheeler 1930, 144; Anderson 1938; Anderson 1939, 204–5; Neblette 1942, 694, 695, 696; Mortimer 1951, 513; Nadeau 1994, 63.
Platinum (as unspecified salt)	N/A	—	Used with paper sensitized without platinum Potassium chloroplatinite	Willis 1887a; Willis 1887b; Engelmann 1904, 27; Hoppé 1911, 221.
Potassium (as phosphate or oxalate)	Purple brown, cold brown, brown black tones	Warm (70°F) to hot (160°F–180°F)/cold	Used with sepia paper Hot processing for purple brown tone; used with mercury dichromate and processed hot for cold brown tones Cold development for sepia tones with potassium oxalate; used with ammonium monophosphate and copper sulfate	[Tennant] 1899, 341; [Ward] 1899b, 310; "Tones on Platinum Paper" 1901; Walton 1904, 36; Hoppé 1911, 218.
Sepia solution (proprietary)	Sepia tone, increased contrast	—	Willis & Clements Sepia Solution marketed for use with Willis & Clements Sepia Paper Angelo Sepia Solution marketed for use with Angelo Sepia Paper	[Tennant] 1899, 339; Eastman Kodak 1907, 125; Schriver and Cummings 1908, 185, 187.
Sodium carbonate, alum	N/A	Cold	Used for old or damp paper	Brown 1888; [Tennant] 1899, 338, 344.
Special developing salts (proprietary)	Sepia tone	Hot (150°F–180°F)/cold	Used hot with Willis & Clements Sepia Paper; used cold with Angelo Sepia Paper	Holding 1904, 14; Schriver and Cummings 1908, 185, 187.
Zinc (as oxalate)	Warm brown	—	—	Jerome 1907; Hoppé 1911, 218.

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Table 3 | Postprocessing Toner for Platinum Prints

Additive	Visual Effects	Processing Temperature	Remarks	References
Bromide (as potassium bromide)	Intensification	—	—	"Jottings from Germany" 1894.
Chromium (as potassium dichromate)	Yellow-brown highlights	—	Used for tinting of the paper by exposure to light	[Ward] 1899a, 278; Schriver and Cummings 1908, 177.
Copper (as chloride)	Bright sepia tones	Hot	—	"Sepia-Tones for Platinotype Prints" 1885.
Gold chloride	Intensification, blue, blue-black tones	—	Lead nitrate included in some recipes; used with glycerine	Hutchings 1893, 55; Stebbins 1893; Dollond 1894; Abney and Clark 1895, 14, 96, 157; Dollond 1895, 134; Warren 1897, 473; Chandler and Scandlin 1899b; Rapp 1899, 311; [Tennant] 1899, 349; [Ward] 1899b, 310; Wall 1902; Cummings and Lambert 1904, 50; H. C. Jones 1904, 47–48; McIntosh 1905, 482–83; Hoppé 1911, 221.
Hydrochloric acid	Blue, green tones	—	Used after iron toner to give blue tones	Rapp 1899, 310; [Tennant] 1899, 349.
Iron (as ammonium iron(III) sulfate, ferrous oxalate, iron chloride, or iron sulfide)	Intensification, blue (Prussian blue), blue-black, green tones	—	Ammonium iron(III) sulfate and potassium ferricyanide used together to produce blue tones; ferrous oxalate used following a uranium toning bath producing blue tones; iron chloride and iron sulfide used following a uranium toning bath to produce green tones	Hübl 1894; "Jottings from Germany" 1894; Warren 1897, 473; Rapp 1899, 310; [Tennant] 1899, 348, 349; [Ward] 1899a, 278; Cummings and Lambert 1904, 51.
Iron (as potassium ferricyanide)	Sepia brown, red tones	—	Used in uranium toner	Hübl 1894; Ardaseer 1895, 94; Warren 1897, 472; Eastman Kodak 1898, 70–71; Rapp 1899, 310; [Tennant] 1899, 347, 349; [Ward] 1899a, 278; [Ward] 1899b, 309; Adamson 1900, 206–7; Cummings and Lambert 1904, 51; H. C. Jones 1904, 47–48; Eastman Kodak 1907, 121–33; Schriver and Cummings 1908, 190–91; Hoppé 1911, 220.
Lead nitrate	Intensification, blue, blue-black tones	—	Used in some gold toner and intensifier recipes	Rapp 1899, 311; Cummings and Lambert 1904, 51; McIntosh 1905, 484.
Mercury (as mercury chloride or mercury iodide)	Intensification, warm sepia	Hot	Used in some uranium toner recipes	[Tennant] 1899, 347; [Ward] 1899a, 278; Adamson 1900, 206–7; Cadby 1904.
Platinum (potassium chloroplatinite, platinum(IV) chloride, or platinum dichloride)	Intensification, warm black tones	—	Used for prints intensified with silver nitrate to increase stability	Vogel 1887; Warren 1897, 473; [Tennant] 1899, 350; [Ward] 1899a, 278; Cummings and Lambert 1904, 50; Walton 1904, 36; McIntosh 1905, 482; Hoppé 1911, 220.
Silver nitrate	Intensification, red-brown tones	—	Variety of tones possible with subsequent intensification Often followed by a toning bath of platinum, gold, uranium, or mercury	Abney and Clark 1895; Warren 1897, 474; Chandler and Scandlin 1898; Rapp 1899, 310; [Ward] 1899a, 278; Cummings and Lambert 1904, 49; H. C. Jones 1904, 47–48; McIntosh 1905, 480–81.
Sodium formate	Intensification	—	Used with platinum perchloride	[Ward] 1899a, 278; Hoppé 1911, 220.
Tannins (plant extracts, i.e., aloes, catechu, chestnut bark, sumac, coffee, tea, and tannic acid)	Brown, sepia, gray–green tones, yellow–brown highlights	Hot	Catechu toning also known as Packham's toning; coffee, tea, and aloes also used to tint the paper	Maclean 1895, 135; Packham 1895a, 356–61; Packham 1895b; Hinton 1897, 89; Warren 1897, 473; [Tennant] 1899, 346; [Ward] 1899a, 278; Ward 1899b, 310; Cummings and Lambert 1904, 62–63; H. C. Jones 1904, 47–48; Mitchell 1907; "Artura Double Re-Development" 1908; B. Jones 1912, 521.
Uranium nitrate	Sepia, brown, red–brown, red, dark red, blue, green tones	—	Used with potassium ferricyanide, ammonium thiocyanate, and glacial acetic acid after processing or after intensification; used with mercury for green tones; used following mercury developer for red-brown tones	Payne 1892; Stieglitz 1893; Hübl 1894; Abney and Clark 1895; Ardaseer 1895, 94; Warren 1897, 472; Eastman Kodak 1898, 70–71; Rapp 1899, 311; [Tennant] 1899, 347, 349; [Ward] 1899a, 278; [Ward] 1899b, 310; Adamson 1900, 206–10; Wall 1902, 515; Cummings and Lambert 1904, 51; "Industrial Notes" 1904; H. C. Jones 1904, 47–48; McCorkle 1906; Eastman Kodak 1907, 70–71; Mitchell 1907; Schriver and Cummings 1908, 190–91; Jarman 1909; Hoppé 1911, 220; [Tennant] 1911, 337, 338, 339, 392.

— = no relevant information found.

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