Table of Select Pigments

Pigment (common name)	Geographical Areas of production or utilization	Origin	Date of discovery | Period of utilization	How can you identify the pigment?		
				Technical Details *Analytical techniques used for identification*	Imaging	
					UVL	FCIR
BLUES						
Azurite	Central and Western Europe, China, Japan, Mesoamerica	Mineral	Discovered by Ancient Egyptians Used as paint pigment as early as the Fourth Dynasty in Egypt (2500s BC), but it was not widely used in Egypt or the classical world due to the availability of the synthetic copper pigment, Egyptian blue. Artificially made starting in the 1600s. Replaced when Prussian blue was introduced at the beginning of the 1700s. Azurite was a very important pigment in European painting throughout the Middle Ages and Renaissance. Also an important pigment in East Asia, widely used in wall paintings in Central China and in Ukiyo-e paintings in Japan.	• Raman • UV/VIS/IR • FTIR XRF can be used to detect copper	No	Dark Blue
Egyptian Blue	Ancient Egypt, West Asia, Ancient Greece, Mesopotamia, Roman Empire, Central Europe	Synthetic *One of the oldest synthetic pigments and considered to be the first synthetic pigment.*	Discovered in antiquity (Egyptians) and used until the Roman era (antiquity). Invention of the manufacturing process during the first dynasties of ancient Egypt, beginning about 3100 B.C.	• Raman • FTIR	n/a	n/a

Indigo	China, India, Japan, Mesopotamia, Egypt, Britain, Mesoamerica, Peru, Iran, and West Africa	Vegetal (plant-based)	Discovered in antiquity and has continued to be used. Used from circa 3500 b.c. - Today. Synthetic, commercially available in 1897 and replaced natural coloring matter	• Raman • FTIR	No	Red
Prussian blue	Europe, Asia (s. XVIII). Later extended to the rest of the world.	Synthetic	Discovered in Germany around 1704. Available to artists by 1724 and has been very popular since its discovery.	• Raman • FTIR XRF can identify iron	No	Black
YELLOWS						
Cobalt Yellow	Europe, later extended to the rest of the world.	Synthetic	Thought to be discovered in Breslau, Poland in 1848. Introduced as a pigment in 1852, replacing Gamboge (an Asian yellow gum). It remained popular until the late 1800s when less expensive pigments like cadmiums were introduced. Still in use.	• Raman • FTIR	No	Blue
Indian Yellow	India, Europe	Animal	Discovered in the 1400s and used until 1883. The pigment was made from the urine of cows fed only mango leaves and water. However, this causes the cows to become extremely undernourished. In the early 1900s, laws prohibited the production of the pigment.	• Raman • FTIR	Yellow	Pale Red
Orpiment	Ancient Egypt, Mesopotamia, India, Japan, China, Central Asia. Arrives to Venice during the Renaissance	Mineral & Synthetic **Synthetic orpiment is very poisonous*	Discovered in antiquity (Egyptians), used as early as the 3100 B.C. until the end of the 1800s. Both natural and synthetic were used until the end of the 1800s.	• Raman	No	Pale White
REDS						

Cochineal	Mexico, later extended to Europe and Northern Africa	Insect	Used from the 1500s until the present. Made from cochineal beetle, native to the New World (mostly Central and South America). Used by Aztecs for dyeing and painting. Following the Spanish conquest in the 1500s, it was brought to Europe.	• Raman • FTIR	Dark Red	
Red Lead	Byzantine Empire, Persia, Roman Empire; Later in Europe, China, and Central Asia	Synthetic *One of the earliest pigments to be artificially made.*	Used from the 1300s through the 1800s. Used by Byzantine and Persian illuminators and European manuscripts and paintings. No longer manufactured because of its toxicity.	• Raman	Dark Red	Yellow-Brown
Vermilion	China, Ancient Greece, Roman Empire, Spain, Japan	Mineral & Synthetic	Discovered in antiquity and used until present, though scarcely due to its toxicity. Synthetic, discovered in the 700s and used until the 1800s. • Dry-process may have been invented by the Chinese around the early 1600s • Wet-process discovered in Germany in 1687 Used up until the discovery of cadmium red.	• Raman • UV/VIS/IR • FTIR	Dark Blue	Yellow
WHITES						
Lead white	Europe, Egypt, Greece, Rome, Indus Valley, China	Synthetic *One of the oldest synthetically produced pigments.*	Used as early as 400 BC. The most important white pigment, and the only white pigment used in European easel paintings until the 1800s. Manufacture was restricted in the 1800s due to lead being poisonous. Widely replaced by titanium dioxide in the 1900s.	• Raman • FTIR	Pale White	White
Shell white	Unique to Japan	Calcium Carbonate *Made of Crushed seashells.*	Used in Japan since the 1400s and 1500s when it replaced clay as the common white pigment.	Analytical techniques used for identification:		

[1]Common chemical name
[2] IUPAC name.

Sources:

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Roy, Ashok, ed., Artists Pigments: A Handbook of their History and Characteristics, Vol. 2, National Gallery of Art, Washington, D.C., 1993.

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All chemical structures and names were taken from PubChem, except for the structure of calcium copper tetrasilicate (Egyptian Blue), which was taken from ChemTube 3D:

Kim, Sunghwan et al. "PubChem 2023 update." Nucleic Acids Res. vol. 51,D1 (2023): D1373-D1380. doi:10.1093/nar/gkac956. & https://pubchem.ncbi.nlm.nih.gov. Retrieved from August 4th, 2023 – August 9th, 2023.

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